BRITISH STANDARD

Code of practice for the operation of fire protection measures –

Part 3: Electrical actuation of pre-action watermist and sprinkler systems

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Contents

Summary of pages

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

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Foreword

Publishing information

This part of BS 7273 is published by BSI and came into effect on 31 January 2008. It was prepared by Subcommittee FSH/12/4, *Automatic operation of fire protection*, under the authority of Technical Committee FSH/12, *Fire detection and alarm systems*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This part of BS 7273 supersedes BS 7273-3:2000, which is withdrawn.

Relationship with other publications

BS 7273 is published in a series of parts:

- Part 1: *Electrical actuation of gaseous total flooding extinguishing systems*;
- Part 2: *Mechanical actuation of gaseous total flooding and local application extinguishing systems*;
- Part 3: *Electrical actuation of pre-action watermist and sprinkler systems*;
- Part 4: *Actuation of release mechanisms for doors*;
- Part 5: *Electrical actuation of watermist systems*.

Parts 1 and 2 give recommendations for the electrical and mechanical actuation of gaseous fire extinguishing systems respectively. Part 4 gives recommendations for the actuation of release mechanisms for doors. Part 5 provides recommendations for electrical actuation of watermist systems (other than pre-action watermist systems). This current part of BS 7273 provides recommendations for the electrical actuation of pre-action watermist and sprinkler systems.

Recommendations for the design, installation, commissioning and maintenance of fire detection and fire alarm systems are given in BS 5839-1. Recommendations for the design, installation, commissioning and maintenance of sprinkler systems are given in BS EN 12845. Recommendations for the design, installation, commissioning and maintenance of watermist systems will be given in DD 8489-1, which is currently in preparation. It is anticipated that an amendment will be issued to BS 7273-3 when DD 8489-1 is published.

Information about this document

This is a full revision of BS 7273-3. The principal changes from the previous edition are as follows.

- The scope of the standard now includes pre-action watermist systems.
- References have been updated.
- Terminology has been brought into line with related standards, particularly in relation to control and indicating equipment.
- Reference is made to DD 8489-1 and BS EN 12845.

Use of this document

As a code of practice, this part of BS 7273 takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

Hazard warnings

CAUTION. Certain electromagnetic fields, such as those generated by radio frequency transmitters, could potentially trigger the charging of pre-action watermist and sprinkler systems or cause them to malfunction. In such cases it is appropriate to take action to minimize the risk of unintentional charging of the pipework due to the electromagnetic field radiated by such apparatus. It might be necessary to seek specialist advice.

Presentational conventions

The provisions in this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller, italic type, and does not constitute a normative element.

Contractual and legal considerations

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

Compliance with a British Standard cannot confer immunity from legal obligations.

Introduction

A pre-action sprinkler system is a fire extinguishing system which consists of a sprinkler system and an electrical detection system with water held back by the pre-action valve and pressurized air in the sprinkler pipework. In the event of the operation of the electrical detection system, the pre-action alarm valve operates and allows water into the sprinkler pipework. Pre-action watermist systems work on the same principle.

Two generic forms of operation exist: type A and type B.

In the case of a type A pre-action system, water will only enter the pipework following the operation of the detection system. Accordingly, type A pre-action systems will only discharge water onto the seat of the fire when both the electrical detection system and any automatic sprinkler head or watermist nozzle has operated. Any accidental damage to the sprinklers/watermist nozzles, or pipework, will not cause water to be discharged.

Type A systems are, therefore, suitable for use in situations in which:

- there is high potential for mechanical damage to the system; or
- the probability of mechanical damage might not be high, but the consequences of inadvertent water damage would include serious damage to sensitive contents and/or major interruption to business.

Type B pre-action systems will discharge water onto the seat of a fire when any sprinkler or watermist nozzle operates, whether or not the electrical detection system has operated. However, normally the fire detection system will operate before a sprinkler head or watermist nozzle so that, in effect, the system is “wet” at the time of watermist/sprinkler operation. Type B systems are normally used in circumstances in which there is a need to speed up the operation of a dry system.

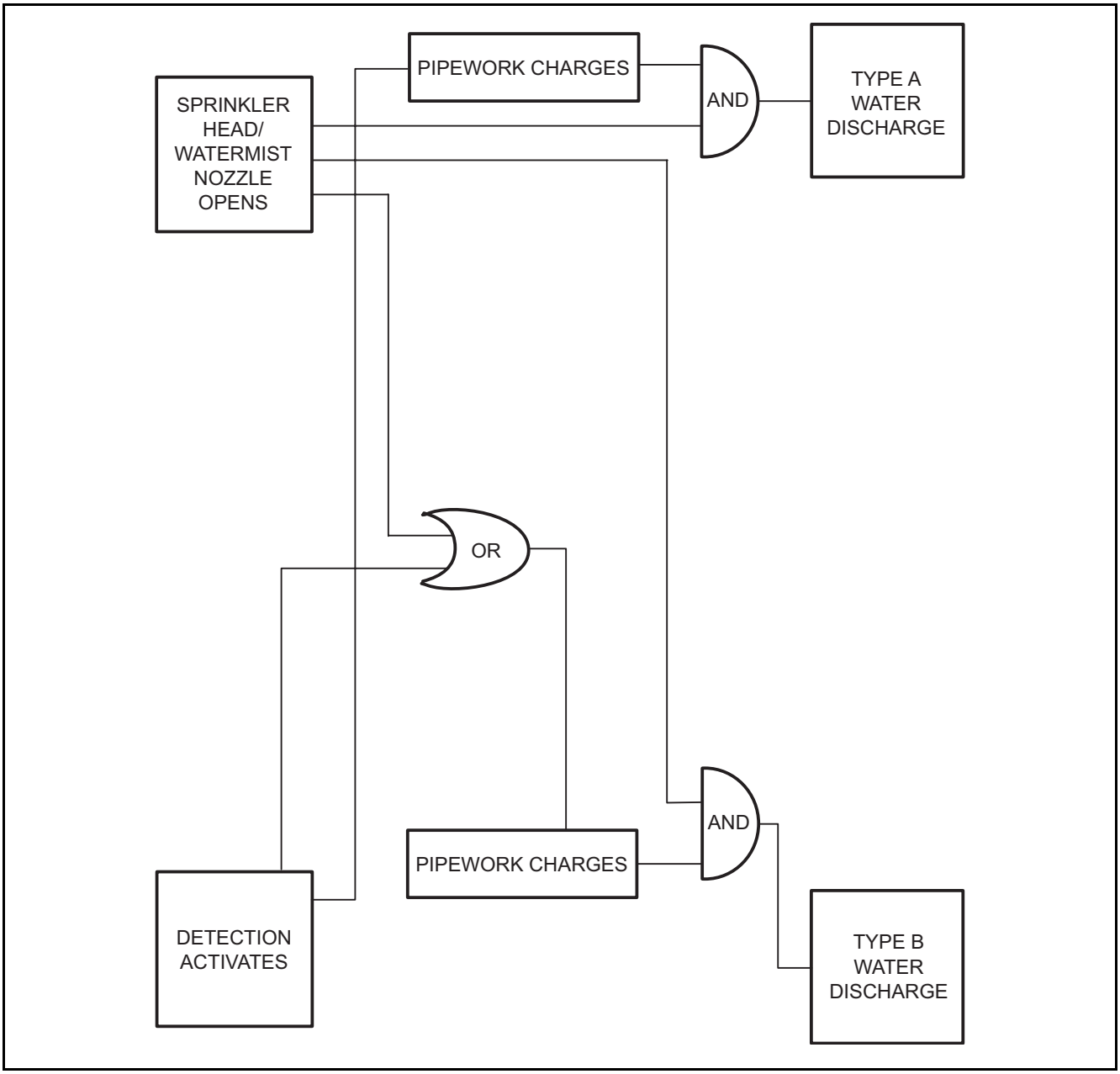
The functions of the two systems can be depicted by the binary logic sequence using “and” and “or” gates as given in Figure 1.

It is of importance that fire detection systems and any interfaces associated with pre-action watermist and sprinkler systems have high integrity and do not cause the pre-action alarm valve to remain closed under fire conditions.

It is also important to avoid inadvertent operation of the pre-action alarm valve, as draining down of the system can be time consuming and inconvenient.

The recommendations in this part of BS 7273 take these factors into account, as well as the recommendations of the relevant British and European Standards covering fire detection and fire alarm systems (BS 5839 and BS EN 54) and sprinklers (BS EN 12845). The standard for watermist systems has not yet been published, and is expected to be issued as a Draft for Development (DD 8489) in due course. The recommendations relating to watermist in this part of BS 7273 have been developed in liaison with FSH/18, the committee working on DD 8489.

Figure 1 **Typical logic gate depiction of pre-action systems**



In some applications (e.g. cold stores), the consequences of inadvertent discharge are so severe that "double interlocked" pre-action systems are sometimes used. In these systems, water is only allowed to enter the pipework if both the electrical detection system and an automatic sprinkler head/watermist nozzle have operated. This differs from a type A system in that the system remains dry if only the electrical detection system has operated.

These and certain other types of pre-action system such as recycling systems are not covered in BS EN 12845 or DD 8489 and are not addressed in this British Standard.

1 Scope

This part of BS 7273 gives recommendations for the design, installation and commissioning of electrical actuation arrangements for pre-action watermist and sprinkler systems. It covers the interface between fire detection and fire alarm systems (see BS 5839-1), sprinkler systems (see BS EN 12845) and watermist systems [1]. This part of BS 7273 does not apply to the interface with sprinkler systems designed in accordance with BS 9251.

Recommendations relating to watermist systems which do not operate in the pre-action mode are contained in BS 7273-5.

NOTE Watermist systems can be used for the suppression, control and extinguishing of fires. In this part of BS 7273, the references to fire extinguishing systems relate to watermist systems of any type, as well as to sprinkler systems.

2 Normative references

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

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

BS 6266, *Code of practice for fire protection for electronic equipment installations*

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

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

BS EN 12094-1, *Fixed firefighting systems – Components for gas extinguishing systems – Part 1: Requirements and test methods for electrical automatic control and delay devices*

BS EN 12094-3, *Fixed firefighting systems – Components for gas extinguishing systems – Part 3: Requirements and test methods for manual triggering and stop devices*

BS EN 12845, *Fixed firefighting systems – Automatic sprinkler systems – Design, installation and maintenance*

BS EN 60651, *Specification for sound level meters*

[1] Watermist systems will be covered in DD 8489-1, which is currently in preparation.

3 Terms and definitions

For the purposes of this part of BS 7273, the terms and definitions given in BS 5839-1, BS EN 12845, BS EN 12094-1 and the following apply.

3.1 coincidence
arrangement designed so that an output is obtained only when at least two independent input triggering signals are present at the same time

NOTE For example, an output suitable for triggering a fire extinguishing system is obtained only after a detector has detected a fire, and at least one other independent detector covering the same protected space or hazard has confirmed the existence of fire.

3.2 electrical automatic control and delay device (e.c.d.)
device that carries out all processing of the functions necessary for the electrical control of a fire extinguishing system

NOTE The e.c.d. can be either a separate device or part of the control and indicating equipment (c.i.e.) of an automatic fire detection and fire alarm system.

3.3 protected space
space protected by a fire extinguishing system

NOTE Watermist systems used for protection of an area, as opposed to a specific item of equipment or plant, are described as volume protection watermist systems.

3.4 pre-action
dry, alternate in dry mode, watermist or sprinkler system in which the alarm valve can be opened by an independent fire detection and fire alarm system in the protected space

3.5 stakeholder
party with an interest in the system

NOTE The interest might be:

- *financial, e.g. owner or insurance company;*
- *as a customer (internal or external);*
- *as an enforcing authority, e.g. building control officer, fire and rescue authority;*
- *in a professional capacity as an adviser to one of the parties, e.g. architect, fire engineer, building service engineer; or*
- *in a contractual capacity, e.g. a manufacturer, installer or maintainer of equipment.*

4 System design

4.1 General

The pre-action mode of operation introduces additional complexity over and above the relatively simple mechanical engineering associated with standard, closed nozzle/head watermist/sprinkler systems. Therefore, it is essential that reliability is maximized. This requires that additional attention is paid to the design of the system.

The requirements of the system should be ascertained by the designer, by means of consultation with the relevant stakeholders. It is particularly important that the agreement of the stakeholders is obtained before the use of a type A pre-action system is considered.

It is essential that, in the event of fire, a pre-planned sequence of actions is taken to ensure the effective operation of the watermist/sprinkler system (see **4.4**). Such necessary actions should be discussed at the design stage and incorporated within the proposed system.

The system design should conform to the appropriate provisions of:

- BS 5839-1, for fire detection and fire alarm systems;
- BS EN 12845, for sprinkler systems.

NOTE Recommendations for the design and installation of watermist systems will be given in DD 8489-1, which is currently in preparation.

On the basis of this consultation, the designer should prepare documents showing details of the design. This may include a simple diagrammatic representation of a sequence of actions leading to the discharge of water.

4.2 Zoning of the pre-action system

Zoning of pre-action sprinkler systems should be in accordance with the requirements specified in BS EN 12845.

NOTE Equivalent recommendations for zoning of pre-action watermist systems will be given in DD 8489-1, which is currently in preparation.

4.3 Inter-relationship between detection system zoning and watermist/sprinkler system zoning

Where single compartments are protected by more than one pre-action watermist/sprinkler system, the area covered by each system should be regarded as a zone of protection. There should be one or more corresponding detection zone(s) for each zone of protection. If it is intended that the pre-action systems operate independently, i.e. each be charged separately, the corresponding detection zones should be exclusive to that zone of protection and should not extend into an area covered by a different pre-action system.

In such instances, consideration should be given to a fire occurring between, or on the borders of two or more zones of protection. In this event, the detection system might need to open the alarm valves for all of the pre-action systems providing protection for that compartment.

4.4 Operation of the system

Operation of the system should follow a sequence of actions leading to the release of water. The system should be capable of both manual and automatic operation.

This sequence may encompass coincidence (see **3.1**) in order to avoid unwanted charging of the watermist/sprinkler system pipework (see **4.6**).

Operation of the first detector should result in at least an indication of fire at the c.i.e. and generate an audible fire alarm warning local to the protected space. As an alternative, or in addition to this, it may also result in the sounding of the building's fire alarm system.

Interruption of the connection between the c.i.e. and any part of the e.c.d. (see **5.1**) should not affect the operation of any fire detector or the generation of the local audible warning (and/or sounding of the building's fire alarm system).

Conditions that would prevent the correct operation of the system, e.g. low pressure in propellant gas container(s), may be monitored and indicated as an "incorrect status condition" at the e.c.d.

The operation of any control for disabling the system during maintenance should be monitored and be indicated as a "disabled condition".

Conditions arising from the use of a pumped water supply might also need to be monitored (see BS EN 12845).

4.5 Manual operation

Both type A and type B systems should incorporate a manual triggering device for manual initiation of system charging. This is in addition to a mechanical means of manually charging the system. This may interface with the pre-action system via the associated fire detection and fire alarm system, but should be additional to any arrangement whereby operation of a fire alarm call point results in charging of the system.

*NOTE Recommendations for manual triggering devices are given in **5.6.1**.*

The activation of a manual triggering device should charge the pre-action system immediately.

When more than one pre-action system is protecting an area and only one system is to be charged with water, it is essential that care is taken in identifying the manual triggering device for each system to ensure the correct system is charged with water.

If a single fire compartment is protected by more than one pre-action system, the manual triggering devices might need to be grouped or linked together.

It is not normal practice to use the operation of fire alarm manual call points to charge the pre-action system. However, according to the particular application of the system and the associated risks, manual call points may be used to contribute to the charging of the system in conjunction with fire detectors, or may be used to directly initiate charging. Such a facility could be subject to misuse, and should only be provided if agreed with stakeholders.

4.6 Automatic operation

Systems should normally be charged by the operation of more than one automatic fire detector.

The fastest response for charging a pre-action system is obtained from a signal from a single detector. However, where the potential for false alarms and the resultant need to drain the system is unacceptable, coincidence should be used.

It should be appreciated that the response time might be increased when coincidence is used. Any benefits or disadvantages from early filling of the sprinkler pipework should be considered at the design stage.

The speed of operation required will influence the choice of detector. Point type smoke detectors are normally used to initiate charging of the watermist/sprinkler pipework. Aspirating smoke detectors may also be used. However, these should not be set to very high sensitivity in view of the higher potential for false alarms.

NOTE 1 If other types of detector (heat, flame, carbon monoxide and multi-sensor detectors) are used, careful consideration should be given to the effect on response time. Heat detectors are not normally considered appropriate.

Detectors should conform to the relevant parts of BS EN 54. In the case of smoke detectors, they should be installed in accordance with Table 1 and the recommendations of BS 5839-1 (and, where appropriate, BS 6266).

Where coincidence is used, the recommendations of Table 1 and, where appropriate, BS 6266, should be followed. The two independent input triggering signals required for coincidence should not be derived from the same detector. For example, signals from two different elements of a multi-sensor detector cannot be considered as coincidence.

Table 1 **Maximum areas of coverage per point-type smoke detector to operate pre-action watermist and sprinkler systems in still air conditions**

Dimensions in square metres (m^2)

Hazard [A)]	**Maximum area of coverage per detector**	
	Without coincidence	**With coincidence**
Light	100	50
Ordinary groups OH1, OH2 and OH3	100	50
Ordinary group OH4	50	25
High process and storage categories 1, 2, 3 and 4	50	25

NOTE Occupancies where a fast response is essential, or those having electronic equipment installations, might require an area of coverage per detector smaller than those stated in the table. Appropriate values for electronic equipment installations are given in BS 6266.

[A)] As defined in BS EN 12845:2004.

In the case of pre-action systems, where the hazard category is OH3 or higher (see BS EN 12845:2004), consideration should be given to increasing the density of detectors. Where multiple levels of sprinkler protection exist (e.g. in rack sprinklers), consideration should be given to providing additional detection where necessary to ensure that the sprinklers respond early enough to be effective.

NOTE 2 Shutting down forced ventilation after the first detector has operated can be beneficial in shortening the response time of the second detector and, therefore, in achieving early coincidence. The effectiveness of the watermist system might also depend on shutting down any forced ventilation prior to discharge.

4.7 Circuit design

4.7.1 Fire detection and fire alarm system

The system should be designed so that, in the event of a single cable fault on a detector circuit, the system is still capable of at least manual charging of the pipework.

The fire detection and fire alarm system should be designed so that in the event of a single cable fault, at least a degraded form of detecting fire remains.

If the system is designed so that the maximum area of coverage per detector is generally X m^2, the degraded level of detection should be such that those detectors that remain operational provide a maximum area of coverage of $2X$ m^2 per detector evenly distributed throughout the area. The degraded detection should meet at least the spacing and positioning recommendations given in BS 5839-1.

The purpose of this degraded detection is to enable warning to be given to persons so that at least manual charging of the pipework is possible.

This can be achieved by, for example, using two interleaved circuits or a single circuit provided that it is configured as a loop and has suitable short and open circuit protection.

4.7.2 Connection to the watermist system

Where there is a separate e.c.d., the reliability of the connection between the c.i.e. and the e.c.d. should be maximized. If the means for transmission of signals in either direction between the c.i.e. and the e.c.d. is via a non-exclusive circuit, e.g. part of a loop of an addressable system, the connections should be protected against a single cable fault (i.e. both short-circuit and open-circuit) on any part of the circuit, e.g. by the provision of short circuit isolators.

5 System interface

5.1 General

The automatic fire detectors associated with the pre-action system should be arranged in one of the following two ways.

a) Automatic fire detectors may be connected to, and monitored by, dedicated c.i.e. that does not incorporate the e.c.d. for the pre-action system, e.g. the fire detection may form part of the general fire detection and fire alarm system in the building (see Annex A).

   In this case, a reliable arrangement is needed for transmission of a signal(s) from the c.i.e. to the e.c.d. (see **4.7.2**).

b) Automatic fire detectors may be connected to c.i.e. dedicated to the pre-action system and incorporating the e.c.d. (see Annex B).

In the case of a), when the general fire detection and fire alarm system is to be used as the detection system for the pre-action system, separate detection zones should be allocated to the area protected by the pre-action system, so that it is clear that the fire alarm indication is from the area protected by the pre-action system and not an adjacent area or another part of the building (see also **4.3**).

In the case of b), fire alarm signals should be transmitted from the pre-action system's c.i.e. to the building's fire detection and fire alarm system's c.i.e. Any such transmission path should be monitored.

In either case a) or b), if a fault occurs that would prevent charging of the pre-action watermist/sprinkler system in the event of fire, this should be indicated within 100 s of its occurrence on the e.c.d. and, where appropriate, also the c.i.e. (see **5.6.3**).

NOTE 1 The intention here is that the user's attention would be drawn to the fault so that action can be taken to charge the system manually, if appropriate.

If the pre-action system is to be charged only when there is coincidence, the coincidence logic may be provided at either the c.i.e. (see Annex C), or at the e.c.d. (see Annex D).

NOTE 2 Other arrangements may also be used.

5.2 Interface design

For c.i.e. with separate e.c.d. (see example in Annex A), the c.i.e. should conform to the requirements of BS EN 54-2, and its power supply to BS EN 54-4. For c.i.e. with separate or combined e.c.d. (see examples in Annexes A and B), in the absence of a specification for e.c.d.s for pre-action systems, the design and manufacture of the e.c.d. should be in accordance with the specifications for c.i.e. for fire detection and fire alarm systems in BS EN 54-2, and power supplies in BS EN 54-4.

Whichever arrangement is adopted, where a single component failure or failure of a processor to correctly execute its function would prevent the charging of the pre-action system, it should still be possible to charge the system manually (see **5.6.1**).

It might be regarded as an advantage to arrange for the interface between the fire detection and alarm system and the pre-action system to fail safe, so that the system charges with water in the event of a fault on the fire detection alarm system. However, this is likely to be undesirable unless there can be discrimination between different faults, since charging of pipework in response to a fault could give rise to the system pipework being filled unnecessarily, e.g. due to the fault condition raised when a detector is removed from a circuit.

5.3 Visual and audible indication at the e.c.d.

For c.i.e. with separate e.c.d. (see example in Annex A), the e.c.d. should incorporate all visual and audible indicating facilities specified in BS EN 54-2, other than those associated with fire detection circuits.

For c.i.e. with combined e.c.d. (see example in Annex B), the combined c.i.e./e.c.d. should incorporate all visual and audible indicating facilities specified in BS EN 54-2.

Irrespective of whichever arrangement is utilized, the e.c.d. should be provided with facilities for visual indication of each of the following conditions:

a) power supply healthy;

b) system fault (as defined by the relevant clauses of BS EN 54-2);

c) system disabled (e.g. by use of any control provided to isolate automatic detectors or the release mechanism);

d) low air pressure;

e) system charged.

NOTE It is desirable that a visual and audible indication also be given in the event of the system failing to charge.

The control sounder provided within or external to the e.c.d. (or combined c.i.e./e.c.d., where appropriate) should give an audible warning in the event of conditions listed in b) to d). The audible fire and fault warning sounders should each produce a sound level of at least 50 dB(A) at every point less than 1 m from the control equipment enclosure when measured with an instrument conforming to BS EN 60651.

The system charged indication should be derived from a pressure or flow switch in the discharge pipework, and not from the actuating signal output of the e.c.d.

Where the e.c.d. (or combined c.i.e./e.c.d., where appropriate) serves more than one pre-action system or a pre-action system protects more than one zone (see **4.2**), each of the pre-action systems/zones should be indicated separately at the e.c.d.

5.4 Output signals from the e.c.d.

The pre-action system e.c.d. should be provided with the following outputs:

a) dual outputs for connection of two actuator mechanisms for each pre-action system valve set. These should be arranged so that a single open circuit or short circuit at any point on the external wiring will not prevent at least one actuation mechanism from operating;

NOTE 1 This recommendation can be met either by the provision of two independent circuits to the actuator mechanisms, or by a single output to a ring circuit that includes protection against both open circuit and short circuit faults.

b) outputs to any audible fire alarm warning devices;

NOTE 2 Where the purpose of these outputs is to provide the primary warning of fire to occupants of the building, two independent outputs will need to be provided to enable conformity to BS 5839-1. Where coincidence detection is used, such outputs may operate on the first or second input, as appropriate.

c) outputs for fault and system charged (see **5.6.2**).

NOTE 3 These outputs are for use to relay signals to other equipment such as the building fire alarm system's c.i.e. should the e.c.d. be in a location that is not fully supervised.

5.5 Monitoring

All external input and output circuits, including to any normally closed solenoid valves, should be monitored.

NOTE 1 The transmission facility may, for example, comprise a volt free contact, switched 24 V supply or any other arrangement with similar integrity and reliability.

NOTE 2 Requirements for monitoring are given in BS 5839-1, BS EN 54-2 and BS EN 54-4.

In the case of the arrangement in **5.1**a), an open or short circuit on the connections to and from the c.i.e. should result in a fault indication at e.c.d. Any fault indication on the c.i.e. should also be indicated on the e.c.d.

5.6 Control and indicating devices

5.6.1 Manual triggering device

Manual triggering devices should conform to BS EN 12094-3. They should be suitably labelled to indicate their function.

NOTE BS EN 12094-3 specifies requirements and test methods for manual triggering devices which form part of electrically actuated gaseous fire extinguishing systems. Its requirements are also considered appropriate to manual triggering devices which form part of pre-action systems.

The operation of a manual triggering device should result in the following:

a) a silenceable audible warning;

b) operation of the release mechanism to open the pre-action system valve;

c) a latched visual indication at the e.c.d.

Manual triggering devices should be sited at a strategic location(s) where they are readily accessible in an emergency whilst avoiding the possibility of malicious operation. For example, this may include the provision of a manual triggering device at the c.i.e. and/or the e.c.d. or in a fire control centre. They should be visually differentiated from manual call points provided for operation of the fire detection and fire alarm system.

5.6.2 Charging of pipework

The charging of pipework resulting from the operation of the release mechanism should produce the following:

a) a silenceable audible warning;

b) a latched visual indication at the e.c.d.;

c) a system charged indication at the e.c.d.

NOTE It is desirable that failure of a system to charge on demand (i.e. a short time after transmission of a signal to the release mechanism) results in a dedicated visual and audible indication.

5.6.3 Remote signalling

If the e.c.d. is not in a location which is supervised, the signals from the outputs in **5.4**c) should be transmitted to a point where the system can be supervised (e.g. reception or a fire control centre). For unmanned buildings, it might be necessary for these signals to be monitored off-site (e.g. at an alarm receiving centre).

6 Power supplies, cables and wiring

6.1 General

The power supplies for the pre-action system should conform to the recommendations given in BS 5839-1:2002, Clause **25** except that appropriate words e.g. “FIRE EXTINGUISHING SYSTEM” should be used in place of the words “FIRE ALARM” in the labels described in BS 5839-1:2002, **25.2**f).

6.2 Wiring for the pre-action system

The wiring for the fire extinguishing system should comprise cables of standard fire resistance as described in BS 5839-1:2002, Clause **26**.

NOTE There is no need for segregation of the cables of the pre-action system from cables of the fire detection and fire alarm system, or for use of cables of enhanced fire resistance.

7 Commissioning and handover

7.1 General

Pre-action sprinkler systems and associated automatic fire detection systems should be commissioned and handed over in accordance with BS EN 12845 and BS 5839-1 respectively. Automatic fire detection systems associated with pre-action watermist systems should be commissioned and handed over in accordance with the recommendations given in BS 5839-1.

NOTE Specific recommendations for the commissioning and handover of watermist systems will be given in DD 8489-1, which is currently in preparation.

In addition, sprinkler systems and watermist systems should both conform to the recommendations given in **7.2** and **7.3**.

7.2 Commissioning

A visual inspection should be undertaken to ensure that the type and location of all equipment is in accordance with the working drawings and design specifications.

Functional tests should be carried out to ensure the correct operation of all controls and indications. The tests should establish the sequence of actions leading to discharge of water, and this should be verified against the sequence of actions in the design documentation (see **4.1**).

As part of this, all auxiliary functions (such as audible and visual warning devices, remote indications, air handling shutdown, power shutdown, etc.) should be checked for correct operation in accordance with design requirements.

The monitoring and indication of incorrect status and disabled conditions should also be checked by test (see **4.4**).

7.3 Handover

On completion of the commissioning, completion certificates, record drawings and instructions on the system's use and maintenance should be supplied to the user.

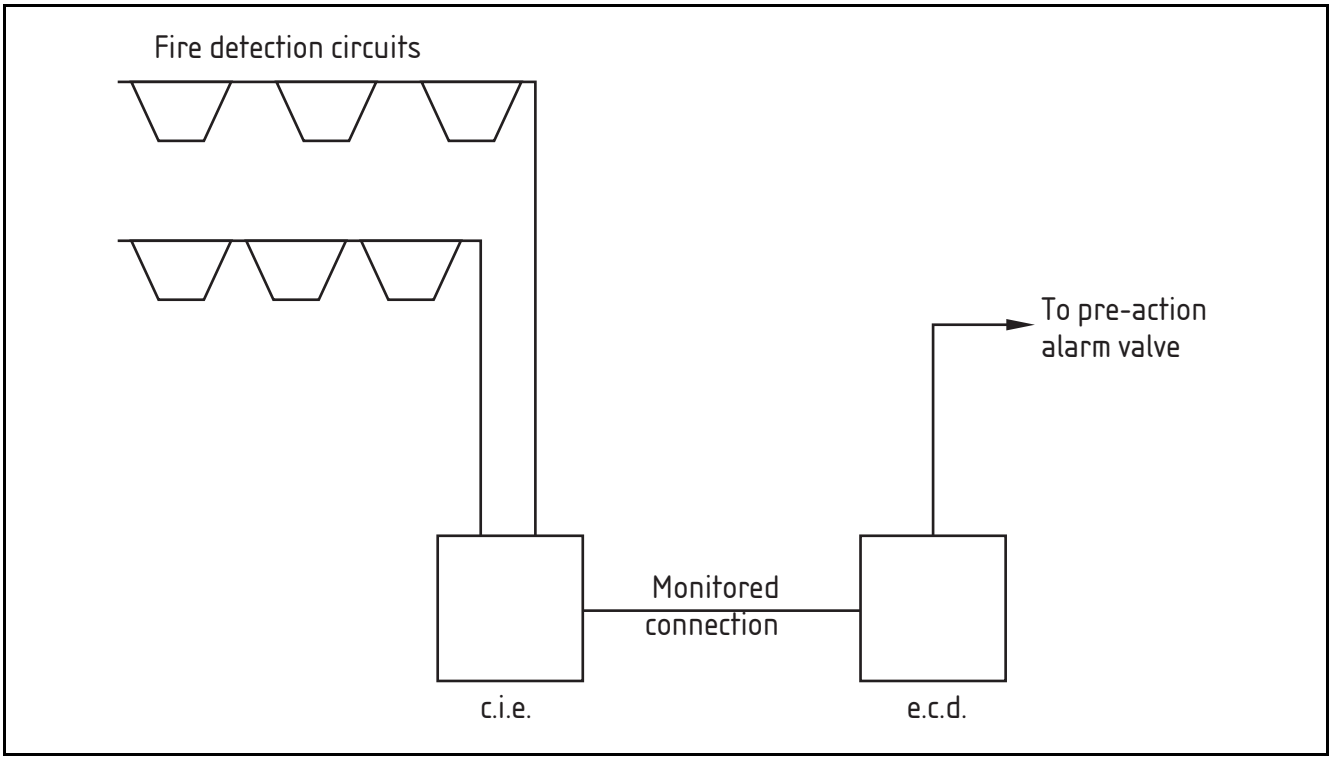
For guidance, refer to BS 5839-1 and BS EN 12845[2)].

[2)] BS EN 12845 deals with sprinklers only. Equivalent guidance for watermist systems will be given in DD 8489-1, which is currently in preparation.

Annex A (informative) Example of an arrangement for c.i.e. with separate e.c.d.

Figure A.1 shows an example of an arrangement for separate control and indicating equipment for the fire detection and alarm system (c.i.e.) and the pre-action system (e.c.d.).

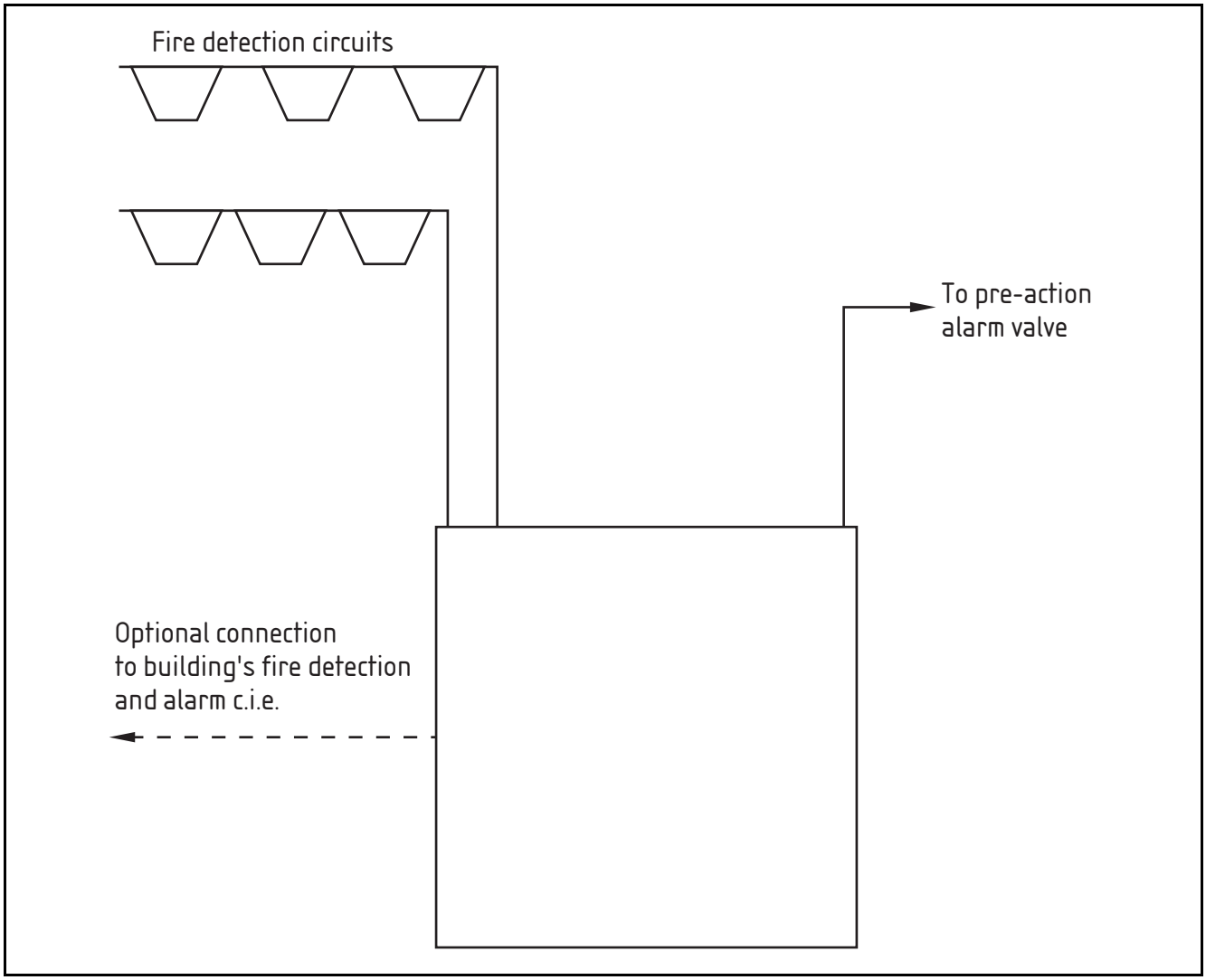
Figure A.1 **Example of an arrangement for c.i.e. with separate e.c.d.**



Annex B (informative) Example of an arrangement for c.i.e. with combined e.c.d.

Figure B.1 shows an example of an arrangement for fire detectors and pre-action valve-set connected to and monitored by c.i.e. incorporating the e.c.d. for the pre-action system.

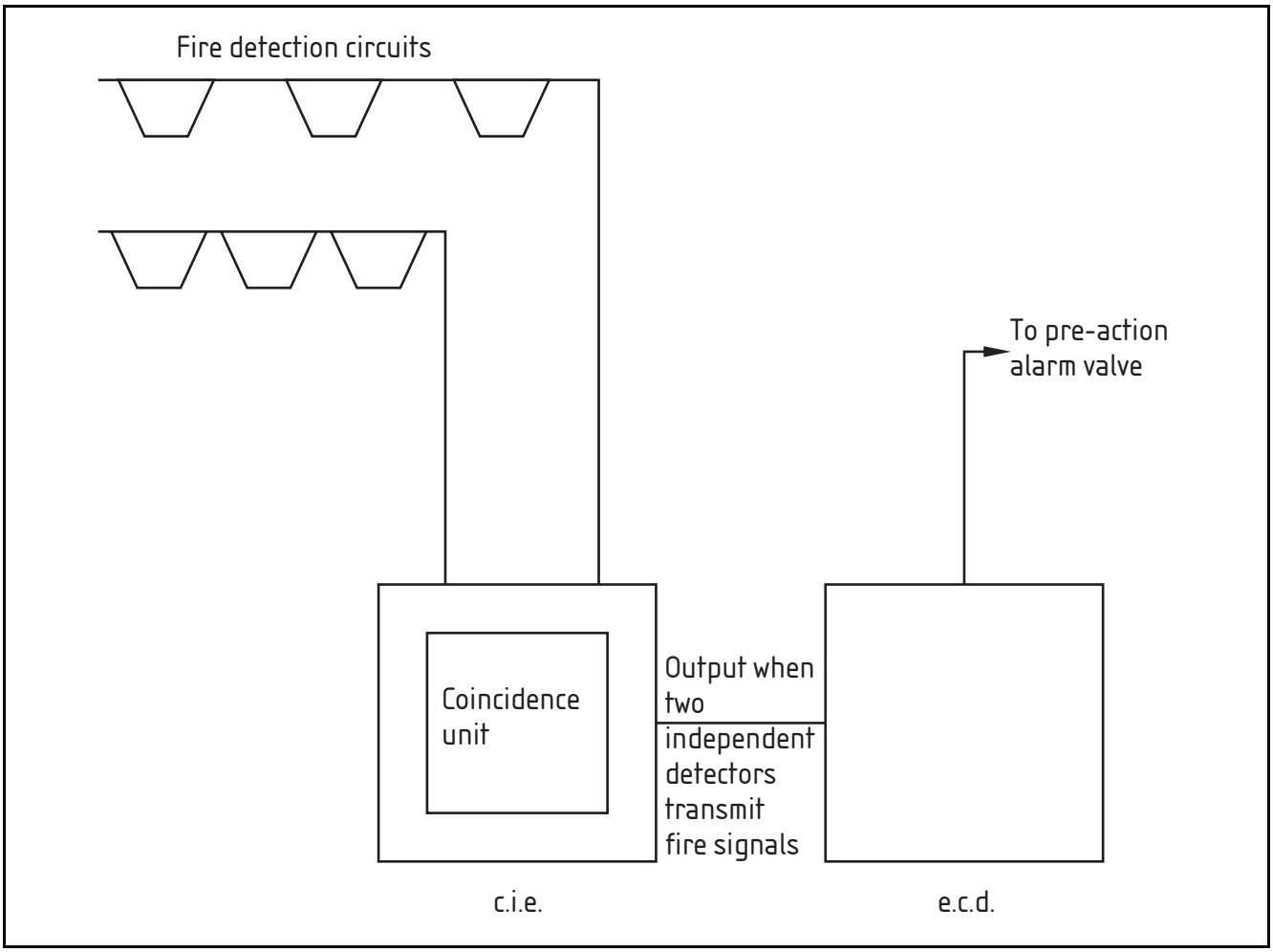
Figure B.1 **Example of an arrangement for c.i.e. with combined e.c.d.**



Annex C (informative) Example of an arrangement for any coincidence logic provided within the c.i.e.

Figure C.1 shows an example of an arrangement for any coincidence logic within the fire detection and fire alarm system's c.i.e.

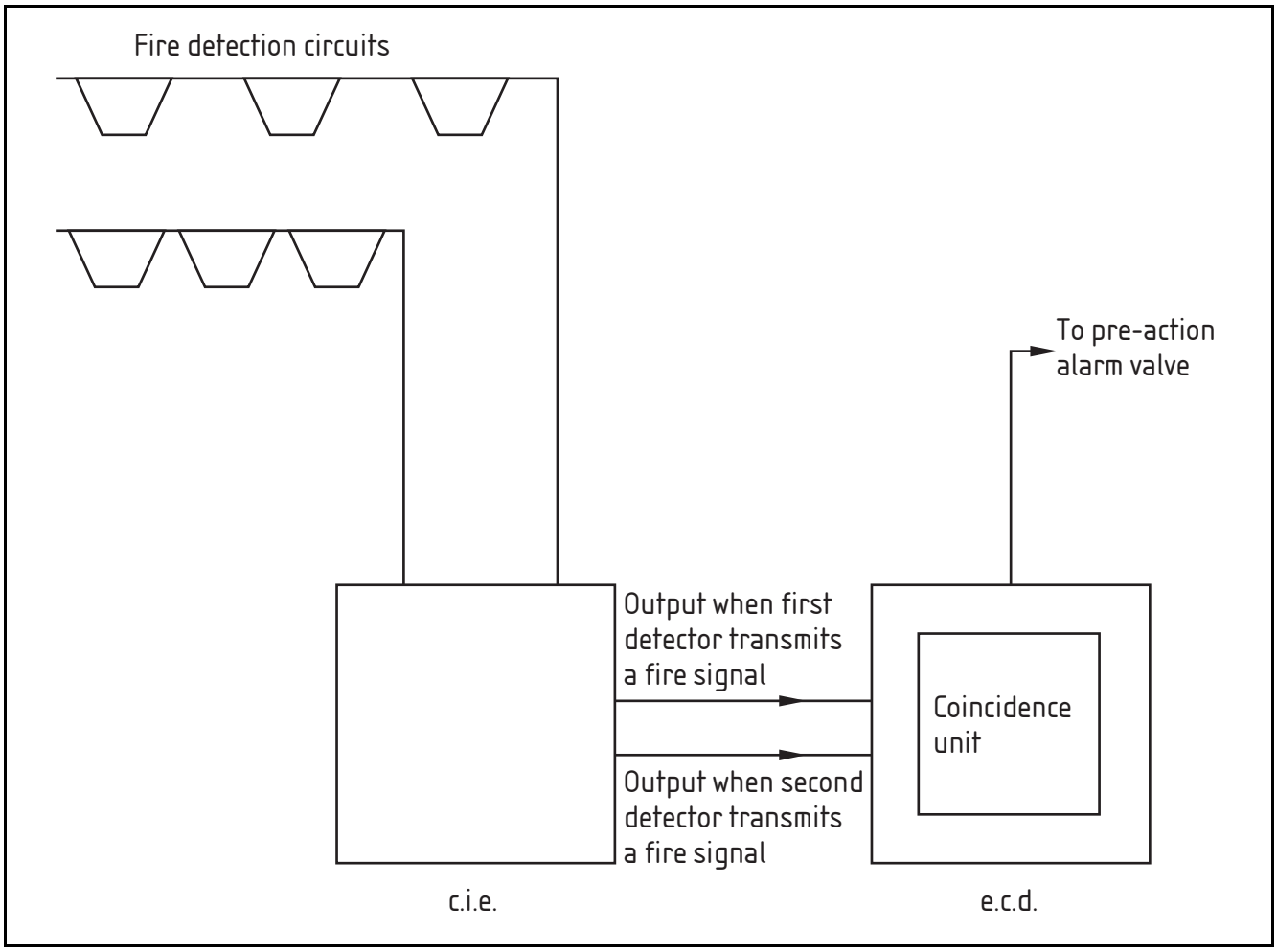
Figure C.1 **Example of an arrangement for any coincidence logic provided within the c.i.e.**



Annex D (informative) Example of an arrangement for any coincidence logic provided within the e.c.d.

Figure D.1 shows an example of an arrangement for any coincidence logic provided within the pre-action system's e.c.d.

Figure D.1 **Example of an arrangement for any coincidence logic provided within the e.c.d.**



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DD 8489 (both parts), *Fixed fire protection systems – Commercial and industrial watermist systems* [3)]

[3)] In preparation.

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