
**Smoke and heat control systems —
Part 9:
Specification for control equipment**

Systèmes pour le contrôle des fumées et de la chaleur —

Partie 9: Spécifications pour les équipements de commande

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 21927-9:2012](https://standards.iteh.ai/catalog/standards/sist/e79723f4-73e4-47dd-ade6-00e8fa9bd94f/iso-21927-9-2012)

<https://standards.iteh.ai/catalog/standards/sist/e79723f4-73e4-47dd-ade6-00e8fa9bd94f/iso-21927-9-2012>



iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 21927-9:2012

<https://standards.iteh.ai/catalog/standards/sist/e79723f4-73e4-47dd-ade6-00e8fa9bd94f/iso-21927-9-2012>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2012

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	vi
Introduction.....	vii
1 Scope	1
2 Normative references	1
3 Terms, definitions and abbreviated terms	2
3.1 Terms and definitions	2
3.2 Abbreviated terms	5
4 General	5
4.1 Overview	5
4.2 Requirements	7
4.2.1 Optional functions	7
4.2.2 Additional functions	7
4.2.3 Types of control equipment	7
4.2.4 Operational reliability	9
4.2.5 Priority	10
4.2.6 Use for other purposes	10
4.2.7 Type and location of control equipment	10
5 Electrical systems	12
5.1 Electrical control panels	12
5.1.1 General requirements	12
5.1.2 General requirements for indications	12
5.1.3 Standby condition	14
5.1.4 Fire condition	15
5.1.5 Fault warning condition	17
5.1.6 Disablement condition (option with requirements)	19
5.1.7 Test condition (option with requirements)	20
5.2 Electrical basic control panels	20
5.2.1 General requirements	20
5.2.2 General requirements for indications	20
5.2.3 Standby condition	21
5.2.4 Fire condition	21
5.3 Manual control point	22
5.3.1 Types of activation	22
5.3.2 Types of manual control point	22
5.3.3 Indications and functions	23
5.3.4 Enclosure	23
6 Pneumatic systems	25
6.1 Pneumatic control panels	25
6.1.1 General requirements	25
6.1.2 General requirements for indications	26
6.1.3 Standby condition	27
6.1.4 Fire condition	27
6.1.5 Fault warning condition (option with requirements)	28
6.1.6 Disablement condition (option with requirements)	29
6.1.7 Test condition (option with requirements)	30
6.1.8 Lettering on front face	31
6.1.9 Lettering on operating face	31
6.2 Pneumatic basic control panels	31
6.2.1 General requirements	31

6.2.2	General requirements for indications.....	32
6.2.3	Fire condition	32
6.2.4	Lettering on front face.....	32
6.2.5	Lettering on operating face	33
6.3	Thermal release element for pneumatic systems	33
6.3.1	Response time	33
6.3.2	Operational reliability.....	33
6.3.3	Performance parameters under fire conditions	33
6.3.4	Durability test.....	33
7	Mechanical control panels (m.c.p.).....	33
7.1	General requirements.....	33
7.2	Manual initiation.....	34
7.3	Electric initiation.....	34
7.4	Pneumatic initiation.....	34
7.5	Lettering on front face.....	35
7.6	Lettering on operating face	35
8	Design and documentation requirements.....	35
8.1	General requirements.....	35
8.2	Classification and testing	35
8.3	Documentation.....	35
8.3.1	User documentation	35
8.3.2	Design documentation	36
8.4	Mechanical design requirements.....	36
8.5	Electrical and other design requirements.....	37
8.6	Integrity of transmission paths.....	37
8.7	Accessibility of indications and controls (see also Annex A)	37
9	Additional requirements for software-controlled control panels	37
9.1	General requirements.....	37
9.2	Software documentation.....	37
9.3	Software design	38
9.4	Program monitoring	38
9.5	The storage of programs and data.....	39
9.6	The monitoring of memory contents	40
10	Additional requirements for networked systems.....	40
10.1	General requirements.....	40
10.2	Fault condition	40
10.3	Connection to other bus systems.....	40
10.4	Maximum cable length	40
11	Marking	40
12	General test requirements	41
12.1	Standard atmospheric conditions for testing.....	41
12.2	Provision for tests	41
12.3	Mounting and orientation.....	41
12.4	Electrical connection.....	41
12.5	Selection of tests	41
12.5.3	Tests for one specimen.....	43
12.5.4	Tests for more than one specimen	43
12.5.5	Requirements	43
13	Tests.....	43
13.1	Reliability test.....	43
13.2	Functional test	43
13.2.1	Objective of the test	43
13.2.2	Electrical functional test	43
13.2.3	Pneumatic functional tests	44
13.2.4	Single-use gas bottle assembly functional tests	44
13.2.5	Single-use/multi-use gas bottle assembly with thermal initiation functional tests.....	44

13.2.6	Single-use/multi-use gas bottle assembly with manual-initiation functional tests.....	45
13.2.7	Mechanical control panel functional tests.....	46
13.2.8	Thermal release elements functional tests.....	47
13.3	Cold (operational).....	48
13.3.1	Object of the test.....	48
13.3.2	Test procedure.....	48
13.4	Damp heat, steady state (operational).....	49
13.4.1	Object of the test.....	49
13.4.2	Procedure.....	49
13.5	Impact (operational).....	50
13.5.1	Object of the test.....	50
13.5.2	Test procedure.....	50
13.6	Vibration, sinusoidal (operational).....	51
13.6.1	Object of the test.....	51
13.6.2	Test procedure.....	51
13.6.3	Final measurements.....	52
13.7	Damp heat, steady state (endurance).....	52
13.7.1	Object of the test.....	52
13.7.2	Procedure.....	52
13.8	Vibration, sinusoidal (endurance).....	53
13.8.1	Object of the test.....	53
13.8.2	Test procedure.....	53
13.9	Dry heat (operational).....	54
13.9.1	Object of the test.....	54
13.9.2	Test procedure.....	54
13.10	SO ₂ corrosion.....	55
13.10.1	Object of the test.....	55
13.10.2	Test procedure.....	55
13.11	Salt spray testing.....	56
13.11.1	Object of the test.....	56
13.11.2	Test procedure.....	56
13.12	Protection against water (IP rating).....	57
13.12.1	Object of the test.....	57
13.12.2	Test procedure.....	57
13.13	Protection against substances (IP rating).....	57
13.13.1	Object of the test.....	57
13.13.2	Test procedure.....	58
13.14	EMC immunity tests (operational).....	58
14	Conformity assessment.....	59
14.1	General.....	59
14.2	Type testing.....	59
14.3	Factory production control (FPC).....	59
Annex A	(normative) Explanation of access levels.....	60
Annex B	(informative) Summary of functions.....	62
Bibliography	63

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 21927-9 was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 11, *Smoke and heat control systems and components*.

ISO 21927 consists of the following parts, under the general title *Smoke and heat control systems*:

- *Part 1: Specification for smoke barriers*
- *Part 2: Specification for natural smoke and heat exhaust ventilators*
- *Part 3: Specification for powered smoke and heat exhaust ventilators*
- *Part 9: Specification for control equipment*
- *Part 10: Specification for power output devices*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 21927-9:2012
<https://standards.iteh.ai/catalog/standards/sist/c79723f4-73e4-47dd-ade6-00e8fa9bd94f/iso-21927-9-2012>

Introduction

Smoke- and heat-control systems (SHCS) create and maintain smoke-free areas in a construction works by controlling smoke flow, thus improving the conditions for the safe escape and/or rescue of people and animals and the protection of property, and permit fire-fighting in the early stages of the fire. The use of smoke and heat exhaust ventilation systems (SHEVS) to create smoke-free areas beneath a buoyant smoke layer has become widespread. Their value in assisting in the evacuation of people from construction works, reducing fire damage and financial loss by preventing smoke logging, facilitating fire fighting, reducing roof temperatures and retarding the lateral spread of fire, is firmly established. For these benefits to be obtained, it is essential that smoke and heat exhaust ventilators operate fully and reliably whenever called upon to do so during their installed life. A heat and smoke exhaust ventilation system is a scheme of safety equipment intended to perform a positive role in a fire emergency.

Components for any smoke and heat control system are installed as part of a properly designed system.

Smoke and heat control systems help to:

- keep the escape and access routes free from smoke;
- facilitate fire fighting operations;
- delay and/or prevent flashover and thus full development of the fire;
- protect equipment and furnishings;
- reduce thermal effects on structural components during a fire;
- reduce damage caused by thermal decomposition products and hot gases.

Pressure differential systems are used to either positively pressurize spaces separated from the fire or to depressurize the space containing the fire in order to limit or prevent the flow of smoke and heat into adjacent spaces. A typical use would be to pressurize an escape stairwell in order to protect vertical means of escape.

Depending on the design of the system, natural or powered smoke and heat ventilators can be used in a smoke and heat control system.

Control equipment (c.e.) is required to control all components in a SHCS, such as:

- natural ventilators;
- powered ventilators;
- smoke barriers;
- smoke dampers;
- air inlets.

SHCS control equipment may also provide control for day-to-day ventilation and signals to other fire safety equipment under fire conditions.

SHCS control equipment may be for extra-low-voltage or low-voltage electrical systems or pneumatic systems or any combination of these.

Power output devices for control equipment are dealt with in ISO 21927-10.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 21927-9:2012

<https://standards.iteh.ai/catalog/standards/sist/e79723f4-73e4-47dd-ade6-00e8fa9bd94f/iso-21927-9-2012>

Smoke and heat control systems —

Part 9: Specification for control equipment

1 Scope

This part of ISO 21927 specifies the product performance requirements, classifications and test methods for control equipment designed for use in smoke- and heat-control systems (SHCS) in buildings.

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.

ISO 3098-2, *Technical product documentation — Lettering — Part 2: Latin alphabet, numerals and marks*

ISO 6988, *Metallic and other non-organic coatings — Sulfur dioxide test with general condensation of moisture*

ISO 7240-5:2003, *Fire detection and alarm systems — Part 5: Point-type heat detectors*

ISO 7240-6, *Fire detection and alarm systems — Part 6: Carbon monoxide fire detectors using electrochemical cells*

ISO 7240-7, *Fire detection and alarm systems — Part 7: Point-type smoke detectors using scattered light, transmitted light or ionization*

ISO 7240-8, *Fire detection and alarm systems — Part 8: Carbon monoxide fire detectors using an electrochemical cell in combination with a heat sensor*

ISO 7240-10, *Fire detection and alarm systems — Part 10: Point-type flame detectors*

ISO 7240-11:2005, *Fire detection and alarm systems — Part 11: Manual call points*

ISO 7240-12, *Fire detection and alarm systems — Part 12: Line type smoke detectors using a transmitted optical beam*

ISO 7240-15, *Fire detection and alarm systems — Part 15: Point type fire detectors using scattered light, transmitted light or ionization sensors in combination with a heat sensor*

ISO 7240-20, *Fire detection and alarm systems — Part 20: Aspirating smoke detectors*

ISO 7240-27, *Fire detection and alarm systems — Part 27: Point-type fire detectors using a scattered-light, transmitted-light or ionization smoke sensor, an electrochemical-cell carbon-monoxide sensor and a heat sensor*

ISO 21927-9:2012(E)

ISO/IEC 17000, *Conformity assessment — Vocabulary and general principles*

ISO/IEC 17050-1, *Conformity assessment — Supplier's declaration of conformity — Part 1: General requirements*

ISO/IEC 17050-2, *Conformity assessment — Supplier's declaration of conformity — Part 2: Supporting documentation*

ISO 21927-3, *Smoke and heat control systems — Part 3: Specification for powered smoke and heat exhaust ventilators*

ISO 21927-10, *Smoke and heat control systems — Part 10: Specification for power output devices*

EN 50130-4, *Alarm systems — Electromagnetic compatibility — Product family standard: Immunity requirements for components of fire, intruder and social alarm systems*

IEC 60068-1:1994, *Environmental testing — Part 1: General and guidance*

IEC 60068-2-1 *Environmental testing — Part 2-1: Tests — Tests A: Cold*

IEC 60068-2-6, *Environmental testing — Part 2-6: Tests — Test Fc: Vibration (sinusoidal)*

IEC 60068-2-47, *Environmental testing — Part 2-47: Test — Mounting of specimens for vibration, impact and similar dynamic tests*

IEC 60068-2-52:1996, *Environmental testing — Part 2: Tests — Test Kb: Salt mist, cyclic (sodium chloride solution)*

IEC 60068-2-75, *Environmental testing — Part 2-75: Tests — Test Eh: Hammer tests*

IEC 60068-2-78, *Environmental testing — Part 2-78: Tests — Test Cab: Damp heat, steady state*

IEC 60529:1992, *Degrees of protection provided by enclosures (IP Code)*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms, definitions and abbreviations apply.

3.1 Terms and definitions

3.1.1

access level

one of several states of control equipment in which selected:

- controls can be operated
- manual operations can be carried out
- indications are visible
- information can be obtained

NOTE Further information is given in Annex A.

3.1.2

addressable point

point which can be individually identified at the control panel

3.1.3**basic control panel****b.c.p.**

single-operation initiating device for a smoke and heat control system component, e.g. manual control point or single-use gas bottle assembly

NOTE A b.c.p. may be regarded as an emergency control panel.

3.1.4**compulsory indication**

visual or audible indications (e.g. light-emitting indicator, label, alphanumeric display, sounder) required by this International Standard

NOTE If options with requirements are chosen, then indications required within those options are compulsory.

3.1.5**control equipment****c.e.**

initiating device for a smoke and heat control system component, e.g. control panel, basic control panel, mechanical control panel

3.1.6**control panel****c.p.**

multi-operation initiating device for a smoke and heat control system

3.1.7**fire condition**

when a fire signal has been received and processed by the control equipment and the intended outputs and indications have been given

3.1.8**fire position**

configuration of a smoke and heat control system component to be achieved and sustained while the system is venting smoke and heat

3.1.9**frangible element**

component which, after receiving a blow or pressure, is physically broken or is visibly displaced by change of position and remains in that condition until replaced or reset

3.1.10**hierarchical system**

networked system with one control panel designated as the main control panel which fulfils at least the following tasks:

- receives and transmit signals from/to other networked control equipment;
- displays the status of the networked control equipment.

3.1.11**manual control point**

initiation device for a smoke and heat control system provided for use in an emergency by building occupants or fire fighters

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 21927-9:2012](https://standards.iteh.ai/catalog/standards/sist/e79723f4-73e4-47dd-ade6-00e8fa9bd94f/iso-21927-9-2012)

<https://standards.iteh.ai/catalog/standards/sist/e79723f4-73e4-47dd-ade6-00e8fa9bd94f/iso-21927-9-2012>

3.1.12

mechanical control panel

m.c.p.

operation initiation device for a smoke and heat control system component where the initiation is provided through a mechanical linkage (e.g. by release of tension in a cable) between the control equipment and the component

3.1.13

networked system

system where control panels are interconnected and able to exchange information electronically

3.1.14

response time

period between the signal to operate being received by the control equipment and the achievement of the fire condition

3.1.15

site-specific data

information that the software uses and that is specific to an installation

NOTE This may include information such as allocation of devices to specific zones, time settings and sensitivity levels.

3.1.16

smoke- and heat-control system

SHCS

arrangement of components installed in a construction works to limit the effects of smoke and heat from a fire

3.1.17

smoke- and heat-exhaust ventilator

SHEV

device specially designed to move smoke and hot gases out of the construction works under conditions of fire

3.1.18

standby condition

quiescent condition when the control equipment is fully operational and waiting to receive a fire signal

3.1.19

transmission path

physical connection, external to the cabinet of the control equipment for the transmission of information and/or power between the control equipment and other components of a SHCS, and/or between parts of a control equipment contained in different cabinets

3.1.20

ventilator

device for enabling the movement of gases into or out of a construction works

3.1.21

zone

individual input or output, usually relating to a geographical sub-division of the protected premises

3.1.22

thermal release element

temperature-sensitive device which responds to initiate a subsequent action

3.2 Abbreviated terms

b.c.p.	basic control panel
c.e.	control equipment
c.i.e.	control and indicating equipment (as specified in ISO 7240-2)
c.p.	control panel
DP	dual purpose
m.c.p.	mechanical control panel
p.o.d.	power output device
p.s.e.	power supply equipment
SHCS	smoke- and heat-control system
SHEV	smoke- and heat-exhaust ventilator
SHEVS	smoke- and heat-exhaust ventilation system
BMS	Building Management System

4 General

4.1 Overview

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Figure 1 illustrates the structure of this part of ISO 21927 and shows how and where the requirements for each type of control equipment are distributed.

<https://standards.iteh.ai/catalog/standards/sist/e79723f4-73e4-47dd-ade6-00e8fa9bd94f/iso-21927-9-2012>

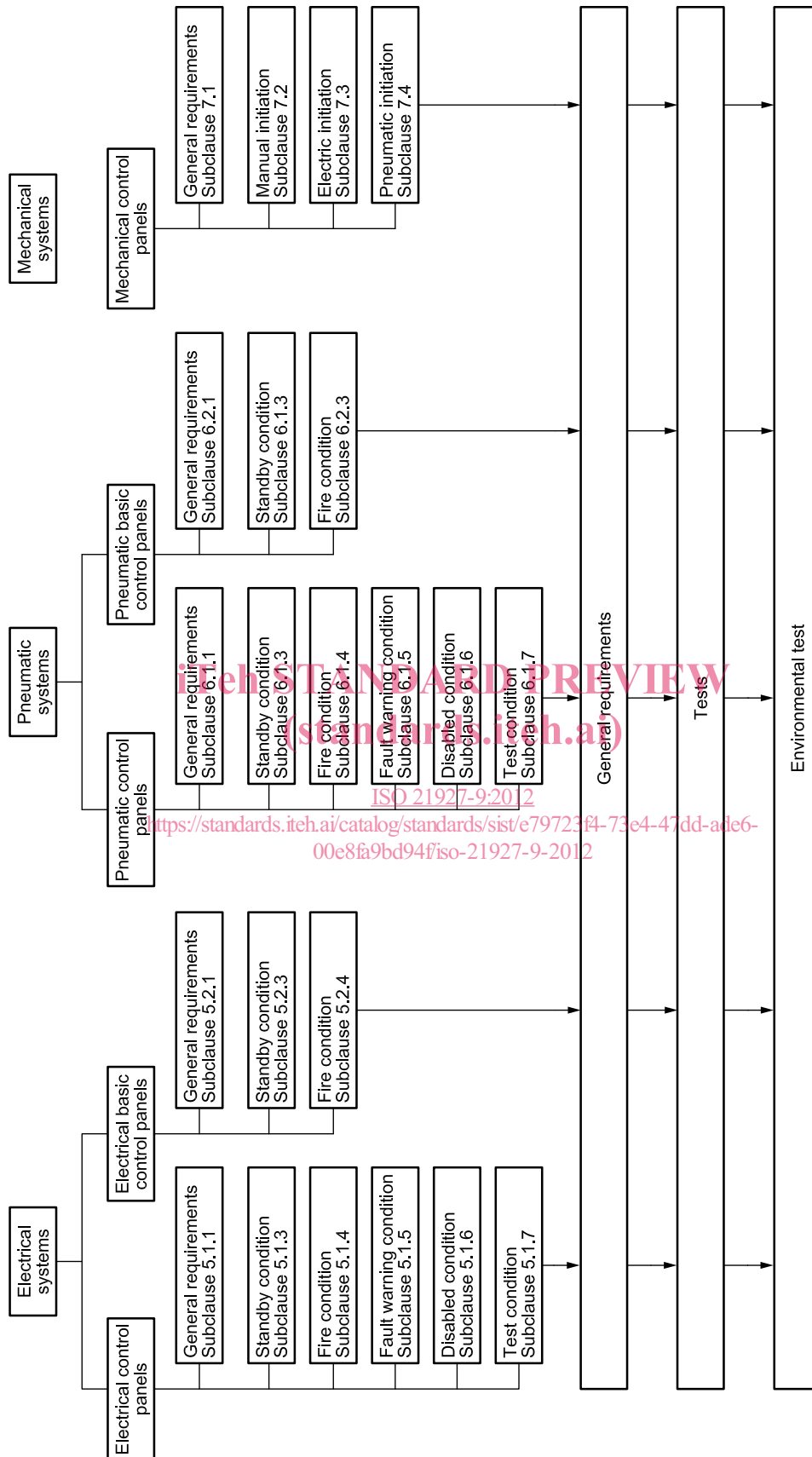


Figure 1 — Overview of the structure of this part of ISO 21927

4.2 Requirements

4.2.1 Optional functions

If an optional function with requirements is included in the control equipment, then it shall conform to all the corresponding requirements of this part of ISO 21927.

4.2.2 Additional functions

If functions additional to those specified in this part of ISO 21927 are provided (for example to control the additional use of a SHEVS for day-to-day comfort ventilation), they shall not jeopardize any of the requirements of this part of ISO 21927.

4.2.3 Types of control equipment

For the purposes of this part of ISO 21927, control equipment shall be typified as follows:

- Type A: mechanical control panels (m.c.p.);
- Type B: basic control panels (b.c.p.) and pneumatic-only control panels;
- Type C: control panels (c.p.) without direct connection for detectors (see Figure 2);
- Type D: control panels with direct connection for detectors (see Figure 3).

See Annex B for a summary of the functions relevant to each type.

NOTE 1 When a type D panel is used without detectors, it may also be considered a type C panel.

NOTE 2 Manual control points are not classified as types A to D except for indoor or outdoor use according to ISO 7240-11.

NOTE 3 Thermal release elements are not classified as types A to D except for the nominal release temperature.