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Fire detection and alarm systems —

Part 29: Video fire detectors

Systèmes de détection et d'alarme d'incendie —

Partie 29: Titre manque

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 3, *Fire detection and alarm systems*.

A list of all parts in the ISO 7240-series can be found on the ISO website.

Introduction

A video fire detection system differs from some point-type detectors (e.g. ISO 7240-6, ISO 7240-7) in that the detection is performed remotely from the actual fire and therefore does not involve sensor contact with the products of combustion. The fire detection is based on mathematical algorithm analysis of a video image. The video image from a camera might be processed by software to determine the presence of smoke and/or flame (depending on the capability of the system) which is visible in the image.

Video fire detectors consist of three elements: a sensor, an image processor, and a transmission path between the sensor and image processor. The elements can be in a single cabinet, or the sensor and processor can be in separate cabinets, interconnected by a transmission path.

The processor incorporates an alarm and fault signalling interface to connect to a compatible fire detection control and indicating equipment transmission path.

Two types of detectors are specified to differentiate equipment that sense smoke or flame. A single detector can also sense both smoke and flame.

Two enclosure protection ratings are specified for dust and water ingress protection.

Three environmental temperature ranges are specified, for detectors suitable for installation indoors or outdoors.

A fire detection and alarm system is required to function satisfactorily not only in the event of fire, but also during and after exposure to conditions likely to be met in practice, including corrosion, vibration, direct impact, indirect shock and electromagnetic interference. Tests are intended to assess the performance of the video fire detectors under such conditions.

This document is not intended to place any other restrictions on the design and construction of such detectors.

Fire detection and alarm systems —

Part 29:
Video fire detectors

1 Scope

This document specifies requirements, test methods and performance criteria for video fire detectors (VFD), which operate in the visible spectrum, for use in fire detection and alarm systems installed in and around buildings (see ISO 7240-1). For the testing of other types of VFD working on different principles, this document can be used only for guidance.

Detectors developed for the protection of specific risks that incorporate special characteristics (including additional features or enhanced functionality for which this document does not define a test or assessment method) are beyond the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 209, *Aluminium and aluminium alloys — Chemical composition*

ISO 2560, *Welding consumables — Covered electrodes for manual metal arc welding of non-alloy and fine grain steels — Classification*

IEC 60064, *Tungsten filament lamps for domestic and similar general lighting purposes — Performance requirements*

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

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

IEC 60068-2-2, *Environmental testing — Part 2-2: Tests — Tests B: Dry heat*

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

IEC 60068-2-27, *Environmental testing — Part 2-27: Tests — Test Ea and guidance: Shock*

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

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 60081, *Double-capped fluorescent lamps — Performance specifications*

IEC 60529, *Degrees of protection provided by enclosures (IP code)*

IEC 62599-2, *Alarm systems — Part 2: Electromagnetic compatibility — Immunity requirements for components of fire and security alarm systems*

3 Terms and definitions, and abbreviated terms

3.1 Definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1.1
response threshold value
time it takes the detector to signal an alarm

Note 1 to entry: When tested as specified in 5.1.6.

Note 2 to entry: The response threshold value can depend on signal processing in the detector and in fire detection control and indicating equipment.

3.1.2
field of view
FOV
image captured by the video fire detector

Note 1 to entry: The FOV can be expressed as an angle or as a width and height, at a specified distance.

3.1.3
field of detecting
FOD
area in the *field of view* (3.1.2) in which smoke and/or flame can be detected by the *video fire detector* (3.1.5)

Note 1 to entry: The FOD may be determined based on type of fire, distance from fire source and manufacturer specifications.

3.1.4
illuminator
light source, internal or external to the *video fire detector* (3.1.5), that assists the equipment to operate in low ambient light conditions

3.1.5
video fire detector
VFD
self-contained device or distributed system in which analysis of video images is performed in order to detect the presence of smoke and/or flame within the images being analyzed

3.2 Abbreviated terms

EM	electromagnetic compatibility
FDCIE	fire detection control and indicating equipment
FOD	field of detecting
FOV	field of view

MIC measuring ionization chamber

IP ingress protection

VFD video fire detector

4 Requirements

4.1 Compliance

In order to comply with this document, the VFD shall meet the following requirements:

a) comply with the requirements of Clause 4, which shall be verified by visual inspection or engineering assessment;

b) be tested as specified in Clause 5, meeting the requirements of the tests;

c) be marked in accordance with Clause 6 and be accompanied by the documentation specified in Clause 7, which shall be verified by visual inspection.

4.2 Fire phenomena

The manufacturer shall declare, in the data presented in Clause 7, a phenomenon of fire in Table 1 to which the VFD is designed to respond.

Table 1 — Fire phenomena types

Type	Fire phenomena
A	Smoke
B	Flame
AB	Smoke and Flame

NOTE 1 Type AB VFD can detect flame emitted by test fire for type A VFD, and can also detect smoke from a type B test fire. Thus type AB VFD is NOT required to detect the smoke emitted by test fire for type A but it can signal an alarm to all the test fires.

NOTE 2 VFD can have two types (i.e. Type A and B) if the flame detection and smoke detection algorithms within the VFD can be separately activated/monitored.

4.3 Immunity to unwanted alarms

4.3.1 Detectors shall be immune from phenomena that can cause unwanted alarms.

4.3.2 Optional tests shall be performed where the manufacturer claims immunity to the phenomena.

4.4 Detection range

The manufacturer shall declare the ranges at which the VFD shall detect a fire in the data supplied in Clause 7.

4.5 Camera lenses

4.5.1 VFD may use interchangeable or variable focal length lenses.

4.5.2 A change of focus of the camera lens that prevents the VFD from detecting a fire shall cause a fault signal.

4.6 Camera lens monitoring

4.6.1 Contamination of the camera lens that prevents the VFD from detecting a fire shall cause a fault signal.

4.6.2 Complete obscuration of the camera lens that inhibits fire detection in the operating FOV shall cause a fault signal.

4.7 Individual alarm indication

4.7.1 Where the VFD does not display an image of the FOV to the user, then each video fire detector shall be provided with an integral red visual indicator by which the individual detector signals an alarm can be identified, until the alarm condition is reset. Where other conditions of the detector can be visually indicated, these shall be clearly distinguishable from the alarm indication.

4.7.2 Where the indicator is mounted on the camera, the visual indicator shall be visible from a distance of 6 m in an ambient light intensity up to 500 lx at an angle of up to:

a) 5° from the axis of the detector in any direction, and

b) 45° from the axis of the detector in at least one direction.

4.8 Connection of ancillary devices

The detector may provide for connections to ancillary devices (remote indicators, control relays, etc.), but open- or short-circuit failures of these connections shall not prevent the correct operation of the detector.

4.9 Monitoring of detachable cameras

For detachable cameras, a means shall be provided to detect the disconnection of the camera, in order to give a fault signal.

4.10 Connection of more than one VFD to the FDCIE transmission path

4.10.1 Where a VFD is designed to share the transmission path to the FDCIE with other devices; connections shall be such that a single transmission fault does not prevent an alarm signal from more than one VFD.

4.10.2 Where more than one VFD share the transmission path to the FDCIE, connections shall be such that one VFD fault signal does not prevent the alarm signal from any other VFD.

4.11 Manufacturer's adjustments

It shall not be possible to change the manufacturer's settings except by special means (e.g. the use of a special code or tool) or by breaking or removing a seal.

4.12 On-site adjustment of response behaviour

4.12.1 If there is provision for on-site adjustment of the response behaviour of the detector, then:

a) for all of the settings at which the manufacturer claims compliance, the detector shall comply with the requirements of this document and access to the adjustment means shall be possible only by the use of a code or special tool or by removing the detector from its base or mounting;

b) any setting or settings at which the manufacturer does not claim compliance with this document shall be accessible only by the use of a special code or tool, and it shall be clearly marked on the detector or in the associated data that if these setting or settings are used, the detector does not comply with this document.

4.12.2 Adjustments may be carried out at the VFD or at the fire detection control and indicating equipment.

4.13 Protection against the ingress of foreign bodies

4.13.1 The manufacturer shall declare, in the data presented in Clause 7, an enclosure protection rating (i.e. IP rating in accordance with IEC 60529) from Table 2 to which the VFD is designed to be protected against.

Table 2 — Video fire detector enclosure protection

Application	IP rating (see IEC 60529)
Indoor	30
Outdoor	54
Special	nominated by the manufacturer

4.13.2 Where the VFD includes more than one subassembly (e.g. a separate sensor and controller), some parts of the detector not designed to be installed in the environment to which the rating applies need not be assessed. In this case, the manufacturer's data shall declare the IP rating of each subassembly.

4.14 Ambient light operating level

The VFD shall operate over the range 15 lx to 10 000 lx.

NOTE In an installation, the light level range might need to be ensured by artificial illumination or shading if necessary.

4.15 Operating temperature

4.15.1 The manufacturer shall declare, in the data presented in Clause 7, the operating temperature specified in Table 3 to which the VFD is designed to operate.

Table 3 — Video fire detector operating environment

Application	Temperature
Indoor controlled	0 °C to 40 °C
Indoor	−10 °C to 55 °C
Outdoor 1	−25 °C to 70 °C
Outdoor 2	−40 °C to 55 °C
Special	nominated by the manufacturer and is an enhancement of the above

4.15.2 Where the VFD includes more than one subassembly (e.g. a separate sensor and controller i.e. a distributed system), some parts of the VFD not designed to be installed in the temperature to which the rating applies shall be assessed separately for their intended installation location. In this case, the manufacturer's data shall declare the environment suitable for each subassembly.

4.16 Software

4.16.1 General

The requirements of 4.16.2 and 4.16.3 shall be met for detectors which rely on software control in order to fulfil the requirements of this document.

4.16.2 Software design

In order to ensure the reliability of the detector, the following requirements for software design apply:

a) the software shall have a modular structure;

b) the design of the interfaces for manually and automatically generated data shall not permit invalid data to cause error in the program operation;

c) the software shall be designed to avoid the occurrence of deadlock of the program flow.

4.16.3 Storage of programs and data

4.16.3.1 The program necessary to comply with this document and any preset data, such as manufacturer's settings, shall be held in non-volatile memory. Writing to areas of memory containing this program and data shall be possible only by the use of some special tool or code and shall not be possible during normal operation of the detector.

4.16.3.2 Site-specific data shall be held in memory which will retain data for at least two weeks without external power to the detector, unless provision is made for the automatic renewal of such data, following loss of power, within 1 h of power being restored.

5 Tests

5.1 General

5.1.1 Atmospheric conditions for tests

5.1.1.1 Unless otherwise stated in a test procedure, carry out the testing after the test specimen has been allowed to stabilize in the standard atmospheric conditions for testing as specified in IEC 60068-1 as follows.

Temperature:	(15 to 35) °C
Relative humidity:	(25 to 75) %
Air pressure:	(86 to 106) kPa

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

5.1.2 Ambient light level for tests

5.1.2.1 Unless otherwise stated in a test procedure, carry out the testing as specified.