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Brand och räddning – Branddetekterings- och brandlarmsystem –
Del 10: Flamdetektorer

Fire detection and fire alarm systems –
Part 10: Flame detectors – Point detectors

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 54-10

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ICS 13.220.20

English version

Fire detection and fire alarm systems - Part 10: Flame detectors - Point detectors

Systèmes de détection et d'alarme d'incendie - Partie 10: Détecteurs de flamme - Détecteurs ponctuels

Brandmeldeanlagen - Teil 10: Flammenmelder - Punktförmige Melder

This European Standard was approved by CEN on 3 November 2001.

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

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

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Contents

Foreword

This document (EN 54-10) has been prepared by Technical Committee CEN/TC 72 " Fire detection and fire alarm 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of an identical text or by endorsement, at the latest by July 2002, and conflicting national standards shall be withdrawn at the latest by July 2004. For products which have complied with the relevant national standard before the date of withdrawal (dow), as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until July 2007.

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

Information on the relationship between this European Standard and other standards of the EN 54 series is given in annex A of EN 54-1:1996.

The annexes A, C and D are normative. The annexes B and E are informative.

1 Scope

This European Standard specifies requirements, test methods and performance criteria for point-type, resettable flame detectors that operate using radiation from a flame for use in fire detection systems installed in buildings.

This standard does not cover flame detectors working on different principles from those described in this standard (although the standard may be used as guidance in assessing such products).

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 54-1:1996, Fire detection and fire alarm systems — Part 1: Introduction

ISO 209-1, Wrought aluminium and aluminium alloys — Chemical composition and forms of products — Part 1: Chemical composition

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 60068-2-1:1990, Environmental testing — Part 2: Tests — Tests A: Cold

IEC 60068-2-2:1974, Basic environmental testing procedures — Part 2: Tests —Tests B: Dry heat

IEC 60068-2-6:1995, Environmental testing — Part 2: Tests — Test Fc: Vibration (sinusoidal)

IEC 60068-2-27:1987, Environmental testing — Part 2: Tests — Test Ea and guidance: Shock

IEC 60068-2-30:1980, Basic environmental testing procedure — Part 2: Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle)

IEC 60068-2-42:1982, Basic environmental testing procedure — Part 2: Test Kc: Sulphur dioxide test for contacts and connections

IEC 60068-2-56:1988, Environmental testing — Part 2: Tests — Test Cb: Damp heat, steady state, primarily for equipment

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

3 Terms and definitions

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

3.1
infrared (IR) detector
a flame detector responding only to radiation having wavelengths greater than 850 nm

3.2
ultra-violet (UV) detector
a flame detector responding only to radiation having wavelengths less than 300 nm

3.3
multiband detector
a flame detector having two or more sensing elements, each responding to radiation in a distinct wavelength range and each of whose outputs may contribute to the alarm decision

NOTE The alarm decision may be based on any arithmetic or logical combination of the individual signals.

3.4
sensitivity
a measure of the ability of a flame detector to detect fires

NOTE Sensitivity is not necessarily directly related to the response point.

3.5
detector classification
a classification of flame detectors to indicate their relative sensitivity to fire

NOTE Class 1 indicates the highest sensitivity and Class 3 the lowest sensitivity acceptable within this European standard.

3.6
response point
distance D, measured in accordance with 5.1.5, at which the individual flame detector under test gives an alarm signal

3.7
sensitivity adjustment
any adjustment of the detector or of the alarm criteria within the supply and monitoring equipment (see 5.1.2) that leads to a change in sensitivity

4 General requirements

4.1 Compliance

In order to comply with this standard the detector shall meet the requirements of this clause, which shall be verified by visual inspection or engineering assessment, shall be tested as described in clause 5 and shall meet the requirements of the tests.

4.2 Classification

Detectors shall conform to one or more of the following classifications: Class 1, Class 2 or Class 3 according to the requirements of the tests specified in 5.5.

4.3 Individual alarm indication

Each detector shall be provided with an integral red visual indicator, by which the individual detector, which released an alarm, may be identified, until the alarm condition is reset. Where other conditions of the detector may be visually indicated, they shall be clearly distinguishable from the alarm indication, except when the detector is switched into a service mode. For detachable detectors the indicator may be integral with the base or the detector head.

4.4 Connection of ancillary devices

Where the detector provides for connections to ancillary devices (e.g. remote indicators, control relays etc.), open- or short-circuit failures of these connections shall not prevent the correct operation of the detector.

4.5 Monitoring of detachable detectors

For detachable detectors, a means shall be provided for a remote monitoring system (e.g. the control and indicating equipment) to detect the removal of the head from the base, in order to give a fault signal.

4.6 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.

4.7 On-site sensitivity adjustment

If there is provision for on-site sensitivity adjustment of the detector then:

a) for each setting, at which the manufacturer claims compliance with this standard, the detector shall comply with the requirements of this standard and shall achieve a classification corresponding to that marked on the detector for that setting;

b) for each setting in a), access to the adjustment means shall only be possible by the use of a code or special tool or by removing the detector from its base or mounting;

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

NOTE These adjustments may be carried out at the detector or at the control and indicating equipment.

4.8 Data

Detectors shall either be supplied with sufficient technical, installation and maintenance data to enable their correct installation and operation[1)] or, if all of these data are not supplied with each detector, reference to the appropriate data sheet shall be given on, or with each detector.

NOTE Additional information may be required by organisations certifying that detectors produced by a manufacturer conform to the requirements of this standard.

4.9 Additional requirements for software controlled detectors

4.9.1 General

For detectors which rely on software control in order to fulfil the requirements of this standard, the requirements of 4.9.2, 4.9.3 and 4.9.4 shall be met.

4.9.2 Software documentation

4.9.2.1 The manufacturer shall submit documentation which gives an overview of the software design. This documentation shall be in sufficient detail for the design to be inspected for compliance with this standard and shall include at least the following:

a) a functional description of the main program flow (e.g. as a flow diagram or structogram) including:

— 1) a brief description of the modules and the functions that they perform;

— 2) the way in which the modules interact;

— 3) the overall hierarchy of the program;

— 4) the way in which the software interacts with the hardware of the detector;

— 5) the way in which the modules are called, including any interrupt processing.

b) a description of which areas of memory are used for the various purposes (e.g. the program, site specific data and running data);

c) a designation, by which the software and its version can be uniquely identified.

4.9.2.2 The manufacturer shall have available detailed design documentation, which only needs to be provided if required by the testing authority. It shall comprise at least the following:

a) an overview of the complete configuration of the product, including all software and hardware components;

b) a description of each module of the program, containing at least:

1) the name of the module;

2) a description of the tasks performed;

[1)] To enable correct operation of the detectors, these data should describe the requirements for the correct processing of the signals from the detector. This may be in the form of a full technical specification of these signals, a reference to the appropriate signalling protocol or a reference to suitable types of control and indicating equipment etc.

3) a description of the interfaces, including the type of data transfer, the valid data range and the checking for valid data.

c) full source code listings, as hard copy or in machine-readable form (e.g. ASCII-code), including all global and local variables, constants and labels used, and sufficient comment for the program flow to be recognized;

d) details of any software tools used in the design and implementation phase (e.g. CASE-tools, compilers).

4.9.3 Software design

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

a) the software shall have a modular structure;

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

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

4.9.4 The storage of programs and data

The program necessary to comply with this standard 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 only be possible by the use of some special tool or code and shall not be possible during normal operation of the detector.

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

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

a) temperature : (15 to 35) °C

b) relative humidity : (25 to 75) %

c) air pressure : (86 to 106) kPa

NOTE If variations in these parameters have a significant effect on a measurement, then such variations should be kept to a minimum during a series of measurements carried out as part of one test on one specimen.

5.1.2 Operating conditions for tests

If a test method requires a specimen to be operational, then the specimen shall be connected to suitable supply and monitoring equipment with characteristics as required by the manufacturer's data. Unless otherwise specified in the test method, the supply parameters applied to the specimen shall be set within the manufacturer's specified range(s) and shall remain substantially constant throughout the tests. The value chosen for each parameter shall normally be the nominal value, or the mean of the specified range. If a test

procedure requires a specimen to be monitored to detect any alarm or fault signals, then connections shall be made to any necessary ancillary devices (e.g. through wiring to an end-of-line device for conventional detectors) to allow a fault signal to be recognised.

Unless otherwise specified in the test method, detectors having adjustable sensitivity shall be set to their highest sensitivity for the conditioning.

NOTE The details of the supply and monitoring equipment and the alarm criteria used should be given in the test report.

5.1.3 Mounting arrangements

The specimen shall be mounted by its normal means of attachment in accordance with the manufacturer's instructions. If these instructions describe more than one method of mounting then the method considered to be most unfavourable shall be chosen for each test.

5.1.4 Tolerances

If a specific tolerance or deviation limit is not specified in a requirement or test procedure a deviation limit of ± 5 % shall be applied.

5.1.5 Determination of response point

5.1.5.1 Principle

The response point shall be measured by exposing the detector to the radiation from a suitable flame source and determining the greatest distance at which the detector will reliably produce an alarm condition within a time of 30 s.

5.1.5.2 Test apparatus

The test apparatus shall be as described in annex A.

The design and construction of the apparatus, and the surfaces surrounding the test area, shall be such that no significant radiation from the source reaches the detector apart from that which has passed through the aperture. (This means for example that there shall be no reflection of radiation from the walls or other parts of the apparatus, and no spurious radiation from hot flue gases or hot surfaces around the burner.)

Throughout this test method it is necessary to align the detector relative to its optical axis and to measure distances relative to the plane of the detector sensing element(s). If the detector does not have a well-defined optical axis then the manufacturer shall nominate an optical axis for the purposes of this test method. The position of this axis relative to an easily identifiable plane on the detector shall be noted in the test report.

Similarly, if the detector sensing elements do not lie in a well-defined plane then the manufacturer shall nominate a plane for the purposes of this test method. The position of this plane relative to an easily identifiable plane on the detector shall be noted in the test report.

5.1.5.3 Initial determination

A suitable area for the aperture shall be determined experimentally before the commencement of the test programme such that the response point of one detector, chosen at random from the specimens submitted for test, lies within the range 1300 mm to 1700 mm. The size and shape of the aperture used shall be recorded and shall be kept constant throughout the test programme. For detectors having adjustable sensitivity, and whose adjustment range covers more than one sensitivity class, it will be necessary to determine an appropriate aperture size for each sensitivity class of the detector.