

Approval Standard

Smoke Actuated Detectors
for Automatic Alarm Signaling

Class Number 3230
January 2010



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Foreword

The FM Approvals certification mark is intended to verify that the products and services described will meet FM Approvals' stated conditions of performance, safety and quality useful to the ends of property conservation. The purpose of Approval Standards is to present the criteria for FM Approval of various types of products and services, as guidance for FM Approvals personnel, manufacturers, users and authorities having jurisdiction.

Products submitted for certification by FM Approvals shall demonstrate that they meet the intent of the Approval Standard, and that quality control in manufacturing shall ensure a consistently uniform and reliable product. Approval Standards strive to be performance-oriented. They are intended to facilitate technological development.

For examining equipment, materials and services, Approval Standards:

- a) must be useful to the ends of property conservation by preventing, limiting or not causing damage under the conditions stated by the Approval listing; and
- b) must be readily identifiable.

Continuance of Approval and listing depends on compliance with the Approval Agreement, satisfactory performance in the field, on successful re-examinations of equipment, materials, and services as appropriate, and on periodic follow-up audits of the manufacturing facility.

FM Approvals LLC reserves the right in its sole judgment to change or revise its standards, criteria, methods, or procedures.

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1 INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states Approval requirements for Smoke Actuated Detectors for Automatic Alarm Signaling.
- 1.1.2 Approval criteria may include, but are not limited to, performance requirements, marking requirements, examination of manufacturing facility(ies), audit of quality assurance procedures, and a follow-up program.

1.2 Scope

- 1.2.1 This standard applies to any spot type smoke and beam type detector intended to be employed in indoor locations in accordance with the National Fire Alarm Code, NFPA 72, and ANSI/UL 268.
- 1.2.2 This standard applies to any duct type smoke detector intended to be employed in indoor locations in accordance with the National Fire Alarm Code, NFPA 72, and ANSI/UL 268A.
- 1.2.3 This standard applies to any aspirating type smoke detector intended to be employed in indoor locations in accordance with the National Fire Alarm Code, NFPA 72.
- 1.2.4 This standard specifically does not apply to video based smoke detector systems.

1.3 Basis for Requirements

- 1.3.1 The requirements of this standard are based on experience, research and testing, and/or the standards of other organizations. The advice of manufacturers, users, trade associations, jurisdictions and/or loss control specialists was also considered
- 1.3.2 The requirements of this standard reflect tests and practices used to examine characteristics of Smoke Actuated Detectors for Automatic Alarm Signaling for the purpose of obtaining Approval. Smoke Actuated Detectors for Automatic Alarm Signaling having characteristics not anticipated by this standard may be FM Approved if performance equal, or superior, to that required by this Standard is demonstrated, or if the intent of the standard is met. Alternatively, Smoke Actuated Detectors for Automatic Alarm Signaling which meet all of the requirements identified in this Standard may not be FM Approved if other conditions which adversely affect performance exist or if the intent of this standard is not met.

1.4 Basis for Approval

Approval is based upon satisfactory evaluation of the product and the manufacturer in the following major areas:

- 1.4.1 Examination and tests on production samples shall be performed to evaluate
 - the suitability of the product;
 - the performance of the product as specified by the manufacturer and required by FM Approvals; and as far as practical,
 - the durability and reliability of the product.
- 1.4.2 An examination of the manufacturing facilities and audit of quality control procedures is made to evaluate the manufacturer's ability to consistently produce the product which is examined and

tested, and the marking procedures used to identify the product. These examinations may be repeated as part of FM Approvals' product follow-up program.

1.5 Basis for Continued Approval

Continued Approval is based upon:

- production or availability of the product as currently FM Approved;
- the continued use of acceptable quality assurance procedures;
- satisfactory field experience;
- compliance with the terms stipulated in the Approval report;
- satisfactory re-examination of production samples for continued conformity to requirements; and
- satisfactory Facilities and Procedures Audits (F&PAs) conducted as part of FM Approvals' product follow-up program.

Also, as a condition of retaining Approval, manufacturers may not change a product or service without prior authorization by FM Approvals.

1.6 Effective Date

The effective date of an Approval standard mandates that all products tested for Approval after the effective date shall satisfy the requirements of that standard. Products FM Approved under a previous edition shall comply with the new version by the effective date or else forfeit Approval.

The effective date of this Standard is January 1, 2013 for compliance with all requirements.

1.7 System of Units

Units of measurement used in this Standard are United States (U.S.) customary units. These are followed by their arithmetic equivalents in International System (SI) units, enclosed in parentheses. The first value stated shall be regarded as the requirement. The converted equivalent value may be approximate. Appendix A lists the selected units and conversions to SI units for measures appearing in this standard. Conversion of U.S. customary units is in accordance with the American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)/American Society for Testing Materials (ASTM) SI 10-97, "Standard for Use of the International System of Units (SI): The Modern Metric System."

1.8 Applicable Documents

The following standards, test methods, and practices are referenced in this standard:

NFPA72, National Fire Alarm and Signaling Code, 2010 edition.

ANSI/UL 268, Standard for Safety Smoke Detectors for Fire Alarm Signaling Systems, 1996, revised October 2003.

ANSI/UL 268A, Standard for Safety Smoke Detectors for Duct Application, December 2008.

1.9 Definitions

For purposes of this standard, the following terms apply:

Aspirating Type detector – A type of smoke detector wherein air from the protected space is sampled with a tubing network and transported to the detection chamber with a fan.

Open area/Spot-Type Detector - A device in which the detecting element is concentrated at a particular location for detecting smoke in a space intended to be occupied.

Projected Beam-Type Detector - A type of photoelectric light obscuration smoke detector wherein the beam spans the protected area. Can be tested as a spot type or a duct detector depending on application.

Smoke Detector - A device that detects visible or invisible particles of combustion.

Test medium.- Smoke from a cotton wick or vaporized paraffin oil.

Transport time - a function of the characteristics of the tubing network from the source to the detector. Variations that affect transport time include but are not limited to: aspirating port size and number, tubing size and branches, fan capacity and exhaust port characteristics.

1.10 References

1. FM Global Data sheet 8-29 Refrigerated Storage
2. ISO 7420 -20 Fire Detection and fire alarm systems - Part 20: Aspirating Smoke Detectors

2 GENERAL INFORMATION

2.1 Product Information

Smoke detectors are supplied to connect to a fire alarm system through dry contact relays, or initiating device circuits or signaling line circuits as defined in the National Fire Alarm and Signaling Code, NFPA 72. They may be fabricated as a removable detector and a base that is wired to a permanently mounted electrical box. The smoke detectors are usually manufactured from polymeric materials. The detectors may be supplied as spot type, duct type, beam type, or aspirating type. Other designs meeting the criteria of this standard may also be considered for Approval. Components peculiar to a particular type of detector must have significant details described in the installation instructions as to how they are to be applied/installed/etc.

2.2 Approval Application Requirements

To apply for an Approval examination the manufacturer, or its authorized representative, should submit a request to

Electrical Director
FM Approvals
1151 Boston-Providence Turnpike
PO Box 9102
Norwood, MA 02062
U.S.A.

The manufacturer shall provide the following preliminary information with any request for Approval consideration:

- a complete list of all models, types, sizes, and options for the products or services being submitted for Approval consideration;
- general assembly drawings, complete set of manufacturing drawings, materials list, anticipated marking format, piping and electrical schematics, nameplate format, brochures, sales literature, spec. sheets, installation, operation and maintenance procedures, and
- the number and location of manufacturing facilities.
- all documents shall identify the manufacturer's name, document number or other form of reference, title, date of last revision, and revision level. All documents shall be provided with English translation.

2.3 Requirements for Samples for Examination

- 2.3.1 Following authorization of an Approval examination, the manufacturer shall submit samples for examination and testing based on the following:
- Sample requirements to be determined by FM Approvals following review of the preliminary information based on the applicable standard for the smoke detector type, see paragraphs 4.2, 4.3, and 4.4.
- 2.3.2 Requirements for samples may vary depending on design features, results of prior or similar testing, and results of any foregoing tests.
- 2.3.3 The manufacturer shall submit samples representative of production. Any decision to use data generated using prototypes is at the discretion of FM Approvals.
- 2.3.4 It is the manufacturer's responsibility to provide any test fixtures necessary to test their specific design, such as those which may be required to evaluate the strength of a properly glued joint of an aspirating detector piping network.

3 GENERAL REQUIREMENTS

3.1 Review of Documentation

During the initial investigation and prior to physical testing, the manufacturer's specifications and details shall be reviewed to assess the ease and practicality of installation and use. The Approval investigation shall define the limits of the Approval.

3.2 Physical or Structural Features

3.2.1 General

The smoke detector ratings shall be appropriate for the service conditions.

As applicable, based on the type of detector and the intended use, the detector will fall into one or more of the following categories and be evaluated to the referenced standards.

3.2.2 Open area/Spot type smoke detector

Spot type smoke detectors, of either the photocell or ionization type, typically characterized by a detachable head of 'clamshell' design that mounts to a base with two or four wire connections and intended installation location of indoor ceilings, shall meet the construction requirements of ANSI/UL 268.

3.2.3 Duct type smoke detector

Duct type smoke detectors, of either the photocell or ionization type, typically characterized by their construction that allows them to be mounted on the outside of a duct and sample the air in the duct, two or four wire connections, and intended installation location, shall meet the construction requirements of ANSI/UL 268A.