



Examination Standard for Smoke Actuated Detectors for Automatic Alarm Signaling

Class Number 3230

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Foreword

This standard is intended to verify that the products and services described will meet stated conditions of performance, safety and quality useful to the ends of property conservation. The purpose of this standard is to present the criteria for certification of various types of products and services.

Examination in accordance with this standard shall demonstrate compliance and verify that quality control in manufacturing shall ensure a consistent and reliable product.

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1 INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states testing and certification requirements for smoke actuated detectors for automatic alarm signaling.
- 1.1.2 Testing and certification criteria may include performance requirements, marking requirements, examination of manufacturing facility(ies), audit of quality assurance procedures, and a surveillance 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 certification. Smoke actuated detectors for automatic alarm signaling having characteristics not anticipated by this standard may be certified if performance equal, or superior, to that required by this standard is demonstrated.

1.4 Basis for Certification

Certification 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 performance of the product as specified by the manufacturer and required for certification;
 - the durability and reliability of the product.
- 1.4.2 An examination of the manufacturing facilities and audit of quality control procedures may be conducted 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. Subsequent surveillance may be required by the agency in accordance with the certification scheme to ensure ongoing compliance.

1.5 Basis for Continued Certification

The basis for continual certification may include the following based upon the certification scheme and requirements of the certification agency:

- production or availability of the product as currently certified;
- the continued use of acceptable quality assurance procedures;
- satisfactory field experience;
- compliance with the terms stipulated by the certification;
- satisfactory re-examination of production samples for continued conformity to requirements; and
- satisfactory surveillance audits conducted as part of the certification agency's product follow-up program.

1.6 Effective Date

The effective date of this examination standard mandates that all products tested for certification after the effective date shall satisfy the requirements of this standard.

The effective date of this standard is eighteen (18) months after the publication date of the standard 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. Conversion of U.S. customary units is in accordance with ANSI/IEEE/ASTM SI-10.

1.8 Normative References

The following referenced 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 cited edition applies.

ANSI/IEEE/ASTM SI 10, American National Standard for Metric Practice

ANSI/UL 268, 6th Edition, Standard for Smoke Detectors for Fire Alarm Systems (United States requirements only)

ANSI/UL 268A, 4th Edition, Standard for Smoke Detectors for Duct Application

EN 54-20, Fire Detection and fire alarm systems - Aspirating Smoke Detectors

ISO/IEC 17025, General Requirements for the Competence of Testing and Calibration Laboratories

NFPA 72, National Fire Alarm and Signaling Code

1.9 Terms and Definitions

For purposes of this standard, the following terms apply:

Agency – a certification agency or test agency

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.

2 GENERAL INFORMATION

2.1 Product Information

Smoke detectors are supplied to connect to a fire alarm system through dry contact relays, initiating device circuits or signaling line circuits as defined in 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 certification. 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 Certification Application Requirements

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

- a complete list of all models, types, sizes, and options for the products or services being submitted for certification 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 a certification examination, the manufacturer shall submit samples for examination and testing based on the following:
- Sample requirements to be determined by the certification agency based on the applicable standard for the smoke detector type.
- 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 the agency.
- 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 agency examination results may further define the limits of the final certification.

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 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 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.

3.2.4 Aspirating type detector

Depending on the application, aspirating detectors shall comply with the requirements of either 3.2.2 or 3.2.3 in addition to 3.2.4.

3.2.4.1 Aspirating type smoke detectors, usually based on the photocell principle, typically characterized by their construction requiring the use of a tubing network and a fan to move air sampled from the protected space to the sensing chamber, Class A or Class B detection circuit connection, separate power supply connection and intended installation location.

3.2.4.2 Tubing used for aspirating detectors shall be sturdy and resistant to temperature variation as demonstrated by the ability to resist, as a minimum, 28 pounds (125 N) of compression force and 0.37 foot-pound (0.5 J) impact, over the temperature range of 5 to 140°F (-15 to 60°C).

The compression test shall be conducted as follows: The two samples of tubing shall be arranged within an environmental chamber. Prior to any exposure, the air flow through the tubing shall be measured using an anemometer with a sample detector and noted. A steel plate measuring 10 inches (254 mm) by 4 inches (102 mm) shall be placed across both tubing samples. The plate shall be loaded with additional weights, so that the total load is 56 lbs (28 lbs applied to each tubing sample). The samples shall be conditioned for 3 hours at the lower temperature extreme, and then tested for airflow by inserting the samples back into the airflow measurement arrangement. The samples shall then be placed back into the environmental chamber and subjected to the compressive load. After 3 hours of conditioning at the higher temperature extreme, the airflow test shall be