# UL 268A

## STANDARD FOR SAFETY

Smoke Detectors for Duct Application

UL Standard for Safety for Smoke Detectors for Duct Application, UL 268A

Fourth Edition, Dated December 11, 2008

***Summary of Topics***

***This revision of ANSI/UL 268A dated August 25, 2023 is being issued to incorporate the following requirements:***

***– Electronic Installation Instructions, 55.1***

Text that has been changed in any manner or impacted by ULSE's electronic publishing system is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated July 7, 2023.

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**ANSI/UL 268A-2023**



# UL 268A

## Standard for Smoke Detectors for Duct Application

Some requirements specified in this standard were previously covered in the Standard for Combustion Products Type Smoke Detectors for Fire Protective Signaling Systems, UL 167, and Photoelectric Type Smoke Detectors for Fire Protective Signaling Systems, UL 168.

First Edition – May, 1983
Second Edition – March, 1993
Third Edition – May, 1998

**Fourth Edition**

**December 11, 2008**

This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through August 25, 2023.

The most recent designation of ANSI/UL 268A as an American National Standard (ANSI) occurred on August 22, 2023. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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## INTRODUCTION

### 1 Scope

1.1 These requirements cover air duct smoke detectors intended for indoor use within or protruding into a duct, or mounted in a housing with sampling tubes extending into or traversing a duct. Air duct smoke detectors are intended to be installed in ducts where the maximum air temperature inside the duct does not exceed 100°F (38°C), nor does the minimum temperature become less than 32°F (0°C), in accordance with the Standard for Automatic Fire Detectors, NFPA 72, and the Standard for the Installation of Air Conditioning and Ventilating Systems, NFPA 90A.

1.2 An air duct smoke detector unit, as covered by these requirements, is intended to detect smoke for the primary purpose of controlling blowers and dampers of air conditioning and ventilating systems to reduce the risk of panic and damage from distribution of smoke and gaseous products. Each unit consists of an assembly of electrical components, including a sensing means to detect smoke (sensing head or projected beam assembly), sampling tubes or equivalent (based on design), provision for connection to a source of power, and means for generating a signal when smoke is detected. It is not prohibited that remote control circuits be provided. A detector shall be powered from a commercial power source, separate power supply, or be connected to a control unit as part of a fire protection signaling system. Duct detectors are not intended as a substitute for open area protection.

1.3 These requirements cover detectors:

a) Intended to control air conditioning and ventilating systems,

b) Intended for control of releasing devices, such as fire and smoke dampers, or

c) Both (a) and (b).

1.4 These requirements do not cover:

a) Control units that are covered by the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864, to which the air duct smoke detectors are connected.

b) Single and multiple station smoke detectors covered by the Standard for Smoke Alarms, UL 217.

c) Smoke detectors intended for open area protection or releasing device service, or both, covered by the Standard for Smoke Detectors for Fire Alarm Systems, UL 268.

d) Smoke detectors integral with combination door closers and holders, covered by the Standard for Door Closers-Holders, With or Without Integral Smoke Detectors, UL 228.

e) Commercial-resident detectors not intended for connection to a system control unit that are covered by the Standard for Smoke Detector Monitors and Accessories for Individual Living Units of Multifamily Residences and Hotel/Motel Rooms, UL 1730.

1.5 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

## 2 General

### 2.1 Components

2.1.1 Except as indicated in 2.1.2, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components usually used in the products covered by this standard.

2.1.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard; or

b) Is superseded by a requirement in this standard.

2.1.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.1.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

### 2.2 Units of measurement

2.2.1 When a value of measurement is followed by a value in other units in parentheses, the first stated value is the requirement.

2.2.2 Unless otherwise indicated, all voltage and current values specified in this standard are root-mean-square (rms).

### 2.3 Undated references

2.3.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

## 3 Glossary

3.1 For the purposes of this standard the following definitions apply.

3.2 COMBINATION SMOKE DETECTOR – A smoke detector that employs more than one smoke detecting means in one unit. In a combination smoke detector either each principle predominates, or contributes in response to at least one of the fire tests described in Fire Tests, Section 36.

3.3 COMPONENT, LIMITED-LIFE – A component that is expected to malfunction and be periodically replaced, and the malfunction of which is monitored when malfunction of the component affects detector operation or sensitivity or both.

3.4 COMPONENT, RELIABLE – A component that is not expected to malfunction or be periodically replaced and therefore is not monitored. A reliable component has a predicated failure rate of 2.5 or less failures per million hours. See Supplement SA.

3.5 PHOTOELECTRIC LIGHT OBSCURATION SMOKE DETECTION – The principle of using a light source and photosensitive sensor onto which the principal portion of the source emissions is focused.

When smoke particles enter the light path, some of the light is scattered and some is absorbed, thereby reducing the light condition when it meets preset criteria.

3.6 PHOTOELECTRIC LIGHT-SCATTERING SMOKE DETECTION – The principle of using a light source and photosensitive sensor arranged so that the rays from the light source do not normally fall onto the photosensitive sensor. When smoke particles enter the light path, some of the light is scattered by reflection and refraction onto the sensor. The light signal is processed and used to convey an alarm condition when it meets preset criteria.

3.7 PROJECTED BEAM TYPE SMOKE DETECTOR – A type of photoelectric light obscuration smoke detector wherein the beam spans the protected area.

3.8 SPOT TYPE SMOKE DETECTOR – A device with the detecting element concentrated at a particular location. A spot type detector is usually employed with a velocity shield or within a duct housing, and serves as the smoke sensing component.

3.9 TROUBLE SIGNAL – A signal initiated by the fire alarm system or device indicative of a fault in a monitored circuit or component.

3.10 VOLTAGE CIRCUITS: (For purposes of this standard only)

a) Low-Voltage Circuit – A circuit involving a potential of not more than 30 volts AC (42.4 volts peak or DC), and supplied from a circuit that is limited to a maximum of 100 volt-amperes.

b) Line-Voltage Circuit – A circuit having characteristics in excess of those of a low-voltage circuit.

3.11 MANUFACTURER'S PUBLISHED INSTRUCTIONS – Published installation and operating documentation provided for each product or component. The documentation includes directions and necessary information for the intended installation, maintenance, and operation of the product or component.

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## 4 Manufacturer's Published Instructions

4.1 A copy of the manufacturer's published instructions, which includes installation and operating instructions, related schematic wiring diagrams and installation drawings shall be used as a reference in the examination and test of the detector. For this purpose, a printed edition is not required. The information may be included in a manual or technical bulletin. See Marking, Section 54, Installation Wiring Diagram, Section 55, and Technical Bulletin, Section 56.

4.2 The manufacturer's published instructions and drawings shall include such directions and information as deemed by the manufacturer to be required for proper installation, testing, maintenance, operation, and use of the detector.

## CONSTRUCTION

### 5 Enclosure

#### 5.1 General

5.1.1 An electrical part of a product shall be enclosed so as to reduce the risk of contact with uninsulated live parts. A separate enclosure for field-wiring terminals enclosed by a back box is not required.

5.1.2 Enclosures for individual electrical components, outer enclosures, and combinations of the two are to be considered in determining compliance with the requirement in 5.1.1.

5.1.3 An enclosure of an air duct smoke detector assembly shall resist total or partial collapse with the subsequent reduction of spacings, loosening or displacement of parts, and other defects, that alone or in combination result in a risk of fire, electric shock, or injury to persons, or affect operation.

5.1.4 An enclosure of an air duct smoke detector shall be provided with means for mounting in the intended manner. Any fittings, such as brackets and hangers, required for mounting shall be furnished with the detector. The mounting means shall be accessible without disassembling any operating part of the assembly. The removal of a completely assembled panel, cover, sensing head, or equivalent, to mount the assembly is not considered to be disassembly of any operating part.

5.1.5 With reference to the requirements of 5.1.4, the sensing area unit is to be installed remote from the sampling tube assembly only when air-tight metal-protected tubing and compatible fittings are employed.

#### 5.2 Cast metal enclosures

5.2.1 The thickness of cast metal used for an enclosure shall be as specified in Table 5.1. Cast metal having a thickness 1/32 inch (0.8 mm) less than that specified in Table 5.1 shall be employed only when the surface under consideration is curved, ribbed, or otherwise reinforced, or when the shape, size, or both, of the surface is such that the mechanical strength is equivalent to that of material specified in Table 5.1.

**Table 5.1**
**Cast-metal enclosures**

| Use, or dimensions of area involved | Minimum thickness | | | |
|---|---|---|---|---|
| | Die-cast metal, | | Cast metal of other than the die-cast type, | |
| | inch | (mm) | inch | (mm) |
| Area of 24 square inches (155 $cm^2$) or less and having no dimension greater than 6 inches (152 mm) | 1/16[a] | 1.6 | 1/8 | 3.2 |
| Area greater than 24 square inches (155 $cm^2$) or having any dimension greater than 6 inches (152 mm) | 3/32 | 2.4 | 1/8 | 3.2 |
| At a threaded conduit hole | 1/4 | 6.4 | 1/4 | 6.4 |
| At an unthreaded conduit hole | 1/8 | 3.2 | 1/8 | 3.2 |

[a] The area limitation for metal 1/16 inch (1.6 mm) in thickness is obtained by reinforcing ribs subdividing a larger area.

5.2.2 When threads for the connection of conduit are tapped all the way through a hole in a metal enclosure wall, there shall not be less than 3-1/2 nor more than five threads in the metal, and the construction shall be such that a standard conduit bushing is capable of being attached.

5.2.3 When threads for the connection of conduit are tapped only part of the way through a hole in an enclosure wall, there shall be a smooth, rounded inlet hole for the conductors that shall afford protection to the conductors equivalent to that provided by a standard conduit bushing.

## 5.3 Sheet metal enclosures

5.3.1 The thickness of sheet metal for an enclosure shall not be less than that specified in Table 5.2.

*Exception: Sheet metal of lesser thickness is not prohibited from being employed when the surface under consideration is curved, ribbed, or otherwise reinforced, or the shape, size, or both, of the surface provides mechanical strength equivalent to that provided by the values of Table 5.2.*

**Table 5.2**
**Sheet metal enclosures**

| Maximum dimensions of enclosure | | | | Minimum thickness of sheet metal | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length or width, | | Area, | | Steel, zinc-coated, | | | Steel, uncoated, | | | Brass or aluminum, | | |
| inch | (mm) | inch$^2$ | (cm$^2$) | inch | (mm) | GSG | inch | (mm) | GSG | inch | (mm) | AWG |
| 12 | (305) | 90 | (581) | 0.034 | (0.86) | 20 | 0.032 | (0.81) | 20 | 0.045 | (1.14) | 16 |
| 24 | (610) | 360 | (2322) | 0.045 | (1.14) | 18 | 0.042 | (1.07) | 18 | 0.058 | (1.47) | 14 |
| 48 | (1219) | 1200 | (7742) | 0.056 | (1.42) | 16 | 0.053 | (1.35) | 16 | 0.075 | (1.91) | 12 |
| 60 | (1524) | 1500 | (9678) | 0.070 | (1.78) | 14 | 0.067 | (1.70) | 14 | 0.095 | (2.41) | 10 |
| Over 60 | (1524) | Over 1500 | (9678) | 0.097 | (2.46) | 12 | 0.093 | (2.36) | 12 | 0.122 | (3.10) | 8 |

5.3.2 Sheet metal shall not be less than 0.032 inch thick (0.81 mm) when of uncoated steel, not less than 0.034 inch (0.86 mm) when of galvanized steel, and not less than 0.045 inch (1.14 mm) when of nonferrous metal at any point where conduit or metal-cable is to be attached.

5.3.3 A ferrous plate or plug closure for an unused conduit opening or other hole in the enclosure having a 1-3/8 inch (34.9 mm) diameter maximum dimension shall have a thickness not less than 0.027 inch (0.69 mm) for steel or 0.032 inch (0.81 mm) for nonferrous metal.

5.3.4 A closure for a hole larger than 1-3/8 inch (34.9 mm) diameter shall either have a thickness equal to that required for the enclosure of the detector or a standard knockout seal shall be used. Such plates or plugs shall be securely mounted.

5.3.5 A knockout in a sheet metal enclosure shall be secured, and shall be removable without permanent deformation of the enclosure.

5.3.6 A knockout shall be provided with a surrounding surface for seating of a conduit bushing, and shall be located so that installation of a bushing at any knockout used during installation does not result in spacings between uninsulated live parts and the bushing of less than those required in (Spacings) General, Section 23.

## 5.4 Nonmetallic enclosures

5.4.1 An enclosure or parts of an enclosure of nonmetallic material shall have the mechanical strength required to comply with Tests of Polymeric Materials, Section 49, and Tests of Elastomeric Materials, Section 50.

5.4.2 Openings in an enclosure for line-voltage circuits, including perforated holes, louvers, and openings protected by means of wire screening, expanded metal, or a perforated cover, shall be of such size or shape and so arranged that a probe, as illustrated in Figure 5.1, is incapable of being made to contact any line-voltage, uninsulated live electrical parts when inserted through the opening in a straight or articulated position.

**Figure 5.1**

**Articulate probe**