



# UL 1484

## STANDARD FOR SAFETY

### Residential Gas Detectors

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UL Standard for Safety for Residential Gas Detectors, UL 1484

Fifth Edition, Dated April 20, 2016

### **Summary of Topics**

***This revision of ANSI/UL 1484 dated February 23, 2022 includes updates to combustible gas detection threshold requirements; [49.1.1](#) and [49.1.10](#)***

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

The revisions are substantially in accordance with Proposal(s) on this subject dated December 10, 2021.

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**UL 1484**

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**Fifth Edition**

**April 20, 2016**

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The most recent designation of ANSI/UL 1484 as an American National Standard (ANSI) occurred on February 23, 2022. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page. Any other portions of this ANSI/UL standard that were not processed in accordance with ANSI/UL requirements are noted at the beginning of the impacted sections.

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

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## CONTENTS

### INTRODUCTION

1	Scope .....	7
2	Components .....	7
3	Units of Measurement .....	7
4	Undated References .....	7
5	Terminology .....	7
6	Glossary .....	8
7	Detector Reliability Prediction .....	9
8	Lifetime .....	9
9	Installation and Operating Instructions .....	10

### CONSTRUCTION

#### ASSEMBLY

10	Product Assembly .....	10
11	Detection-Threshold Adjustment .....	10
12	Supplementary Signaling Feature .....	10
13	Sharp Edges .....	10
14	Enclosures .....	11
	14.1 General .....	11
	14.2 Electrical component enclosures .....	11
	14.3 Sheet metal enclosures .....	11
	14.4 Cast metal enclosures .....	11
	14.5 Nonmetallic enclosures .....	12
	14.6 Product mounting .....	12
	14.7 Ventilating openings .....	12
	14.8 Screens and expanded metal .....	13
	14.9 Glass panels .....	13
15	Protection Against Corrosion .....	14

#### FIELD-WIRING CONNECTIONS

16	General .....	14
17	Cord-Connected Products .....	15
18	Permanently Connected Products .....	15
	18.1 General .....	15
	18.2 Field-wiring compartment .....	15
	18.3 Field-wiring terminals .....	16
	18.4 Field-wiring leads .....	16
	18.5 Grounded supply terminals and leads .....	16
19	Supplementary Signaling Circuits .....	17
20	Grounding .....	17

#### INTERNAL WIRING

21	General .....	18
22	Wiring Methods .....	18
	22.1 Wireways .....	18
	22.2 Splices .....	18
	22.3 Bushings .....	18

22.4	Barriers.....	19
23	Separation of Circuits .....	19
24	Bonding for Grounding.....	19

## ELECTRICAL COMPONENTS

25	General .....	20
25.1	Mounting of components .....	20
25.2	Insulating materials .....	20
25.3	Uninsulated live parts.....	21
25.4	Current-carrying parts .....	21
26	Lampholders and Lamps.....	21
27	Printed-Wiring Boards.....	22
28	Protective Devices.....	22
29	Switches.....	22
30	Transformers .....	22

## SPACINGS

31	General .....	23
----	---------------	----

## PERFORMANCE

### GENERAL

32	Samples and Data for Test .....	25
33	Test Voltages .....	27

### TESTS

34	Normal Operation Test.....	27
35	Input Measurement Test .....	28
36	Electrical Supervision Test .....	28
36.1	General.....	28
36.2	Power loss .....	28
36.3	Power interruption .....	28
36.4	Silencing means .....	28
36.5	Component failure .....	28
37	Temperature Test .....	29
38	Dielectric Voltage-Withstand Test .....	31
39	Abnormal-Operation Test .....	32
40	Overload Test.....	32
40.1	Detector.....	32
40.2	Separately energized circuits .....	32
41	Endurance Test .....	33
41.1	Detector.....	33
41.2	Separately energized circuits .....	33
41.3	Audible signaling appliance .....	33
42	Audibility Test.....	33
43	Leakage Current Test .....	34
44	Tests of Thermoplastic Materials.....	35
44.1	General.....	35
44.2	Accelerated air-oven aging test.....	35
44.3	Flame test.....	35
45	Power Supply Tests .....	36

45.1	General.....	36
45.2	VA capacity .....	36
45.3	Burnout test.....	36
46	Polarity Reversal Test .....	36
47	Electric Shock Current Test .....	37
48	Ignition Test .....	41
49	Detection Threshold Tests.....	42
49.1	General.....	42
49.2	Overvoltage test .....	45
49.3	Undervoltage test .....	45
49.4	Variable ambient test – all gas detectors .....	45
49.5	Variable ambient test – RV gas detectors.....	45
49.6	Humidity test .....	46
49.7	Effect of shipping and storage.....	46
49.8	Transient tests.....	46
49.9	Stability tests .....	49
49.10	Jarring test .....	50
49.11	Static discharge test .....	51
49.12	Dust test.....	52
49.13	Vibration test – all gas detectors.....	52
49.14	Vibration test – RV gas detectors .....	52
49.15	Corrosion test – all gas detectors .....	52
49.16	Corrosion (salt spray) test – RV gas detectors.....	53
49.17	Contamination test (cooking by-products) – all gas detectors .....	53
50	Permanence of Marking Tests .....	56
51	Strain-Relief Test.....	56
51.1	General.....	56
51.2	Power supply cord .....	56
51.3	Field-wiring leads.....	56

**MANUFACTURING AND PRODUCTION TESTS**

52	General .....	56
53	Production-Line Detection-Threshold Calibration Tests .....	56
54	Production-Line Dielectric Voltage-Withstand Test .....	57
55	Production-Line Grounding Continuity Tests.....	57

**MARKING**

56	General.....	57
----	--------------	----

**INSTRUCTIONS**

57	General .....	58
----	---------------	----

**SUPPLEMENT SA – RELIABILITY AND FAILURE RATE DETERMINATION INFORMATION**

**GENERAL**

SA1	Instructions for Determining a Reliability Prediction for Gas Detectors.....	61
SA2	Methods of Determining Failure Rate .....	61
SA3	Maximum Detector Failure Rates .....	71

**CRITERIA FOR ACCEPTANCE OF MICROELECTRONIC DEVICES**

SA4	General.....	71
SA5	Quality-Assurance-Screening Program .....	72
SA6	Determination of Failure Rate Number Supplemented by Burn-In Test .....	73
SA6.1	General .....	73
SA6.2	Determination sequence.....	73
SA6.3	Test calculations and procedures.....	73
SA6.4	Test conditions.....	75
SA6.5	Failure-rate number calculation .....	75

**APPENDIX A**

Standards for Components .....	77
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## INTRODUCTION

### 1 Scope

1.1 These requirements cover electrically operated gas detectors intended for installation in residential occupancies and recreational vehicles (RVs).

1.2 These requirements cover gas detectors intended to detect flammable gases such as propane and natural gas.

1.3 These requirements also cover all remote accessories that may be connected to a gas detector.

1.4 These requirements do not cover gas detectors for use in hazardous locations, as defined by the National Electrical Code, NFPA 70, for industrial or commercial use, or for use as smoke and fire detectors.

### 2 Components

2.1 Except as indicated in [2.2](#), 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 used in the products covered by this standard.

2.2 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.

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

2.4 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.

### 3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

### 4 Undated References

4.1 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.

### 5 Terminology

5.1 The term "product" as used in these requirements refers to all or any part of a product covered by these requirements unless specifically noted otherwise.

## 6 Glossary

6.1 For the purpose of this standard the following definitions apply.

6.2 ALARM SIGNAL – A signal intended to indicate a gas concentration in excess of the preset detector alarm level.

6.3 COMPONENTS:

a) Nonreliable Component – A component that is expected to fail and be periodically replaced and the failure of which is supervised. Typical examples of such components include incandescent lamps, electronic tube heaters, and functional heating elements.

b) Reliable Component – A component that is not expected to fail or be periodically replaced and is not supervised. A reliable component shall have a predicted failure rate of 3.5 or fewer failures per million hours.

6.4 DETECTION THRESHOLD – The minimum gas concentration at which the detector will alarm.

6.5 DETECTOR, GAS – A self-contained alarm device that consists of an assembly of electrical components including an element to detect gas concentration, an alarm sounding appliance, and provision for connection to a power supply source by either splice leads or a cord and plug arrangement. Terminals may be included for connection to a remote audible signaling appliance or accessory.

6.6 ELECTRICAL CIRCUITS:

a) High-Voltage Circuit – A circuit involving a potential of not more than 600 volts and having circuit characteristics in excess of those of a low-voltage circuit.

b) Low-Voltage Circuit – A circuit involving a potential of not more than 30 volts AC, rms, 42.4 volts DC or AC peak and:

1) Supplied by an NEC Class 2 transformer, or by a transformer and fixed impedance each of which, as a unit, is in compliance with the requirements for a Class 2 transformer; or

2) Limited to a maximum of 100 volt-amperes.

A circuit derived from a source of supply classified as a high-voltage circuit, by connecting resistance in series with the supply classified as a high-voltage circuit, is not considered to be a low-voltage circuit.

6.7 END-OF-LIFE-SIGNAL – An audible signal, differing from the alarm signal, intended to indicate that the device has reached the end of its useful life and should be replaced. It is permitted for the audible component of the signal to be of the same format as a trouble signal, provided a visual indicator is employed to differentiate between the end-of-life and other trouble conditions. The end-of-life signal shall repeat once every 30 – 60 seconds  $\pm 10$  percent.

6.8 LOWER EXPLOSIVE LIMIT (LEL) – The minimum concentration of a gas in air which, if ignited, will propagate flame throughout the gas-air mixture independently of continued application of the source of ignition; expressed as a percent by volume of gas in air.

6.9 NORMAL STANDBY CONDITION – The operating condition of the detector as intended by the manufacturer in which the detector is ready for alarm-signaling performance.

6.10 SPECIFIED LIFETIME – A continuous period of time specified by the manufacturer, during which the alarm meets the requirements of this standard. The manufacturer will specify the start date of the period as either the date of manufacture of the fully assembled unit in its final enclosure, or the date the unit is placed into service.

6.11 SWITCHING DEVICE – A device designed to close and/or open one or more electrical circuits.

6.12 TROUBLE SIGNAL – A visual or audible signal intended to indicate a fault or trouble condition, such as an open or shorted condition of a component in the device or an open or ground in the connected wiring.

## 7 Detector Reliability Prediction

7.1 A detector unit shall be intended for a failure rate of not more than:

- a) 4.0 failures per million hours as calculated by a full part stress analysis prediction as described in Section 5.1 of MIL-HBK 217 or
- b) 3.5 failures per million hours as calculated by a simplified parts count-reliability prediction as described in Section 5.2 of MIL-HBK 217, or equivalent. A Ground Fixed ( $G_F$ ) environment is to be used for all calculations. If equivalent data is available from the manufacturer, it may be used in lieu of the projected data for the purpose of determining acceptable reliability.

7.2 Any component, the failure of which results in an audible trouble signal, shall not be included in the failure rate calculation. The audible signal appliance shall not be included in the reliability prediction.

## 8 Lifetime

8.1 The unit (including the sensor but excluding batteries) shall have a specified lifetime of at least 3 years from the date of manufacture, or from the date the unit is placed into service. If the manufacturer bases the specified lifetime on the date that the unit is placed into service, this specification shall be substantiated with technical data documenting that performance degradation is not likely to occur prior to the unit being placed into service, if the unit is placed into service within 18 months after manufacture. The selection of which basis is employed to define the beginning of specified lifetime may be contingent upon the technology of the sensor used in the unit.

8.2 The unit shall indicate end-of-life, based on the manufacturer's specified lifetime, with an end-of-life signal (see [6.7](#)) This signal shall be triggered either by an internal timer or by self-diagnostic test(s). See [49.1.11](#).

- a) For a unit that employs a signal generated by an internal time, once maximum specified lifetime is reached the end-of-life signal shall be initiated. The timer can be reset repeatedly, for a period not exceeding 72 hours for each period of reset, if self-diagnostic test(s) indicate that the unit still meets the requirements of this standard. The timer shall not be able to be reset after 30 days following the initial end-of-life signal.
- b) For a unit that employs a signal generated by a self-diagnostic test, once this test has determined the device no longer meets the requirements of this standard, the end-of-life signal shall be initiated.
- c) If the sensor is automatically and periodically tested for response to gas, then the unit's specified lifetime calculations can exclude the sensor component.

## 9 Installation and Operating Instructions

9.1 A copy of the installation and operating instructions and related schematic wiring diagrams and installation drawings shall be used as guides in the examination and test of the detector. For an investigation, a printed edition is not required; however, in accordance with Instructions, General, Section [57](#), a printed edition is required to be provided with each finished product. The information may be included in a user's manual.

9.2 The instructions and drawings shall include such directions and information deemed by the manufacturer as necessary for correct installation, testing, maintenance, operation, and use of the detector.

## CONSTRUCTION

### ASSEMBLY

#### 10 Product Assembly

10.1 A product shall be factory-built as a complete assembly and shall include all the essential components necessary for its intended function when installed as intended.

10.2 A product shall be constructed so that disassembly is not possible without at least the use of a common hand tool. Disassembly of any part of the detector shall not be necessary for intended installation.

*Exception: A removable detector cover, with or without the use of a hand tool, may be used if removal of the cover does not expose the installer to a risk of electric shock.*

#### 11 Detection-Threshold Adjustment

11.1 If a field detection-threshold adjustment is provided, it shall be accessible with the detector installed as intended, marked to indicate the upper or lower detection threshold, and employ a mechanical stop at both extremes. The detection threshold at the upper detection threshold end shall be within the limits specified in [49.1.1](#).

11.2 Removal of a snap-on cover to gain access to the detection threshold control is permissible if no high-voltage parts can be contacted by the user.

#### 12 Supplementary Signaling Feature

12.1 A supplementary signaling feature, such as a transmitter for remote signaling, integral with a gas detector, shall be compatible with the device with which it is intended to be used and shall comply with the requirements in this standard.

#### 13 Sharp Edges

13.1 An enclosure, a frame, a guard, a handle, or the like of a gas detector shall be smooth and rounded so as not to cause an injury when contacted during use, and shall be evaluated in accordance with the Standard for Test for Sharpness of Edges on Equipment, UL 1439.

## 14 Enclosures

### 14.1 General

14.1.1 The enclosure of a detector shall be sufficiently strong and rigid to resist the abuses likely to be encountered in intended use. The degree of resistance to abuse inherent in the detector shall preclude total or partial collapse with the consequent reduction of spacings, loosening or displacement of parts, and other defects that alone or in combination constitute an increase in the risk of fire, electric shock, or injury to persons.

### 14.2 Electrical component enclosures

14.2.1 Enclosures for individual electrical components, outer enclosures, and combinations of the two are to be considered in determining compliance with the requirement in [14.1.1](#).

14.2.2 All electrical parts of a detector, including a separate power supply, except for plug-in blades, shall be enclosed to reduce the risk of unintentional contact with uninsulated live parts. A separate enclosure is not required for field-wiring terminals that will be enclosed by a back box.

### 14.3 Sheet metal enclosures

14.3.1 The thickness of sheet metal used for the enclosure of a detector shall not be less than specified in [Table 14.1](#).

*Exception: Sheet metal 20 percent thinner may be used if the surface under consideration is curved, ribbed, or otherwise reinforced, or if the shape or size of the surface is such that equivalent mechanical strength is determined to be provided.*

**Table 14.1**  
**Sheet metal enclosures**

Maximum dimensions of enclosure				Minimum thickness of sheet metal					
				Steel				Aluminum or brass	
Length or width		Area		Zinc-coated		Uncoated			
inches	(mm)	inches <sup>2</sup>	(cm <sup>2</sup> )	inch	(mm)	inch	(mm)	inch	(mm)
12	(305)	90	(581)	0.034	(0.86)	0.032	(0.81)	0.045	(1.14)
24	(610)	360	(2322)	0.045	(1.14)	0.042	(1.07)	0.058	(1.47)
48	(1219)	1200	(7742)	0.056	(1.42)	0.053	(1.35)	0.075	(1.91)
60	(1524)	1500	(9678)	0.070	(1.78)	0.067	(1.70)	0.095	(2.41)
Over 60	(1524)	Over 1500	(9678)	0.097	(2.46)	0.093	(2.36)	0.122	(3.10)

14.3.2 At any point where conduit or metal-clad cable is attached, sheet metal shall be of such thickness or so formed or reinforced that it will have a stiffness at least equivalent to that of an uncoated flat sheet steel having a minimum thickness of 0.053 inch (1.35 mm).

### 14.4 Cast metal enclosures

14.4.1 The thickness of cast metal for an enclosure shall be as specified in [Table 14.2](#). Cast metal having a thickness 1/32 inch (0.8 mm) less than that specified in the table may be used if the surface under consideration is curved, ribbed, or otherwise reinforced, or if the shape or size of the surface is such that equivalent mechanical strength is provided.

**Table 14.2**  
**Cast-metal enclosures**

Use, or dimensions of area involved	Minimum thickness			
	Die-cast metal		Cast metal other than die-cast	
	inch	(mm)	inch	(mm)
Area of 24 square inches (155 cm <sup>2</sup> ) or less and having no dimension greater than 6 inches (152 mm)	1/16 <sup>a</sup>	(1.6)	1/8	(3.2)
Area greater than 24 square inches (155 cm <sup>2</sup> ) 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)

<sup>a</sup> The area limitation for metal 1/16 inch (1.6 mm) thick may be obtained by the provision of reinforcing ribs subdividing a larger area.

14.4.2 If threads for the connection of conduit are tapped all the way through a hole in an enclosure wall, there shall not be less than three and one-half nor more than five threads in the metal, and the construction shall permit a standard conduit bushing to be attached.

14.4.3 If threads for the connection of conduit are tapped only part of the way through a hole in an enclosure wall, there shall not be less than three and one-half full threads in the metal, and 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.

#### 14.5 Nonmetallic enclosures

14.5.1 An enclosure or parts of an enclosure of nonmetallic material shall have the mechanical strength and durability and be formed so that operating parts will be protected against damage. The mechanical strength of the enclosure shall be at least equivalent to a sheet metal enclosure of the minimum applicable thickness specified in [Table 14.1](#). See the Tests of Thermoplastic Materials, Section [44](#).

#### 14.6 Product mounting

14.6.1 The enclosure of a detector shall be provided with means for mounting in the intended manner. Any fittings, such as brackets, hangers, or the like, necessary for intended mounting shall be furnished with the detector. The mounting means shall be accessible without disassembling any operating part of the detector. A detector cover is not to be considered an operating part if its removal does not expose the installer to a risk of electric shock.

14.6.2 If the detector is intended for permanent connection, the enclosure shall either have provision for the connection of metal-clad cable, conduit, or nonmetallic sheathed cable or have provision for mounting on an outlet box.

#### 14.7 Ventilating openings

14.7.1 Ventilating openings in an enclosure for high-voltage circuits including perforated holes, louvers, and openings protected by means of wire screening, expanded metal, or perforated covers, shall be of such size or shape that no openings will permit passage of a rod having a diameter of 9/64 inch (3.6 mm). An enclosure for a fuse or other overload protective device provided with ventilating openings shall afford protection against the emission of flame or molten metal.