



UL 1450

STANDARD FOR SAFETY

Motor-Operated Air Compressors,
Vacuum Pumps, and Painting
Equipment

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UL Standard for Safety for Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment,
UL 1450

Fourth Edition, Dated May 5, 2010

Summary of Topics

The revisions to ANSI/UL 1450 dated May 27, 2021 include the following changes in requirements:

- Revision of Cord Tag Requirements; [56.2](#)**
- Update of Standard Reference For Ultraviolet Light Test; [SA10.9.1](#) and [SA10.9.2](#)**

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 revised requirements are substantially in accordance with Proposal(s) on this subject dated April 9, 2021.

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ANSI/UL 1450-2021

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UL 1450

Standard for Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment

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Fourth Edition

May 5, 2010

This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through May 27, 2021.

The most recent designation of ANSI/UL 1450 as an American National Standard (ANSI) occurred on May 27, 2021. 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 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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INTRODUCTION

1 Scope

1.1 These requirements cover household and commercial air compressors, vacuum pumps, inflators (both compressor-type and blower-type inflators), paint sprayers, paint mixers, and paint pigment dispensers intended for indoor or outdoor use or both in accordance with the National Electrical Code, ANSI/NFPA 70. These requirements also cover motor-operated air compressors intended for use with sprinkler systems in accordance with the Standard for Installation of Sprinkler Systems, NFPA 13, and the National Electrical Code, ANSI/NFPA 70.

1.2 These requirements do not cover products:

- a) Rated more than 600 V,
- b) Employing a universal motor rated more than 250 V, or
- c) Intended for installation and use in a hazardous location.

1.3 These requirements do not cover medical and dental products; products intended to be used in heating, air conditioning, or refrigeration systems; paint heaters; electrostatic paint spraying products; or other products covered by separate requirements.

1.4 These requirements do not cover pneumatic tools and accessories that are covered by the Outline for Investigation for Portable Pneumatic Tools, Subject 7700-1.

1.5 These requirements do not cover industrial compressors that are primarily supplied to an individual customer specification with regard to pressure, flow, electrical supply, or optional equipment.

2 Glossary

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

2.2 **AUTOMATICALLY CONTROLLED PRODUCT** – A product is considered to be automatically controlled under any one or more of the following conditions if:

- a) The repeated starting of the product, beyond one complete predetermined cycle of operation to the point where some form of limit switch opens the circuit, is independent of any manual control.
- b) During any single predetermined cycle of operation, the motor is caused to stop and restart one or more times.
- c) Upon energizing the product, the initial starting of the motor may be intentionally delayed beyond normal, conventional starting.
- d) During any single predetermined cycle of operation, automatic changing of the mechanical load may reduce the motor speed sufficiently to reestablish starting-winding connections to the supply circuit.

2.3 **EQUIPMENT, FIXED** – Equipment that is intended for permanent connection to the electrical supply. This type of equipment may be physically secured to the supporting surface.

2.4 **EQUIPMENT, MOVABLE** – Cord-connected equipment that is intended to be moved from location to location during and in between performing its intended function. This type of equipment is not supported by the user, but supported by the ground or by other supporting surface during use.

2.5 EQUIPMENT, STATIONARY – Equipment that is cord-connected, but is not required to be moved from its original location during or in between performing its intended function.

2.6 FLASH POINT – The minimum temperature of a liquid at which vapor is evolved in sufficient quantity to form a flammable mixture with the air near the surface of the liquid or within the test vessel.

2.7 HAND-HELD PRODUCT, HAND-GUIDED PRODUCT – A portable product that during use is contacted by the hand of the user for purposes of electrical or physical control but not for complete support.

2.8 HAND-HELD HIGH-PRESSURE PAINT SPRAYER – A movable spraying system intended to be held in the hand during normal use that consists of a paint reservoir integral to the spray gun and pump assembly that operates at a pressure of 360 psi (2482 kPa) or greater at the spray tip.

2.9 HAND-SUPPORTED PRODUCT – A product that is physically supported by any part of the body of the user during the performance of its intended electrically-operated functions, such as a portable paint sprayer with an integral motor.

2.10 HIGH-PRESSURE AIRLESS PAINT SPRAYER – A spraying system employing a separate high-pressure liquid pump assembly connected by a high-pressure liquid hose to a spray gun that operates at a pressure of 360 psi (2482 kPa) or greater.

2.11 HIGH-PRESSURE PAINT SPRAYING PRODUCT – A term that applies to both a hand-held high-pressure paint sprayer and a high-pressure airless paint sprayer.

2.12 HOUSEHOLD-USE PRODUCT – A product that complies with Household Type Products, Section [64.4](#), and has an instruction manual that complies with [66.6](#).

2.13 INDOOR-USE PRODUCT – A product marked in accordance with [65.14](#) that is intended to be used in an indoor location and where wet contact is not likely to occur.

2.14 INFLATOR – A type of device that falls under one of the following two categories:

a) Blower-Type Inflator – An inflator product where the primary method to provide the inflation function is to generate air movement by rotation of an impeller or blade configuration in order to blow air out of the inflator outlet and into the inflatable product. These types are used to inflate low pressure objects, such as air mattresses and pool toys, and they do not contain any type of pressurized vessel.

b) Compressor-Type Inflator – An inflator product where the primary method to provide the inflation function is to compress air in order to cause air movement through pressure differentials, thereby forcing air from the inflator outlet into the inflatable product. These types are used to inflate objects such as automobile tires and may or may not contain a pressurized vessel.

2.15 LINEAR COMPRESS OR VACUUM PUMP – A nontank type compressor or vacuum pump that employs a diaphragm pump actuated by a moving member located between two coil assemblies rather than a standard motor operated piston, for example, style pump.

2.16 LINE-VOLTAGE CIRCUIT – A circuit involving a potential of not more than 600 V and having circuit characteristics in excess of those of a low-voltage circuit.

2.17 LOWER FLAMMABLE LIMIT (LFL) – The minimum concentration of a gas in air that, 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.

2.18 LOW-VOLTAGE CIRCUIT – A circuit involving a peak open-circuit potential of not more than 42.4 V supplied by a primary battery, by a Class 2 transformer, or by a combination of a transformer and a fixed impedance that as a unit, complies with all performance requirements for a Class 2 transformer. A circuit derived from a line-voltage circuit by connecting a resistance in series with the supply circuit, as a means of limiting the voltage and current, is not considered to be a low-voltage circuit.

2.18.1 LOW-VOLTAGE, LIMITED-ENERGY CIRCUIT – A circuit involving a potential of not more than 42.4 volts peak or 60 V dc with limited energy as described in Low Voltage Limited Energy Circuits, Section [27B](#).

2.19 OCCASIONAL OUTDOOR-USE PRODUCT – A product that is able to be used outdoors and be stored within a garage. These products are not intended to be exposed to rain and are marked in accordance with [65.13](#).

2.20 OUTDOOR-USE PRODUCT – A product that is intended for use in locations exposed to weather including partially protected locations under canopies, roofed open porches, barns, and similar locations that may be damp or wet.

2.20.1 PORTABLE PRODUCT – A product that is easily carried or moved from one place to another in normal use.

2.21 REMOTELY CONTROLLED PRODUCT – A product that is out of sight of the operator who is at the starting device.

3 Components

3.1 Except as indicated in [3.2](#), 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 generally used in the products covered by this standard.

3.2 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.

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

3.4 Specific components are recognized as being 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 for which they have been recognized.

4 Units of Measurement

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

5 References

5.1 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.

6 Attachments

6.1 Deleted November 1, 2013

7 Instructions Provided with the Product

7.1 A copy of the operating, user-maintenance, and other instructions intended to accompany a product as produced shall be used as a guide in the examination and test of the product. For this purpose, a final printed copy is not required.

7.2 The instructions shall include such directions and information as deemed by the organization responsible for the product to be necessary to cover the operation, intended use, and maintenance of the product, and shall comply with the requirements for instruction manuals in Sections [66](#) – [70](#).

7.3 A tank-type compressor that does not employ a pressure vessel marked with the code "U" or "UM" of the American Society of Mechanical Engineers (ASME) shall comply with the requirements in [66.7](#).

CONSTRUCTION

8 General

8.1 A product shall employ materials found by investigation to be acceptable for the intended application.

8.2 An air compressor categorized as household use only in accordance with [2.12](#) shall not be rated more than 3 hp (2.25 kW output) or more than 150 psi (1034 kPa) and shall comply with [66.7](#).

8.3 A motor-operated air compressor intended for use with sprinkler systems shall be provided with a means to be permanently connected to a wiring system.

8.4 A nitrogen generator that is intended to remove oxygen from air within an enclosure, such as a control panel, a means shall be provided to prevent the creation of an enriched oxygen concentration within the enclosure such as the use of a ventilation fan or external discharge port.

9 Enclosure

9.1 A product shall be formed and assembled so that it will have the strength and rigidity necessary to resist the abuses to which it is likely to be subjected, without resulting in a risk of fire, electric shock, or injury to persons due to total or partial collapse with resulting reduction of spacings, loosening or displacement of parts, or other defects.

9.2 Cast and sheet-metal portions of an enclosure shall not be thinner than the applicable values specified in [Table 9.1](#).

Exception No. 1: An enclosure investigated and judged acceptable with respect to the factors mentioned in [9.3](#) and any additional requirements applicable to the product under investigation.

Exception No. 2: For blower-type inflators, a small area or surface that is curved or otherwise reinforced to provide equivalent mechanical strength is not required to comply with the specifications in the first column of thicknesses in [Table 9.1](#).

9.3 Among the factors that shall be considered when judging the acceptability of a nonmetallic enclosure or an enclosure of magnesium are:

- a) Mechanical strength,
- b) Resistance to impact,
- c) Moisture-absorptive properties,
- d) Flammability, and
- e) Resistance to distortion at temperatures to which the material may be subjected under conditions of normal or abnormal usage.

9.4 An enclosure of polymeric material shall comply with the applicable requirements for products that are not categorized as household use only as contained in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.

Exception No. 1: An attended, intermittent duty portable product can be evaluated for compliance with the household use requirements of UL 746C if it is marked in accordance with [64.4.1](#), [64.4.2](#), and [66.6](#). A tank-type compressor with an automatic pressure-regulating control is not considered to be an attended, intermittent duty product.

Exception No. 2: A blower-type inflator intended for indoor, residential use only, may be evaluated for compliance with the household use requirements of UL 746C when the product is marked in accordance with [64.4.1](#) and [64.4.2](#), and the instruction manual complies with [66.6](#).

9.4.1 Enclosures of components in a Class 2, Limited Power Source (LPS), or Low Voltage Limited Energy (LVLE) circuit shall have a flammability rating of HB minimum.

9.5 An enclosure of polymeric material shall be subjected to the Resistance to Impact Test described in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C before and after cold conditioning at minus 35°C ±2°C (minus 31°F ±3.6°F) for 3 hours. For products marked in accordance with [65.13](#), the Ultraviolet Light Exposure requirements are not applicable and the cold conditioning shall be at 0°C ±2°C (32°F ±3.6°F) for 3 hours. After each test, the enclosure shall comply with [9.1](#).

Exception: A product marked in accordance with [65.14](#) is not required to be subjected to the cold conditioning.

9.6 The enclosure of a remotely or automatically controlled product shall prevent molten metal, burning insulation, flaming particles, or the like from falling on flammable materials, including the surface upon which the product is supported.

Table 9.1
Thickness of enclosure metal

Metal	Minimum thickness, in (mm)				
	At a small flat, unreinforced surface and at a surface of a shape or size to provide mechanical strength		At a surface to which a wiring system is to be connected in the field	At a relatively large unreinforced flat surface	
Die-cast metal	3/64	(1.2)	–	5/64	(2.0)
Cast malleable iron	1/16	(1.6)	–	3/32	(2.4)
Other cast metal	3/32	(2.4)	–	1/8	(3.2)

Table 9.1 Continued on Next Page

Table 9.1 Continued

Metal	Minimum thickness, in (mm)					
	At a small flat, unreinforced surface and at a surface of a shape or size to provide mechanical strength		At a surface to which a wiring system is to be connected in the field		At a relatively large unreinforced flat surface	
Uncoated sheet steel	0.026	(0.66)	0.032	(0.81)	0.026	(0.66)
Galvanized sheet steel	0.029	(0.74)	0.034	(0.86)	0.029	(0.74)
Nonferrous sheet metal	0.036	(0.91)	0.045	(1.14)	0.036	(0.91)

9.7 The requirement in 9.6 will necessitate that a switch, a relay, a solenoid, or the like be individually and completely enclosed, except for terminals, unless it can be shown that malfunction of the component would not result in a risk of fire, or there are no openings in the bottom of the product enclosure. It will also necessitate the use of a barrier of nonflammable material:

a) Under a motor unless:

1) The structural parts of the motor or of the product provide the equivalent of such a barrier;

2) The protection provided with the motor is such that no burning insulation or molten material falls to the surface that supports the product when the motor is energized under each of the following fault conditions:

i) Open main winding,

ii) Open starting winding,

iii) Starting switch short-circuited, and

iv) Capacitor of permanent-split capacitor motor short circuited – the short-circuit is to be applied before the motor is energized, and the rotor is to be locked;

3) The motor is provided with a thermal motor protector – a protective device that is sensitive to temperature and current – that will prevent the temperature of the motor windings from exceeding 125°C (257°F) under the maximum load under which the motor will run without causing the protector to cycle and from exceeding 150°C (302°F) with the rotor of the motor locked;

4) The motor complies with the requirements for impedance-protected motors in either the Standard for Overheating Protection for Motors, UL 2111, or the Standard for Impedance Protected Motors, UL 1004-2, and the temperature of the motor winding will not exceed 150°C (302°F) during the first 72 h of operation with the rotor of the motor locked; or

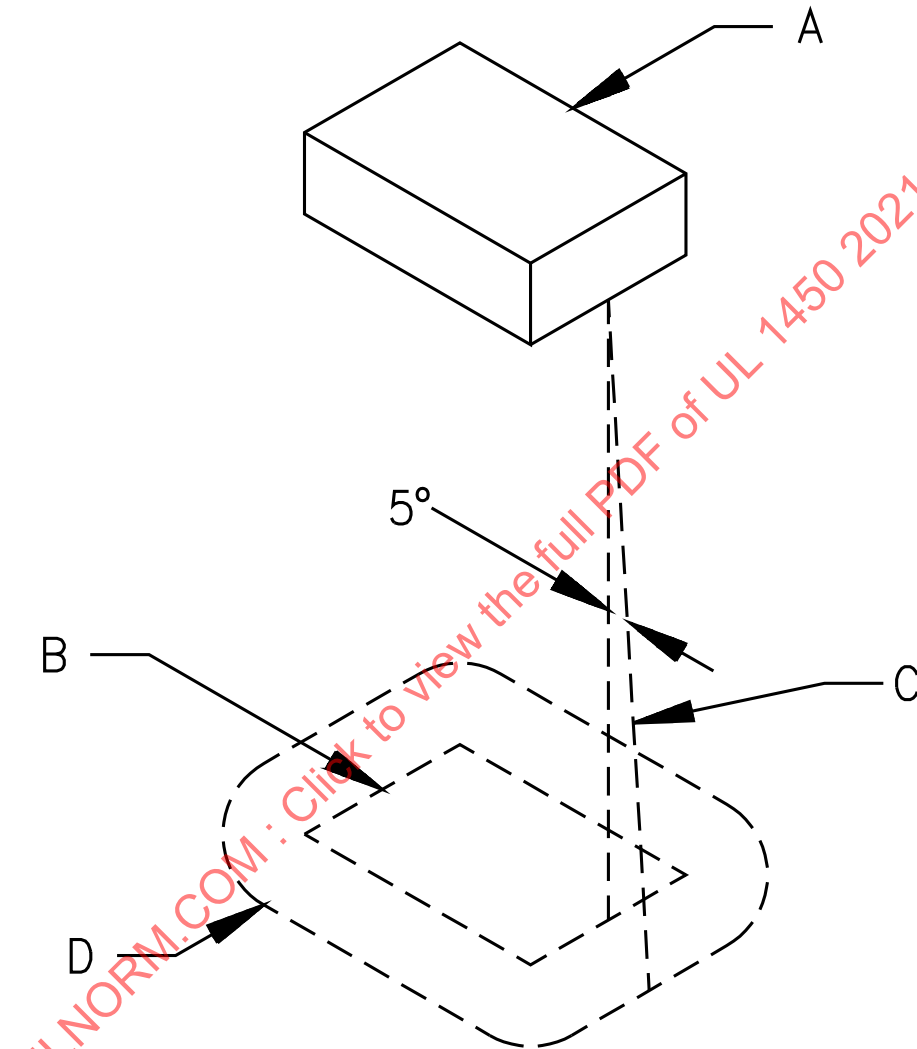
5) A vertically mounted motor is supplied with a metal screen on the end bell having a mesh with nominal openings not greater than 0.079 in (2 mm) between center lines and with wire diameters of not less than 0.018 in (0.45 mm) or if the motor complies with the Flammability Tests For The Bottom Of A Fire Enclosure in the Standard for Safety For Audio/video, Information And Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1.

b) Under wiring, unless the wire is marked VW-1.

9.8 The barrier mentioned in 9.7 shall be horizontal, shall be located as indicated in Figure 9.1, and shall not have an area less than that described in that illustration. Openings for drainage, ventilation, and the

like may be employed in the barrier, provided such openings would not permit molten metal, burning insulation, or the like to fall on flammable material.

Figure 9.1
Location and extent of barrier



SA0604-1

NOTES –

A – Region to be shielded by barrier. This will consist of the entire component if it is not otherwise shielded and will consist of the unshielded portion of a component that is partially shielded by the component enclosure or equivalent.

B – Projection of outline of component on horizontal plane.

C – Inclined line that traces out minimum area of barrier. The line is always

- 1) tangent to the component,
- 2) 5 degrees from the vertical, and
- 3) oriented so that the area traced out on a horizontal plane is maximum.

D – Location (horizontal) and minimum area for barrier. The area is that included inside the line of intersection traced out by the inclined line C and the horizontal plane of the barrier.

9.9 A paint sprayer or compressor shall be constructed so that the accumulation of paint on any uninsulated live part is unlikely when tested as described in Section [50](#), Paint Entry Test.

Exception No. 1: A paint sprayer having a separate compressor or pump, a hose at least 6 ft (1.83 m) long, and a maximum paint capacity of 6 fluid ounces (186 mL) need not be tested.

Exception No. 2: A compressor, including a tank-type compressor, that:

- a) Is provided with a hose at least 15 ft (9.57 m) long and is marked in accordance with [64.1.11](#); or*
- b) Either cannot be carried in one hand during use, or weighs 20 lb (9.07 kg) or more and is marked in accordance with [64.1.10](#), need not be tested.*

9.10 In determining whether a paint sprayer or compressor is capable of being carried in one hand as mentioned in Exception No. 2 to [9.9](#), consideration shall be given to such factors as the weight of the compressor, the number and location of handles, and the like.

9.11 A door or a cover of an enclosure that provides access to any overload-protective device that requires resetting or renewal shall be hinged or otherwise attached in an equivalent manner.

9.12 Means shall be provided for holding the door or cover over a fuseholder in a closed position, and the door or cover shall be tight-fitting.

10 Mechanical Assembly

10.1 A product shall be assembled so that it will not be adversely affected by the vibration of operation. Brush caps shall be tightly threaded or otherwise constructed to prevent loosening.

10.2 A switch other than a through-cord switch, a lampholder, an attachment-plug receptacle, a motor-attachment plug, or similar component shall be mounted securely and shall be prevented from turning. See [10.4](#).

Exception No. 1: A switch need not be prevented from turning if all four of the following conditions are met:

- a) The switch is of a plunger or other type that does not tend to rotate when operated. A toggle switch is considered to be subject to forces that tend to turn the switch during operation of the switch;*
- b) The means for mounting the switch make it unlikely that operation of the switch will loosen it;*
- c) The spacings are not reduced below the minimum required values if the switch rotates; and*
- d) The operation of the switch is by mechanical means rather than by direct contact by persons.*

Exception No. 2: A lampholder of the type in which the lamp cannot be replaced, such as a neon pilot or indicator light in which the lamp is sealed in a nonremovable jewel, need not be prevented from turning or shifting in position, if such motion may result in a reduction of spacings below the minimum acceptable values.

10.3 Uninsulated live parts shall be secured to the base or mounting surface so that they will be prevented from turning or shifting in position, if such motion may result in a reduction of spacings below the minimum required values.

10.4 The means for preventing the turning or shifting mentioned in [10.2](#) and [10.3](#) shall consist of more than friction between surfaces – for example, a properly applied lock washer, is acceptable as the means

for preventing a small stem-mounted switch or other device, having a single-hole mounting means, from turning.

11 Protection Against Corrosion

11.1 Iron and steel parts shall be protected against corrosion by enameling, galvanizing, plating, or other equivalent means, if corrosion of such unprotected parts would be likely to result in a risk of fire, electric shock, or injury to persons.

Exception No. 1: Surfaces of sheet-steel and cast-iron parts within an enclosure may not be required to be protected against corrosion if the oxidation of the metal due to the exposure to air and moisture is not likely to be appreciable. The thickness of metal and temperature are also to be considered.

Exception No. 2: Bearings, laminations, or minor parts of iron or steel, such as washers, screws, and the like.

11.2 If deterioration of a liquid container provided as a part of a product would result in a risk of fire or electric shock, the container shall be of a material that is resistant to corrosion by the liquid intended to be used therein.

12 Accessibility of Uninsulated Live Parts and Film-Coated Wire

12.1 To reduce the likelihood of unintentional contact that may involve a risk of electric shock from an uninsulated live part or film-coated wire, an opening in an enclosure shall comply with either (a) or (b).

- a) For an opening that has a minor or dimension (see [12.5](#)) less than 1 in (25.4 mm), such a part or wire shall not be contacted by the probe illustrated in [Figure 12.1](#).
- b) For an opening that has a minor dimension of 1 in or more, such a part or wire shall be spaced from the opening as specified in [Table 12.1](#).

Exception: A motor other than one used in either a hand-held product or a hand-supported portion of a product need not comply with these requirements if it complies with the requirements in [12.2](#).

12.2 With respect to a part or wire as mentioned in [12.1](#) in an integral enclosure of a motor as mentioned in the Exception to [12.1](#):

a) An opening that has a minor dimension (see [12.5](#)) less than 3/4 in (19.1 mm) is acceptable if:

- 1) Film-coated wire cannot be contacted by the probe illustrated in [Figure 12.3](#);
- 2) In a directly accessible motor (see [12.6](#)), an uninsulated live part cannot be contacted by the probe illustrated in [Figure 12.4](#); and
- 3) In an indirectly accessible motor (see [12.6](#)), an uninsulated live part cannot be contacted by the probe illustrated in [Figure 12.2](#).

b) An opening that has a minor dimension of 3/4 in or more is acceptable if a part or wire is spaced from the opening as specified in [Table 12.1](#).

Table 12.1
Minimum acceptable distance from an opening to a part that may involve a risk of electric shock

Minor dimension ^a of opening		Minimum distance from opening to part	
in	(mm) ^b	in	(mm) ^b
3/4 ^c	(19.1)	4-1/2	(114.0)
1 ^c	(25.4)	6-1/2	(165.0)
1-1/4	(31.8)	7-1/2	(190.0)
1-1/2	(38.1)	12-1/2	(318.0)
1-7/8	(47.6)	15-1/2	(394.0)
2-1/8	(54.0)	17-1/2	(444.0)
d		30	(762.0)

^a See [12.5](#).
^b Between 3/4 in and 2-1/8 in, interpolation is to be used to determine a value between values specified in the table.
^c A dimension less than 1 in applies to a motor only.
^d More than 2-1/8 in, but not more than 6 in (152.0 mm).