



UL 122

STANDARD FOR SAFETY

Photographic Equipment

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UL Standard for Safety for Photographic Equipment, UL 122

Fifth Edition, Dated October 29, 2007

Summary of Topics

This revision of ANSI/UL 122 dated October 15, 2019 includes the addition of reference UL 62368- 1 as an alternative to UL 60950-1.

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 new and revised requirements are substantially in accordance with Proposal(s) on this subject dated July 26, 2019.

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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 electrically-operated, cord-connected photographic equipment rated 300 V or less, and permanently connected photographic equipment rated 600 volts or less, intended for household or commercial use on interior wiring systems in accordance with the National Electrical Code, NFPA 70. These requirements also cover battery-powered photographic equipment involving a risk of fire or electric shock.

1.2 These requirements cover motion picture projectors, including those intended for use in motion picture theaters; still picture projectors; equipment intended for use in taking photographs; accessories intended for use with or installation upon picture projectors or intended to be employed in viewing, editing or handling films, slides, pictures, drawings, or similar stationary graphic material; cameras; chemical replenishers; contact printers; enlargers; exposure meters; film copiers, film cutters, film dryers; film editors; household film viewers; film and paper processors; film rewinders, film strip projectors; film strip projector-phonograph combinations; film strip projector-tape player combinations; motor-operated projector screens; silent and sound motion picture projectors; print dryers; print processors; printing easels; opaque projectors; overhead projectors; photoflash equipment; photographic timers; photometers, flash cameras; slide projectors; silver recovery units; slide projector-phonograph combinations; slide projector-tape player combinations; slide sorters; slide viewers; stripping and line-up tables; video printers; and similar equipment.

1.3 These requirements do not cover commercial film viewers and dark room safelights, which are evaluated under the requirements for fixtures and portable lamps; projector tables, which are evaluated under the requirements for utility tables; microfilm and micrographic equipment, which are evaluated under the requirements for office appliances and business equipment; or portable photographic lamps and floodlights, which are evaluated under the requirements for stage and studio lighting fixtures.

1.4 Electric photographic equipment intended for use in a hazardous location as defined in the National Electrical Code is evaluated on the basis of its compliance with the requirements in this standard, and other appropriate examination and tests to determine whether it is acceptable for the purpose.

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

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 Terminology

3.1 In the following text, a requirement that applies only to specific equipment is identified by a specific reference in that requirement to the equipment involved. Absence of such specific reference or use of the term appliance indicates that the requirement applies to all equipment covered by this standard.

3.2 The values specified for voltage, current, and power in these requirements are (rms) values unless otherwise specified.

4 Glossary

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

4.2 ACCESSIBLE – Able to be contacted by an accessibility probe.

4.3 APPLIANCE – Utilization equipment that uses electrical energy for some function.

4.4 AUTOMATICALLY CONTROLLED APPLIANCE – An appliance in which energization of a motor, solenoid, magnet, heating device, or a similar device, occurs without manual intervention; or, during any single predetermined cycle of operation, automatic changing of the mechanical load can reduce the speed of a motor sufficiently to reestablish starting-winding connections to the branch circuit. An appliance intended to be used in a commercial movie theater is considered to be automatically controlled.

4.5 CONTINUOUS-DUTY MOTOR – A motor that can operate unattended and under load under any normal conditions of use for 3 hours or more. A commercial film processor is considered to be a continuously operated appliance.

4.6 EXPOSED – Visible but not necessarily able to be contacted by an accessibility probe.

4.7 FIELD-WIRING TERMINALS – A terminal to which a supply wire or other wire can be connected by an installer in the field, is a field-wiring terminal unless the wire is provided as part of the appliance and a pressure terminal connector, soldering lug, soldered loop, a crimped eyelet, or other means for making the connection is factory-assembled to the wire.

4.8 FUNCTIONAL INSULATION – The insulation required for proper functioning of the appliance and for basic protection against risk of electric shock.

4.9 HAND-SUPPORTED APPLIANCE – An appliance that, during normal operation, is completely supported by the user.

4.10 LEAKAGE AND ELECTRIC SHOCK CURRENT – All current or currents, including capacitively-coupled currents, that may be conveyed between exposed conductive surfaces of an appliance and ground or other exposed conductive surfaces of the appliance.

4.11 LIMITED PRIMARY CIRCUIT – Wiring and components that are conductively connected to the supply circuit for which available power is less than 50 watts determined in accordance with [30.4.2](#).

4.12 LINE VOLTAGE (PRIMARY) CIRCUITS – The wiring and components that are conductively connected to the supply circuit.

4.13 LIVE PARTS – Metal or other conductive parts that, in normal use, have a potential difference with respect to earth ground or any other conductive part.

4.14 LOW-VOLTAGE, LIMITED-ENERGY CIRCUIT – A circuit that complies with the requirements in Low-Voltage, Limited-Energy Circuits, Section [32](#).

4.15 PORTABLE APPLIANCE – An appliance that is:

- a) Cord-connected, battery-operated, or both;
- b) Intended to be transported for use at various locations; and
- c) Designed to be carried by hand or provided with integral casters, wheels, and similar parts, or a cart to make it mobile.

4.16 REMOTELY-CONTROLLED APPLIANCE – An appliance that is not within the sight of the operator at the location of the starting device. An appliance intended to be used in a commercial movie theater is considered to be remotely controlled.

4.17 RISK OF ELECTRIC SHOCK – The risk of injury to persons resulting from exposure to a part involving excessive leakage current or excessive shock current. See the Leakage Current and Shock Current Tests, Section [47](#).

4.18 SAFETY CIRCUIT – A primary or secondary circuit that is relied upon to reduce the risk of fire, electric shock, or injury to persons during normal operation of an appliance.

4.19 USER SERVICING – Any form of servicing that may be performed by personnel other than those who are trained to maintain the particular appliance. Some examples of user servicing are:

- a) Attaching an accessory by means of an attachment plug and a receptacle, or by means of other separable connectors.
- b) Clearing jammed film, prints, or slides.
- c) Resetting a circuit breaker; replacing a battery, a fuse, or a lamp that is accessible without the use of a tool; and, replacing a battery or a lamp likely to require frequent replacement – for example, a projection lamp regardless of whether a tool is required.

- d) Making a routine operating adjustment necessary to adapt the appliance for one of its intended functions.
- e) Routine cleaning of an optical component, such as a lens or a mirror.
- f) Changing solutions, and cleaning a solution tray, a film or print roller, a guide, or a similar part.

CONSTRUCTION

5 Moisture Condensation

5.1 In an appliance provided with a cold-water infeed, uninsulated live parts and electrical components not acceptably protected shall be located so that there shall be no collection of moisture on or flooding of such parts by condensed water vapor dripping from tanks, pipes, and similar parts.

6 Frame and Enclosure

6.1 General

6.1.1 The enclosure of an appliance shall house all parts that may present a risk of fire, electric shock, or injury to persons. The enclosure or a portion of the enclosure may be an integral part of a component, a separate item, or all or part of the ultimate enclosure or outer cabinet.

6.1.2 Steel, aluminum, glass – heat-resistant, tempered, wired, or laminated – and equivalent material may be used for the overall enclosure of an appliance.

6.1.3 In addition to the factors specified in [6.1.4](#), an enclosure of sheet metal shall be evaluated with regard to its size, shape, and thickness, considering the intended use of the appliance.

6.1.4 Among the factors to be considered in evaluating an enclosure are its:

- a) Mechanical strength,
- b) Resistance to impact,
- c) Moisture-absorptive properties,
- d) Combustibility,
- e) Resistance to corrosion, and
- f) Resistance to distortion at temperatures to which the enclosure may be subjected during normal or abnormal use.

For a nonmetallic enclosure, all of these factors are to be considered with regard to thermal aging.

6.1.5 The construction and intended use of the appliance is to be taken into account when evaluating the strength and rigidity of an enclosure. See the Strength of Enclosure Test, Section [58](#).

6.1.6 The frame and enclosure of an appliance shall have the strength and rigidity needed to resist the abuses to which it is likely to be subjected to during use. The degree of resistance inherent in the appliance shall preclude total or partial collapse with the attendant reduction of spacings, loosening or displacement of parts, and other serious defects that alone or in combination constitute an increase in the risk of fire, electric shock, or injury to persons.

6.1.7 The enclosure of an appliance shall be complete. No dependence shall be placed on an adjacent wall or adjacent equipment to complete an enclosure.

6.1.8 In evaluating the acceptability of the bottom of a portable appliance, consideration shall be given to the possibility of the appliance being placed on an object that could damage wiring or other electrical components. See [58.1.1](#) and [58.1.2](#).

6.2 Remotely- and automatically-controlled appliances

6.2.1 The enclosure of a remotely or automatically controlled appliance, an appliance intended for operation unattended, or an appliance of which the operation or non-operation would not be evident to the operator, shall prevent molten metal, burning insulation, or flaming particles, from falling outside the enclosure, including the surface upon which the appliance rests or is otherwise supported.

6.2.2 The requirements in [6.2.1](#) necessitate the use of a barrier or pan of metal or equivalent material:

a) Under a motor unless:

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

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

i) Open main winding;

ii) Open auxiliary windings;

iii) Starting switch short-circuited; and

iv) Capacitor of a 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 mounted as intended in the appliance is provided with a thermal motor protector complying with the Standard for Thermally Protected Motors, UL 1004-3, that prevents the temperature of the motor windings from exceeding 125°C (257°F) under the maximum load under which the motor runs without causing the protector to cycle, and from exceeding 150°C (302°F) with the rotor of the motor locked; or

4) The motor complies with 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 does not exceed 150°C during the first 72 hours of operation with the motor mounted as intended in the appliance and the rotor of the motor locked;

b) Under a fuse, a switch, a relay, a solenoid, a transformer, or similar devices, unless it can be shown that malfunction of the component would not result in a risk of fire.

UL 1004-2 will replace Part II of UL 2111

6.2.3 The barrier specified in [6.2.2](#) shall be:

a) Horizontal or constructed to provide equivalent protection;

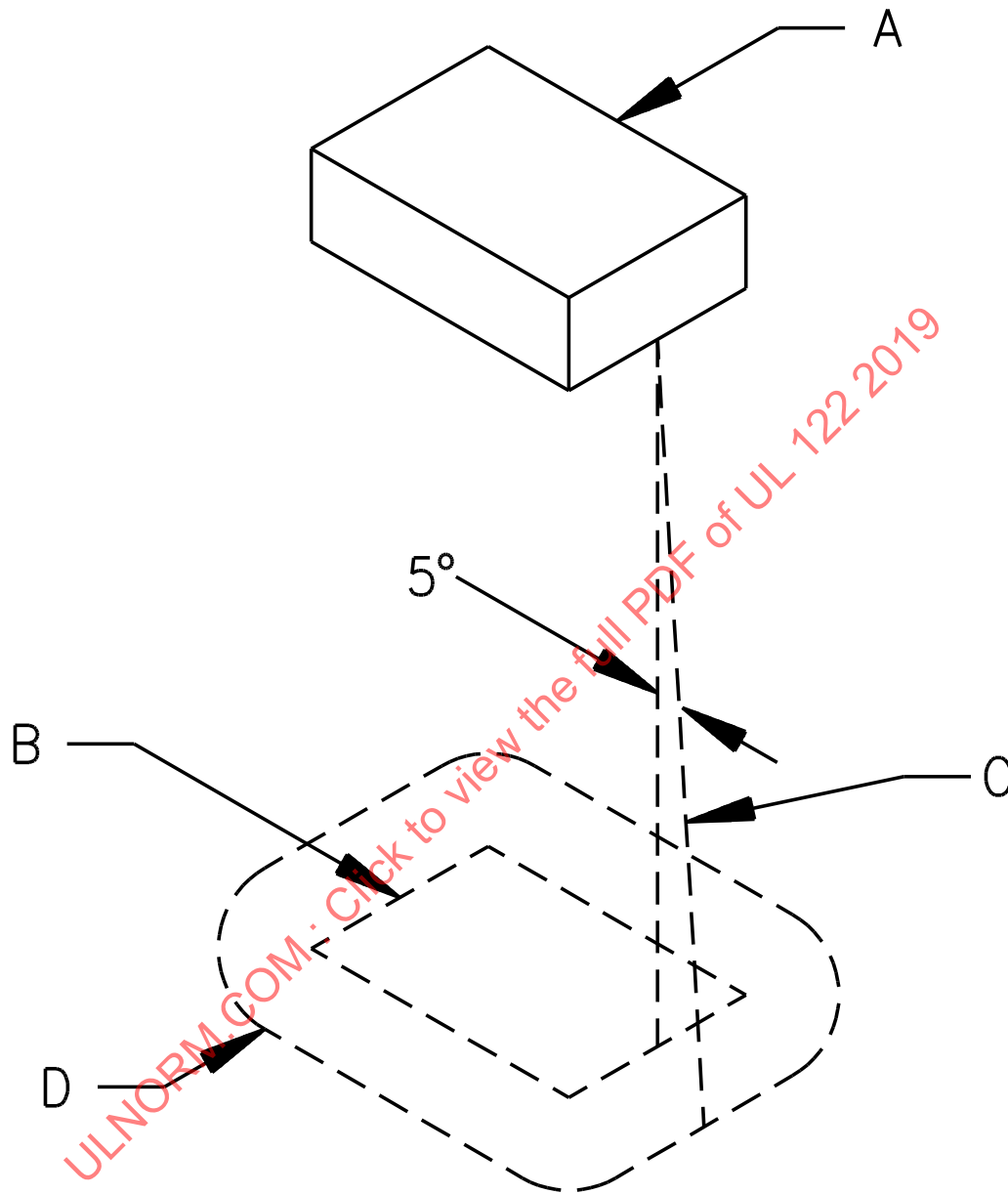
b) Located as indicated in [Figure 6.1](#); and

c) Not smaller in area than is indicated in [Figure 6.1](#).

Openings for drainage, ventilation, and similar openings, shall be used in the barrier if the openings are protected by a baffle or similar protection so that molten metal or burning insulation cannot fall outside the enclosure.

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Figure 6.1
Location and extent of barrier



SA0604-1

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 which is partially shielded by the component enclosure or equivalent.

B – Projection of outline of component on horizontal plane.

C – Inclined line which traces out minimum area of barrier. When moving, the line is always (1) tangent to the component, (2) five degrees from the vertical, and (3) so oriented 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.

6.3 Enclosure material

6.3.1 An enclosure of material having an exposed surface area greater than 10 square feet (0.93 m²) or a single dimension larger than 6 feet (1.83 m) shall have either:

a) A flame-spread rating of 200 or less when tested in accordance with the Standard for Tests for Surface Burning Characteristics of Building Materials, UL 723, or

Exception: A material with a flame-spread rating higher than 200 is acceptable as the exterior finish or covering on any portion of the enclosure if the flame-spread rating of the combination of the base material and finish or covering is 200 or less.

b) A flame-spread index of 100 or less when tested in accordance with the radiant-panel furnace methods in the Test Method for Surface Flammability of Materials Using A Radiant Heat Energy Source, ASTM E162.

Exception No. 1: If all specimens of the thinnest wall section do not exhibit flame propagation, flaming particles, or flaming drops, the flame-spread index for any specimen shall not exceed 200.

Exception No. 2: If any specimen of the thinnest wall section exhibits flame propagation but does not exhibit flaming particles or drops, the flame-spread index for any specimens shall not exceed 150.

6.3.2 The size limits specified in [6.3.1](#) refer to the exposed surface area of a single unbroken section. If two sides of a single piece are exposed, only the larger side is to be considered in computing the area.

6.3.3 Cast metal and sheet metal portions of the enclosure shall not be thinner than the applicable value specified in [Table 6.1](#).

Exception: The thickness may be less than the value specified in [Table 6.1](#) if investigated in accordance with the Strength of Enclosure Test, Section [58](#), and determined to be acceptable for the application as indicated in [6.1.1](#) – [6.1.7](#).

Table 6.1
Thickness of metal for enclosures

Metal	Minimum thickness,	
	inch	(mm)
Die-cast	3/64	1.2
Cast malleable iron	1/16	1.6
Other cast metal	3/32	2.4
Uncoated sheet steel	0.032	0.81
Galvanized sheet steel	0.034	0.86
Sheet aluminum	0.044	1.12
Sheet copper and brass	0.043	1.09

6.3.4 A polymeric enclosure or a polymeric part of an enclosure employed on an appliance to reduce the risk of fire or electric shock shall comply with the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.

Exception: The enclosure of a photoflash unit that is powered only by batteries or a power supply not exceeding low-voltage, limited-energy levels, is not required to meet the flame resistance requirements in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C, but shall

comply with the requirements for classifying materials as HB, V-0, V-1, or V-2 in the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94.

6.3.5 If openings for ventilation are provided in the enclosure of a permanently connected appliance, they shall be located so that they will not vent into concealed spaces of a building structure, such as into false-ceiling space, into hollow spaces in the wall, and the like, when the appliance is installed as intended.

6.3.6 During user servicing of household and commercial appliances, electrical parts of an appliance shall be located or enclosed to reduce the risk of electric shock.

7 Accessibility of Live Parts

7.1 Openings

7.1.1 If a marking draws attention of the user to a hole of any size in the enclosure for the adjustment of a thermostat or for a similar activity, it shall not be possible to damage insulation or contact uninsulated parts involving a risk of electric shock through the hole with a 1/16 inch (1.6 mm) diameter rod.

7.1.2 To reduce the risk 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 dimension (see [7.1.6](#)) less than 1 inch (25.4 mm), such a part or wire shall not be contacted by the probe illustrated in [Figure 7.1](#).
- b) For an opening that has a minor dimension of 1 inch or more, such a part or wire shall be spaced from the opening as specified in [Table 7.1](#).

Exception: A motor other than one used in either a hand-held product or a hand-supported portion of a product is not required to comply with these requirements if it complies with the requirements in [7.1.3](#).

Figure 7.1
Articulate probe with web stop

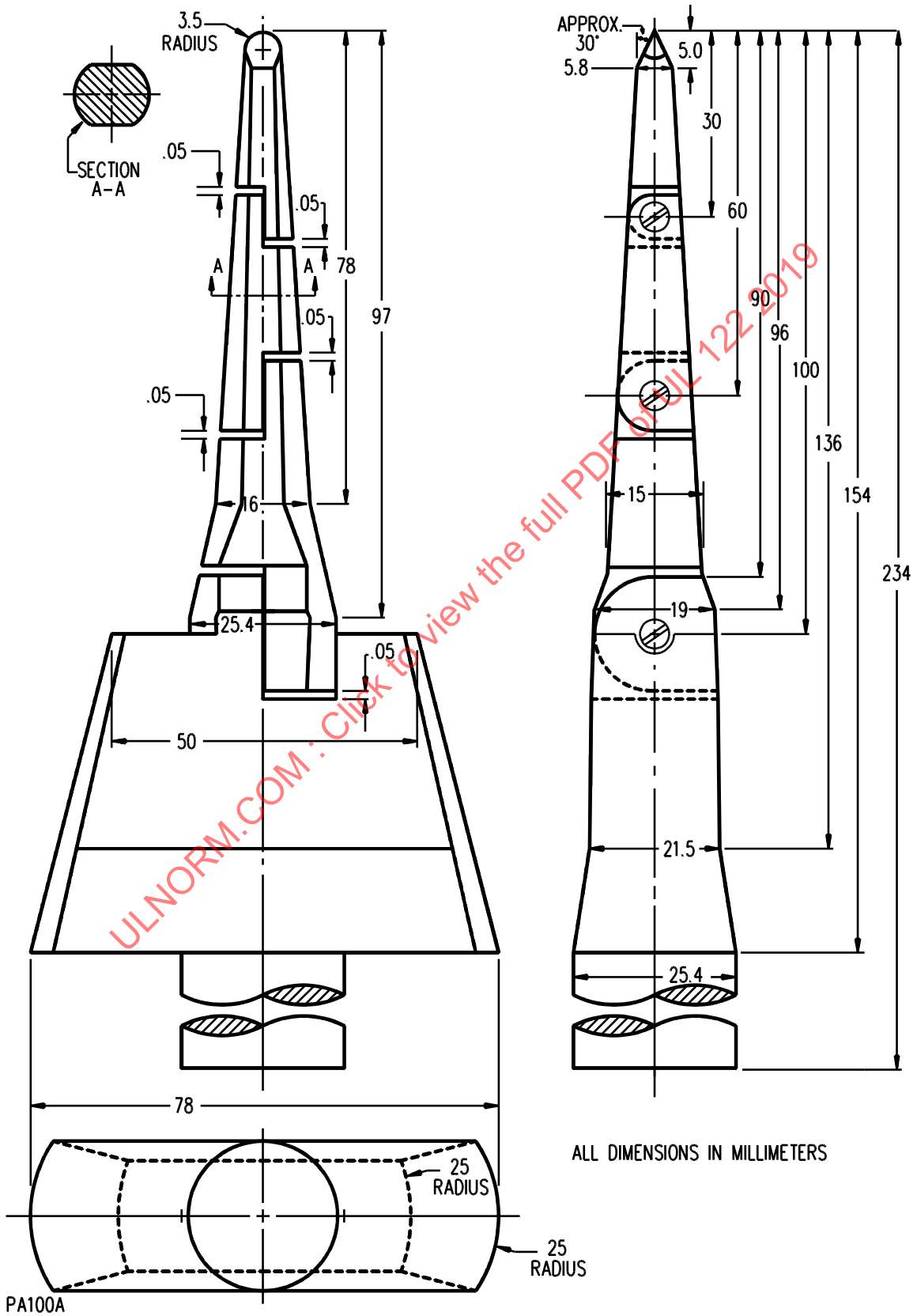


Table 7.1
Minimum distance from an opening to a part that may involve a risk of electric shock or injury to persons

Minor dimension ^a of opening,		Minimum distance from opening to part	
inches	(mm)	inches	(mm) ^b
3/4 ^c	19.1	4-1/2	114
1 ^c	25.4	6-1/2	165
1-1/4	31.8	7-1/2	190
1-1/2	38.1	12-1/2	318
1-7/8	47.6	15-1/2	394
2-1/8	54.0	17-1/2	444
d	d	30	762

^a See [7.1.6](#).
^b Between 3/4 and 2-1/8 inches, interpolation is to be used to determine a value between values specified in the table.
^c Any dimension less than 1 inch applies to a motor only.
^d More than 2-1/8 inches, but not more than 6 inches (152 mm).

7.1.3 With regard to a part or wire as mentioned in [7.1.2](#), in an integral enclosure of a motor as mentioned in the Exception to [7.1.2](#):

a) An opening that has a minor dimension (see [7.1.6](#)) less than 3/4 inch (19.1 mm) is not acceptable if:

- 1) A moving part can be contacted by the probe illustrated in [Figure 7.2](#);
- 2) Film-coated wire can be contacted by the probe illustrated in [Figure 7.3](#);
- 3) In a directly accessible motor (see [7.1.7](#)), an uninsulated live part can be contacted by the probe illustrated in [Figure 7.4](#); and
- 4) In an indirectly accessible motor (see [7.1.7](#)), an uninsulated live part can be contacted by the probe illustrated in [Figure 7.2](#).

b) An opening that has a minor dimension of 3/4 inch or more is acceptable if a part or wire is spaced from the opening as specified in [Table 7.1](#).

7.1.4 The probes mentioned in [7.1.2](#) and [7.1.3](#) and illustrated in [Figure 7.1](#) – [Figure 7.4](#) shall be applied to any depth that the opening will permit; and shall be rotated or angled before, during, and after insertion through the opening to any position that is necessary to examine the enclosure. The probes illustrated in [Figure 7.1](#) and [Figure 7.4](#) shall be applied in any possible configuration; and when required, the configuration shall be changed after insertion through the opening.