



UL 1889

STANDARD FOR SAFETY

Commercial Filters for Cooking Oil

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UL Standard for Safety for Commercial Filters for Cooking Oil, UL 1889

First Edition, Dated August 30, 1996

Summary of Topics

This revision of ANSI/UL 1889 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

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 requirements are substantially in accordance with Proposal(s) on this subject dated June 29, 2018.

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UL 1889

Standard for Commercial Filters for Cooking Oil

Prior to the first edition, the requirements for the products covered by this standard were included in the Standard for Commercial Electric Cooking Appliances, UL 197, the Standard for Motor-Operated Appliances, UL 73, and the Standard for Motor Operated Water Pumps, UL 778.

First Edition

August 30, 1996

This ANSI/UL Standard for Safety consists of the First Edition including revisions through September 4, 2018.

The most recent designation of ANSI/UL 1889 as a Reaffirmed American National Standard (ANS) occurred on September 4, 2018. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

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INTRODUCTION

1 Scope

1.1 These requirements cover commercial filters for cooking oil rated 600 volts or less and intended for use in accordance with the National Electrical Code, NFPA 70. These requirements cover both portable filters and fixed filters intended to be used with a specific fryer or fryers or with any fryer or fryers.

1.2 These requirements cover oil filters used to filter cooking oil used in deep fat fryers usually found in commercial kitchens, restaurants, or other business establishments where food is dispensed. The filters consist of a pump motor to pump oil to and/or from a deep fat fryer and are capable of including an integral oil heater. The requirements are also applicable to filters built into a fryer.

1.3 When a filter is provided as part of a larger appliance, these requirements cover the filter and related components. The other portions of the appliance are to be evaluated in accordance with the requirements that normally apply to that type of equipment. However, consideration shall be given to the interaction between the two portions of the appliance; for example, to the possibility that the entire appliance is capable of being exposed to hot cooking oil.

1.4 Deleted October 8, 2004

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 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 Glossary

For the purpose of this standard the following definitions apply.

3.1.1 ATTACHMENT PLUG – A male contact device for the temporary connection of a flexible cord or cable to a receptacle, cord connector, flanged equipment power outlet, or other outlet device.

3.1.1 added June 16, 1998

3.1.2 CORD CONNECTOR – A female contact device to be wired on a flexible cord for use as an extension from an outlet to make a detachable electrical connection to an attachment plug or as an appliance coupler to an equipment inlet.

3.1.2 added June 16, 1998

3.1.3 FILTER, CENTRAL – A unit that filters oil from one or more fryers (or other appliances) from a stationary position. Central filters may derive their power from another appliance or directly from the building supply. These filters form an integral part of a larger appliance.

3.1.3 added June 16, 1998

3.1.4 FILTER, PORTABLE – A unit that is intended to be moved from place to place for filtering oil from multiple fryers (or other appliances), one at a time. These filters do not form part of and are not connected electrically, physically, or by permanent plumbing to any other appliance.

3.1.4 added June 16, 1998

3.1.5 FILTER, STATIONARY – A unit that filters oil from one or more fryers (or other appliances) from a stationary position. These filters do not form part of and are not connected electrically or physically to any fryer or other appliance. However, they are not prohibited from being interconnected to another appliance or appliances by plumbing.

3.1.5 added June 16, 1998

3.1.6 FILTER, UNDER-FRYER – A unit that is located below the oil kettle of a fryer or bank of fryers (or other appliances), and is intended to filter cooking oil used by that appliance. An under-fryer filter obtains electrical power from the appliance being serviced and forms an integral part of that appliance. However, a unit that is constructed to be removable from the appliance without the use of tools for the purposes of cleaning or servicing another appliance specifically designed for use with that filter is considered to be an under-fryer filter.

3.1.6 added June 16, 1998

3.1.7 NOZZLE – A device connected to the end of the oil hose for the purpose of removing and/or returning oil to the intended appliance (fryer). The nozzle is intended to be held by the operator during use.

3.1.7 added June 16, 1998

3.2 SAFETY CIRCUIT – A primary or secondary circuit that is relied upon to prevent a risk of fire, electric shock, or injury to persons; for example, an interlock circuit.

3.3 USER SERVICING – Any servicing that is capable of being 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 receptacle or by means of other separable connectors.
- b) Resetting or replacing any protective device in an appliance, or its receptacle circuit, that are capable of being overloaded by the user.
- c) Resetting a circuit breaker or replacing a fuse.
- d) Making a routine operating adjustment required to adapt the appliance for a different intended function.
- e) Routine cleaning.

CONSTRUCTION

4 Accessories

4.1 An appliance having provisions for the use of an electrical accessory intended to be attached in the field shall comply with the requirements in this standard, with or without an accessory installed.

4.2 Electrical connection of an accessory by the user shall be by means of a receptacle and plug-in connector. See 14.2.

4.3 The installation of an accessory by service personnel shall be by means of receptacles, plug-in connectors, insulated wire connectors, or by connection to existing wiring terminals. Receptacles, when used, shall be located and protected in accordance with 14.2.

4.4 With regard to 4.3, an installation shall not require the cutting of wiring or the soldering of connections by the installer. Installations shall not require cutting, drilling, or welding in electrical enclosures and in other areas where such operations are capable of damaging electrical components and wiring within the enclosure.

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4.5 A means for strain relief shall be provided for the wiring in the accessory when there is a possibility of transmitting stress to the terminal connections during installation.

4.6 All terminals and wiring intended to be field connected shall be identified on the accessory, on the appliance when connections are made between the accessory and the appliance, and on a wiring diagram provided with the accessory unless they are obvious.

4.7 The mounting location of the accessory shall be indicated on the appliance.

Exception: When the mounting location is obvious due to the function of the accessory and arrangement of the appliance, and instructions are provided covering the installation and location for the accessory, the mounting location of the accessory is not required to be indicated on the appliance.

4.8 As part of the investigation, an accessory is to be trial-installed to determine whether:

- a) The installation is feasible;
- b) The instructions are detailed and correct; and
- c) The use of the accessory does not introduce a risk of fire, electric shock, or injury to persons.

5 Frames and Enclosures

5.1 General

5.1.1 An appliance shall be formed and assembled so that it has the strength and rigidity required to resist the abuses to which it is subjected, without increasing the 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 serious defects.

5.1.2 The enclosure of an appliance shall be of a material capable of being used for the application and shall house all electrical parts, except a supply cord, that are capable of presenting a risk of fire, electric shock, or injury to persons under any condition of use. An adjacent wall or adjacent equipment shall not be depended upon to complete an enclosure.

5.1.3 Among the factors included in the evaluation of an enclosure are:

- a) Mechanical strength,
- b) Resistance to impact,
- c) Moisture-absorptive properties,
- d) Resistance to combustion,
- e) Resistance to corrosion, and
- f) Resistance to distortion at temperatures to which the enclosure is capable of being subjected under conditions of normal or abnormal use.

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

5.1.4 An enclosure of polymeric material shall comply with the applicable requirements in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C. A polymeric enclosure part that is capable of coming in contact with hot oil – that is, a part that is not shielded to prevent contact with hot oil – shall be evaluated in accordance with the test for Parts Subject to Contact with Oil or Other Liquids, Section 57.

Revised 5.1.4 effective December 16, 1998

5.1.5 The minimum thickness of cast metal shall be in accordance with Table 5.1.

Exception: Thinner metal complies with the intent of this requirement when the metal is evaluated in accordance with the Enclosure Strength Test, Section 52, and the Impact Test, Section 53, with acceptable results.

Table 5.1
Minimum thicknesses of cast metal

Table 5.1 revised October 8, 2004

Metal	Minimum thickness, mm (inch)			
	At reinforced surfaces ^a		At unreinforced flat surfaces	
Die-cast metal	1.2	3/64	2.0	5/64
Cast malleable iron	1.6	1/16	2.4	3/32
Other cast metal	2.4	3/32	3.2	1/8

^a Includes surfaces that are curved, ribbed, and similar designs, or that are otherwise of a shape or size to provide intended mechanical strength.

5.1.6 In addition to being evaluated with regard to the factors specified in 5.1.3, an enclosure of sheet metal is to be evaluated with regard to its size and shape, the thickness of metal, and its acceptability for the particular application. Sheet steel having a thickness less than 0.66 mm (0.026 inch) when uncoated or 0.74 mm (0.029 inch) when galvanized, or of nonferrous sheet metal having a thickness of less than 0.91 mm (0.036 inch) shall not be used except for a small area or for a surface that is curved or otherwise reinforced.

5.1.6 revised October 8, 2004

5.1.7 Sheet metal to which a wiring system is to be connected in the field shall have a thickness of no less than 0.81 mm (0.032 inch) when of uncoated steel, no less than 0.86 mm (0.034 inch) when of galvanized steel, and no less than 1.14 mm (0.045 inch) when of nonferrous metal.

Exception: Sheet steel no less than 0.66 mm (0.026 inch) thick when uncoated steel or no less than 0.74 mm (0.029 inch) thick when galvanized steel meets the intent of the requirement when the area surrounding a knockout has a thickness of no less than 1.35 mm (0.053 inch).

5.1.7 revised October 8, 2004

5.2 Openings

5.2.1 An opening in the bottom of an appliance shall not be located below an electrical part unless a solid, noncombustible pan complying with Figure 5.1 is interposed between the electrical part and supporting surface. The pan is to have a rim, lip, or other raised edge that is in a horizontal plane and extends all the way around the pan. The bottom of the pan is not required to be flat or any regular shape and the transition from the bottom to the rim, lip, and similar raised edges are allowed to have any convenient shape, but at every point directly below the electrical part, the floor of the pan is to be 3.2 mm (1/8 inch) or more below the plane of the rim, lip, and similar raised edges.

Exception: The use of a pan constructed from noncombustible material under a motor is not required when:

- a) *The motor has no openings below a horizontal plane through the center of the motor;*
- b) *The structural parts of the motor or of the appliance provide the equivalent of the described barrier;*
- c) *The 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:*
 - 1) *Open main winding,*
 - 2) *Open starting winding,*
 - 3) *Starting switch short-circuited, and*
 - 4) *For a permanent-split capacitor motor, capacitor short-circuited. The short circuit is to be applied before the motor is energized and the rotor is to be locked;*
- d) *The motor is provided with a thermal motor protector – a protective device that is sensitive to temperature and current – so that the temperature of the motor windings does not exceed 125°C (257°F) at the maximum load under which the motor is capable of running without causing the protector to cycle and does not exceed 150°C (302°F) with the rotor of the motor locked; or*
- e) *The motor is impedance-protected and the locked-rotor temperature of the motor winding is no more than 150°C (302°F) with the appliance otherwise operating as intended.*

5.2.1 revised October 8, 2004

5.2.2 The structure of the part or appliance is not prohibited from providing the equivalent of the pan described in 5.2.1 when it complies with Figure 5.1. The raised edge is capable of being incorporated in the opening.

5.2.3 An appliance shall be constructed so that, with the appliance in any normal position of operation, cooking oil and cleaning solution do not contact electrical parts, including internal wiring, during operation, user servicing, or cleaning under any of the following conditions:

- a) In the as-received condition;

b) With any fitting that is intended to be loosened during user servicing or cleaning loosened or damaged; and

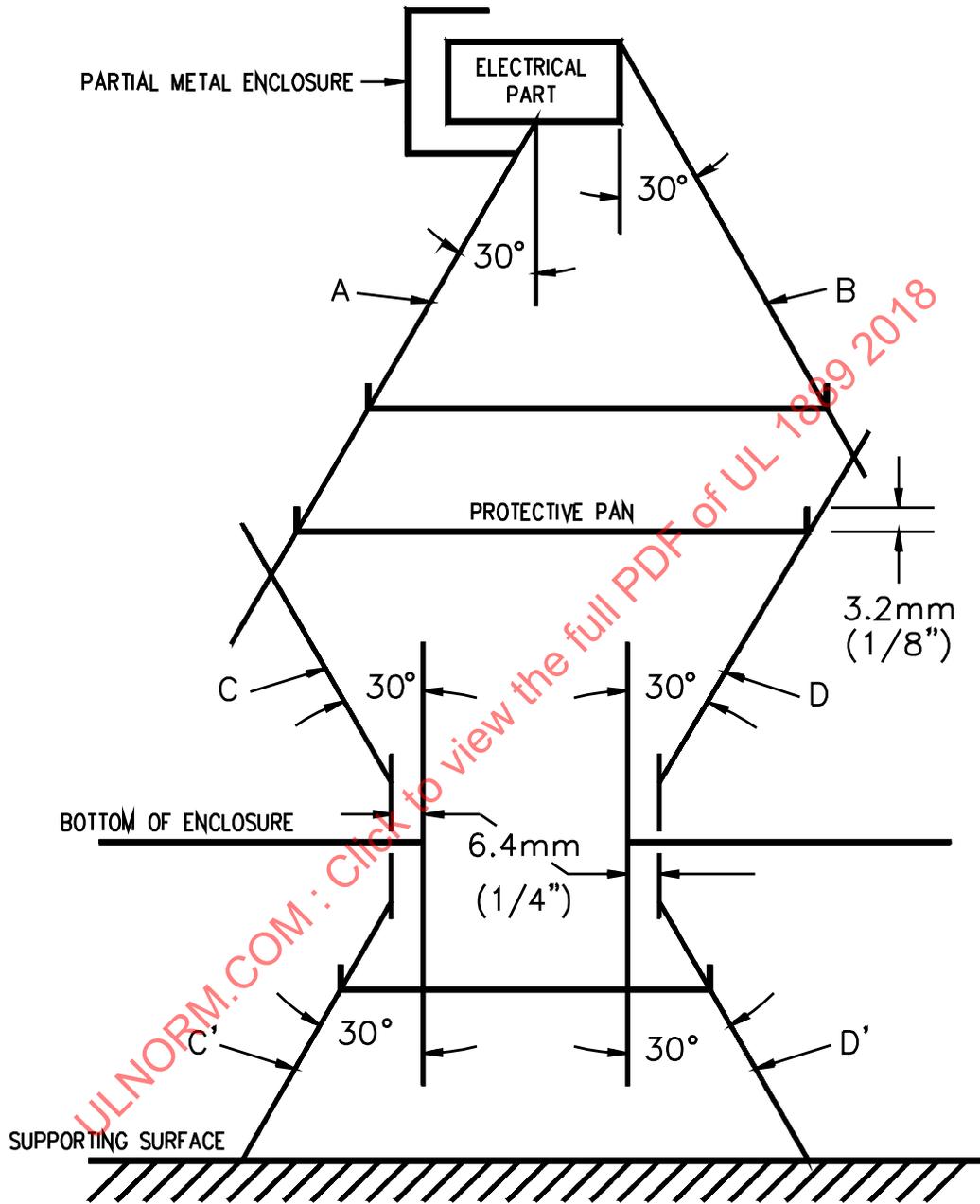
c) After deterioration or breakdown of a timer switch, a float- or pressure-operated switch, a hose, flexible tubing, a gasket, a boot, a seal, a diaphragm, or similar parts.

Effective date for 5.2.3 changed from March 1, 1998 to December 16, 1998

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Figure 5.1
Minimum extent of baffle for opening in bottom of enclosure

Figure 5.1 revised October 8, 2004



SB0714A

A, B, C, and D are projections that define a volume between an electrical part and an opening; C' and D' are projections that define a volume between an opening and the supporting surface. A protective pan in any horizontal plane between the part and the opening in the supporting surface shall be larger than the area defined by projections A, B, C, and D, or projections C' and D', respectively. Three samples of protective pans are illustrated in the figure; two are above the opening and one is below it.

5.2.4 An appliance is determined to comply with 5.2.3(c) when no oil leaks when the appliance is operated with the part in question removed, as described in Deterioration of Parts, Section 47. When oil leaks during the test, the appliance shall be examined to determine whether oil has contacted, or is capable of contacting, electrical parts. Consideration shall be given to any possible spraying or dripping that occurs upon partial deterioration of the part. In addition, when any of the components or connections described in 5.2.3 (b) and (c) are located within the enclosure, a guard shall be provided to prevent oil from contacting electrical components in case of failure or poor operation of such components.

Exception: Parts as described in 5.2.3(c) that are not subject to flexing and that have been evaluated for exposure to hot oil in accordance with Parts Subject to Contact With Oil or Other Liquids, Section 57, are not required to be further evaluated.

Effective date for 5.2.4 changed from March 1, 1998 to December 16, 1998

5.2.5 A pump motor with supports of polymeric material shall be tested in accordance with Polymeric Motor Supports, Section 58.

Effective date for 5.2.5 changed from March 1, 1998 to December 16, 1998

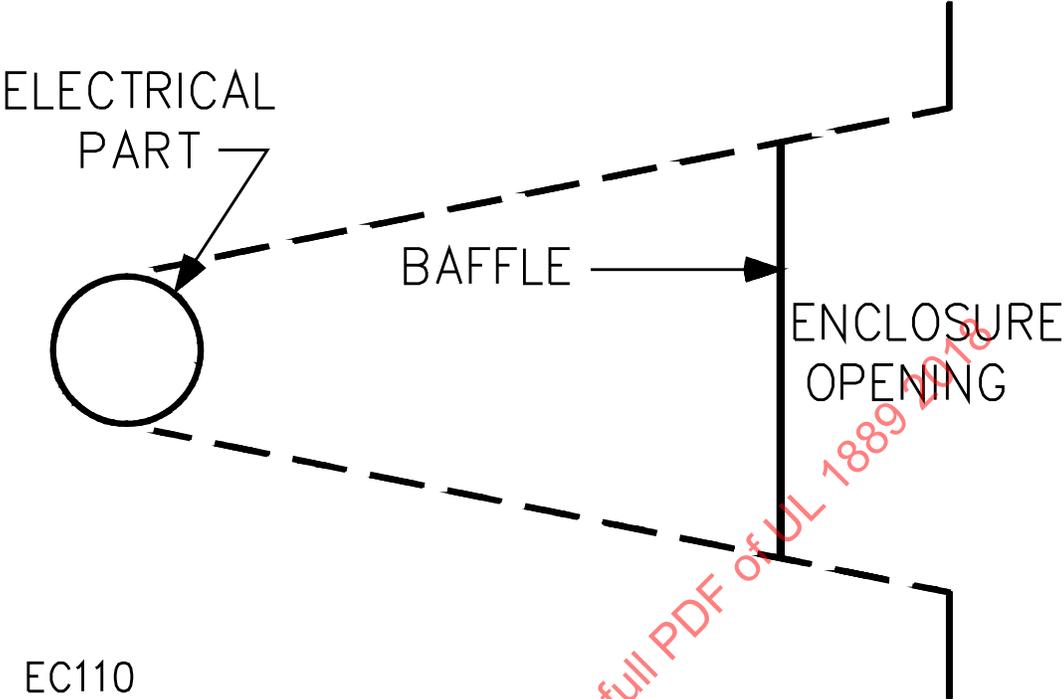
5.2.6 An opening in a surface other than the bottom of an enclosure that contains electrical parts shall be provided with a baffle, such as the one illustrated in Figure 5.2, that prevents the emission of flame, molten metal, burning insulation, or similar occurrences.

Exception: A baffle is allowed to be omitted from an enclosure that contains electrical parts other than an overcurrent-protective device such as a fuse or circuit breaker when:

- a) *The structure of the part provides the equivalent of a baffle;*
- b) *The distance from the electrical part to the plane of the enclosure is greater than 305 mm (12 inches);*
- c) *For ventilating openings in a vertical wall, no opening is more than 9.5 mm (3/8 inch) wide, and the total area of such openings located less than 305 mm (12 inches) from the floor in any 0.3 m² (1 ft²) area of the enclosure does not exceed 52 cm² (8 square inches); or*
- d) *All openings in a vertical wall are protected by louvers, as long as the louvers allow an opening no more than 6.4 mm (1/4 inch) wide and are shaped to deflect external falling objects outward. See Figure 5.3.*

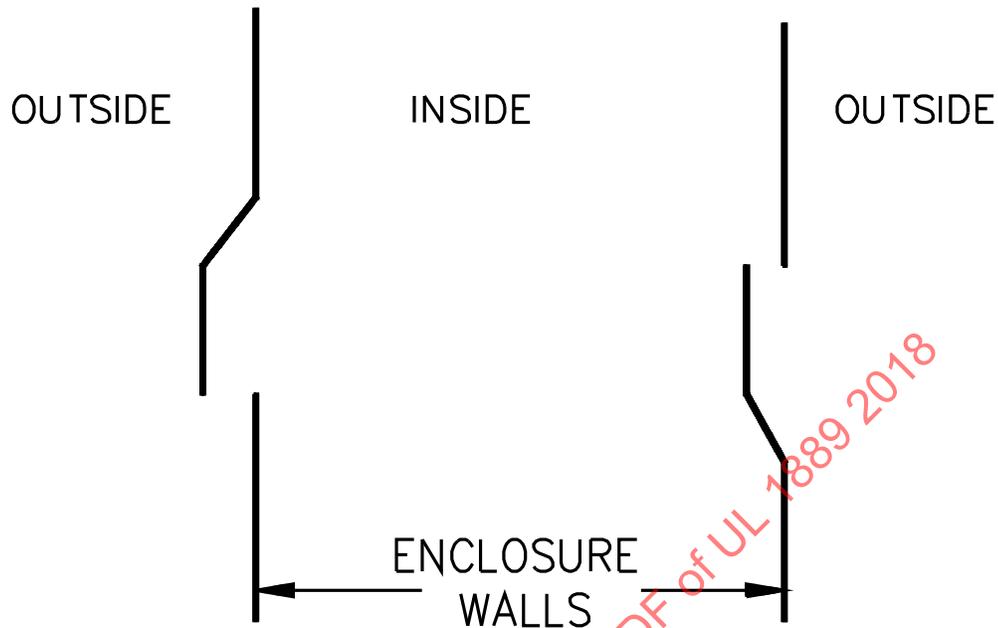
5.2.6 revised October 8, 2004

Figure 5.2
Relationship of baffle and electrical part to prevent emission



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Figure 5.3
Louver constructions



SB0716

6 Accessibility of Live Parts

6.1 General

6.1.1 The electrical parts of an appliance shall be located or enclosed so that persons are protected against unintentional contact with uninsulated live parts involving a risk of electric shock.

6.1.2 A risk of electric shock is determined to exist when the available open-circuit potential is more than 42.4 volts peak, and the available current through a 1500-ohm resistance is more than 5 milliamperes.

6.1.3 The following are not uninsulated live parts:

- a) A coil of a controller,
- b) A relay,
- c) A solenoid, and
- d) A transformer,

when they are provided with insulating overwraps at least 0.8 mm (1/32 inch) thick; enclosed motor windings; insulated terminals and splices; and insulated wire.

6.1.3 revised October 8, 2004

6.1.4 An uninsulated live part, such as a terminal bus bar, and similar parts, not including film-coated wire, shall be no less than 25.4 mm (1 inch) from any opening in the enclosure of an appliance.

6.1.4 revised October 8, 2004

6.1.5 An opening that will not permit the entrance of a 19.1-mm (3/4-inch) diameter rod is allowed, except as noted in 6.1.4, when a probe as illustrated in Figure 6.1 cannot be made to touch any uninsulated live part or film-coated wire when inserted into the opening.

6.1.5 revised October 8, 2004

6.1.6 An opening that permits entrance of 19.1-mm (3/4-inch) diameter rod is allowed when there are no uninsulated live parts:

- a) Less than X inches from the perimeter of the opening and
- b) Within the volume generated by projecting the perimeter X inches normal to its plane.

X equals five times the diameter of the largest diameter rod that is capable of being inserted through the opening, and no less than 102 mm (4 inches). See Figure 6.2.

6.1.6 revised October 8, 2004

6.1.7 An uninsulated live part shall not be located behind an opening that is used to make an adjustment determined to be a function of user servicing when a 3.2-mm (1/8-inch) diameter straight rod can be made to touch the part when the rod is inserted through the opening and moved to all positions possible without producing an angle of more than 30 degrees between the rod and the line drawn between the center of the opening and the center of the face of the adjusting mechanism. The length of the rod beyond the opening is not to exceed the distance between the opening and the face of the adjusting mechanism by more than 76 mm (3 inches). See Figure 6.3.

6.1.7 revised October 8, 2004

6.1.8 During the examination of an appliance in connection with the requirements in 6.1.5– 6.1.7, a part of the outer enclosure that is capable of being removed without the use of tools, or that must be opened or removed for user servicing, is to be disregarded – that is, it is not assumed that the part in question affords protection against the risk of electric shock. A warning marking is not determined to reduce the risk of electric shock.