

UL 1083

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Household Electric Skillets and Frying-Type Appliances

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UL Standard for Safety for Household Electric Skillets and Frying-Type Appliances, UL 1083

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FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. 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.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

INTRODUCTION

1 Scope

1.1 These requirements cover portable electric household skillets and other frying-type appliances, rated at 125 V or less, for use in ordinary locations in accordance with the National Electrical Code, ANSI/NFPA 70.

1.2 Frying-type appliances in this standard include frying-pans, sauce-pans, griddles, corn poppers, deep fat fryers, fondues, tempuras, woks, waffle or sandwich makers, and other similar appliances which may or may not be thermostatically controlled.

1.3 These requirements do not cover skillets or frying-type appliances intended for outdoor use, warming trays, or appliances that are covered in individual requirements that are separate from this standard.

1.4 In the following text, a requirement which applies to one type of equipment coming within its scope (skillet, waffle-maker, and the like) will be so identified by a specific reference in that requirement to the type of equipment involved. In the absence of such specific reference or if the term "appliance" is employed, it is to be understood that the requirement applies to all of the types of equipment covered by the standard.

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.

3.2 Unless indicated otherwise all voltages and current values mentioned in this standard are root-mean-square (rms).

4 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.

CONSTRUCTION

5 General

5.1 Only materials that are intended for the particular use shall be used in an appliance. It shall be made and finished with the degree of uniformity and grade of workmanship practicable in a well-equipped factory.

6 Frame and Enclosure

6.1 The frame and enclosure of an appliance shall be strong and rigid enough to resist the abuses likely to be encountered during normal service. 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 which alone or in combination constitute an increase in the risk of fire, electric shock, or injury to persons.

6.2 An appliance shall be provided with an enclosure of material acceptable for the particular application, which shall house all electrical parts, except a supply cord that may present a risk of fire, electric shock, or injury to persons under any condition of use.

6.3 In the case of an appliance employing oil or grease in its cooking operation, special consideration is to be given to the need for an enclosure over the cooking compartment, and to the acceptability for the purpose of the material employed for such an enclosure.

6.4 Among the factors that shall be taken into consideration when an enclosure is being judged for acceptability are its:

- a) Physical 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 under conditions of normal or abnormal use.

For a nonmetallic enclosure, see the enclosure requirements in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C. A metal enclosure or enclosure part shall be tested in accordance with Metal Enclosure Impact Test, Section 36, for resistance to impact of this standard.

Exception No. 1: When considering the abnormal and severe conditions tests of UL 746C, the appliance enclosure is to be judged under the abnormal operations tests of Abnormal Operation Test, Section 43, of this standard.

Exception No. 2: Thermoset materials need not be subjected to the relative thermal capability requirements of UL 746C. For a thermoset material operating at a temperature above its temperature rating, the 1000 hour aging test as outlined in 40.1 shall be conducted.

6.5 A thermoplastic enclosure of an appliance provided with overheating protection (Overheating Protection, Section 21) need not comply with the flammability requirements of UL 746C if a material rated HB, and possessing 60 arcs minimum resistance to high current arc ignition, and 7 second minimum resistance to hot wire ignition is employed and all enclosure parts including ribs, grills, and the like are spaced a minimum 1/2 inch (12.7 mm) from uninsulated live parts.

6.6 Cast- and sheet-metal portions of the enclosure shall be no thinner than indicated in Table 6.1 unless the enclosure is found to be acceptable when judged under considerations such as are mentioned in 6.4.

Table 6.1
Minimum acceptable thicknesses of enclosure metal

Metal	At small, flat, unreinforced surfaces and at surfaces that are reinforced by curving, ribbing, or the like or are otherwise of a shape and/or size to provide equivalent physical strength		At relatively large unreinforced flat surfaces	
	Inches	Millimeters	Inches	Millimeters
Die-cast	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
Uncoated sheet steel	0.026 ^a	0.66 ^a	0.026	0.66
Galvanized sheet steel	0.029 ^a	0.74 ^a	0.029	0.74
Nonferrous sheet metal	0.036 ^a	0.91 ^a	0.036	0.91

^a Thinner sheet metal may be employed if found to be acceptable when the enclosure is judged under considerations such as those mentioned in 6.4.

6.7 Electrical parts of an appliance, except the radiating portion of an open-wire element of a waffle-maker-type appliance with removable grids and its terminal connections immediately adjacent to the radiating element, shall be so located or enclosed that protection against unintentional contact with uninsulated live parts will be provided.

6.8 The enclosure shall be constructed so that molten metal, burning insulation, flaming particles, or the like will not fall on the supporting surface.

6.9 The requirement in 6.8 necessitates that an enclosure bottom with an opening be provided with a barrier above or below the opening if the opening is:

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 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 starting winding,
 - iii) Starting switch short-circuited; and
 - iv) For a permanent-split-capacitor motor the capacitor is short circuited. The short circuit is to be applied before the motor is energized and the rotor is to be blocked,
- 3) The motor is provided with a thermal motor protector (a protective device that is sensitive to both temperature and current) that prevents the temperature of the motor windings from becoming more than 125°C (257°F) under the maximum load under which the motor runs without causing the protector to cycle, and from becoming more than 150°C (302°F) with the rotor of the motor locked, or
- 4) The motor complies with the requirements for impedance-protected motors.

b) Under wiring, unless the wiring complies with the VW-1 flame test or the Vertical Flame Test described in the Reference Standard for Electrical Wires, Cables, and Flexible Cords, UL 1581.

c) Under an unenclosed switch, transformer, relay, solenoid, and the like, unless it can be shown that malfunction of the component is not likely to result in a fire.

d) Under field and factory-made splices and overload and overcurrent protective devices.

Exception: A barrier need not be provided if the opening is not within the area under the component requiring a barrier as illustrated by Line D in Figure 6.1

6.10 The barrier mentioned in 6.9 shall be:

- a) Of metal, ceramic or a material that would be acceptable as an enclosure in accordance with 6.4,
- b) Horizontal, and
- c) Located as indicated in Figure 6.1, and shall not have an area less than that described in Figure 6.1.

6.11 An opening in the enclosure that has a minor dimension of less than 1 inch (25.4 mm) is acceptable if a probe as illustrated in Figure 6.2, inserted through the opening, cannot be made to touch any uninsulated live part or film-coated wire that involves the risk of electric shock. The probe shall be applied in all possible articulated positions before, during, and after insertion.

6.12 An opening that has a minor dimension of 1 inch (25.4 mm) or more, in an enclosure, as illustrated in Figure 6.3, is acceptable if, within the enclosure, there is no uninsulated live part or film-coated wire less than, R distance from the inside edge of the perimeter of the opening and X distance from the plane of the opening. T equals the enclosure thickness, R equals X minus T, and X equals five times the diameter of the largest round rod that can be inserted through the opening but not less than 6-1/16 inches (154 mm). In evaluating an opening, any barrier located within the volume is to be ignored unless it intersects the boundaries of the volume in a continuous, closed line.

6.13 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 live parts through the hole with a 1/16-inch diameter rod (1.6 mm).

6.14 During the examination of an appliance in connection with the requirements in 6.7 and 6.10 – 6.13, any part of the enclosure is to be disregarded – that is, it will not be assumed that the part in question affords protection against electric shock or injury to persons – if it either:

- a) Must be opened or removed, with or without the use of tools, to perform manufacturer's recommended user servicing, maintenance, operating adjustments, attachment of accessories, or other instructions, or
- b) Can be opened or removed without the use of tools.

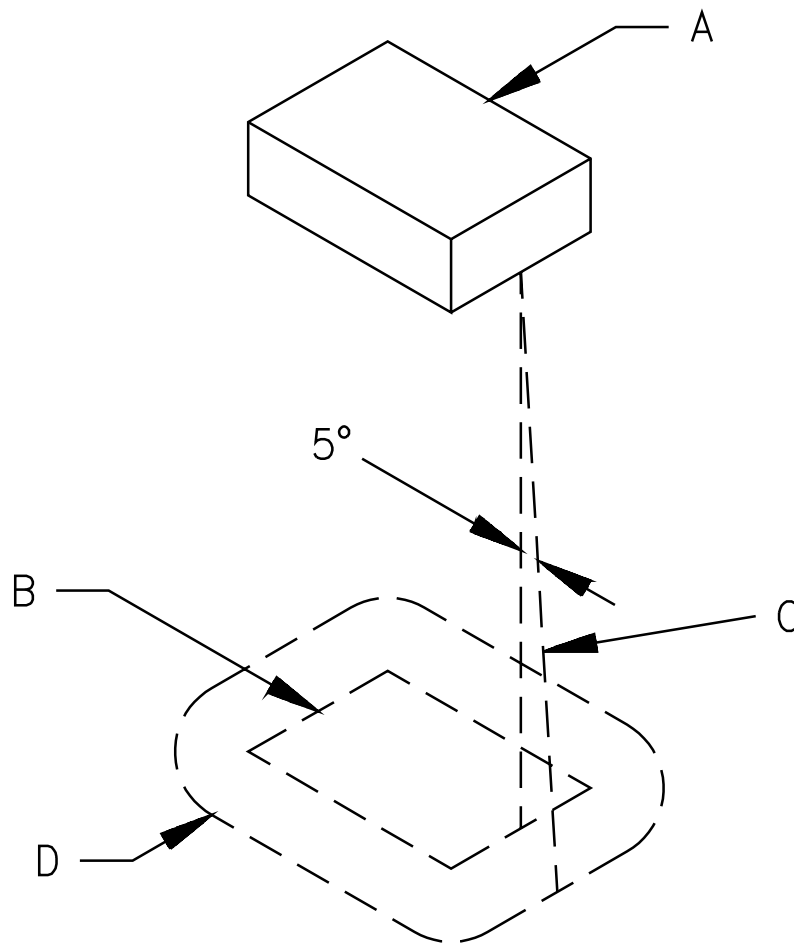
Exception: A part that requires a tool for opening or removal to perform manufacturer's recommended user servicing, maintenance, operating adjustments, attachment of accessories, or other instructions is to remain in place if the appliance is marked in accordance with 51.6.

6.15 A component of an appliance that is likely to need inspection, replacement, cleaning, or other servicing shall be as accessible as possible. The component shall be readily accessible without the use of special tools (tools not available to other than service personnel) if it is intended to be manually operated or adjusted or periodically serviced.

6.16 A deep-fat fryer shall be so constructed that spillage of the hot fat on the heating element will be prevented.

6.17 The bulb and capillary tube of a thermostat shall be protected from mechanical damage if damage of the tube or bulb would increase the risk of fire.

Figure 6.1
Location and extent of barrier



EB120A

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) 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.

Figure 6.2
Accessibility probe

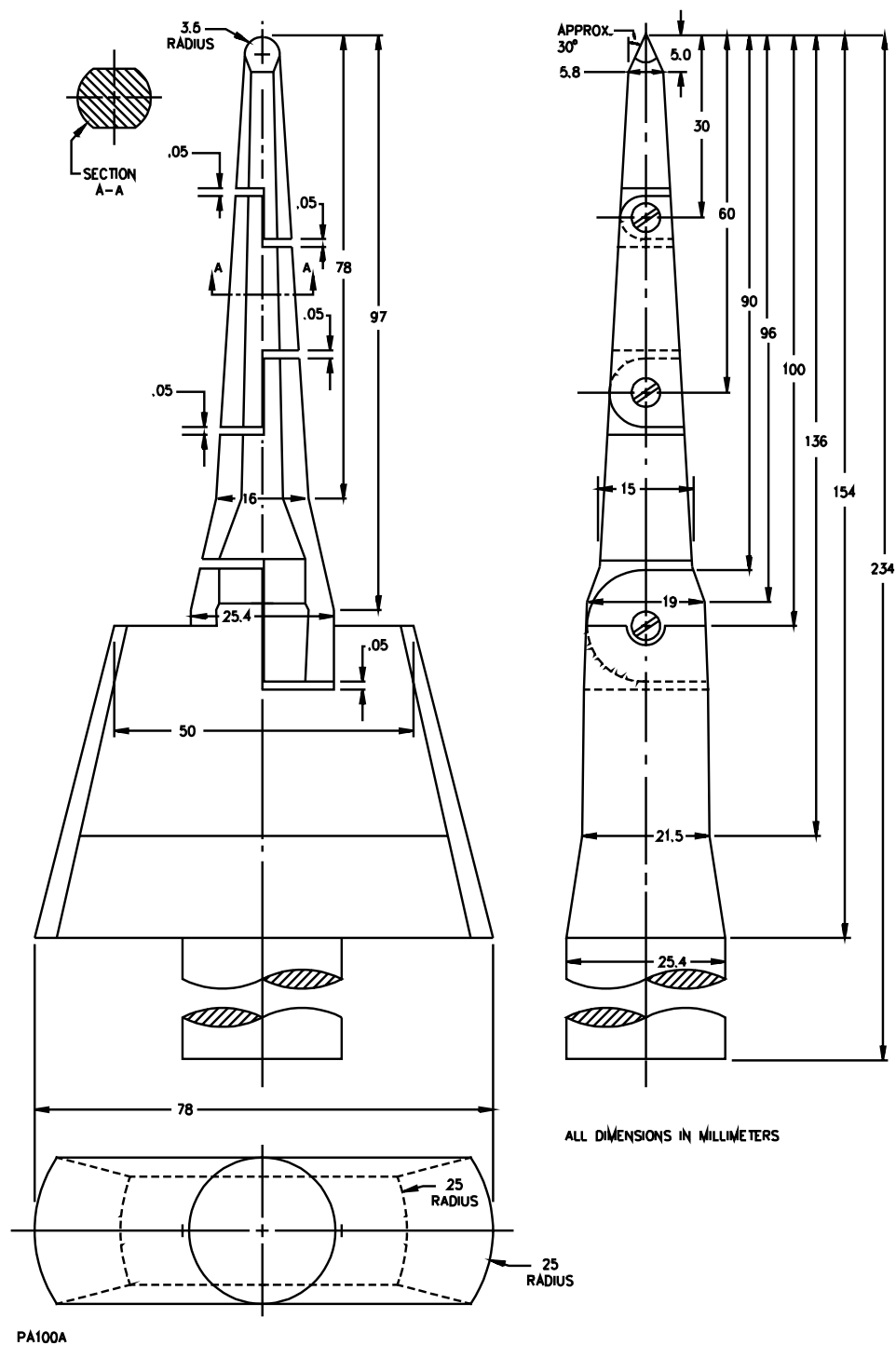
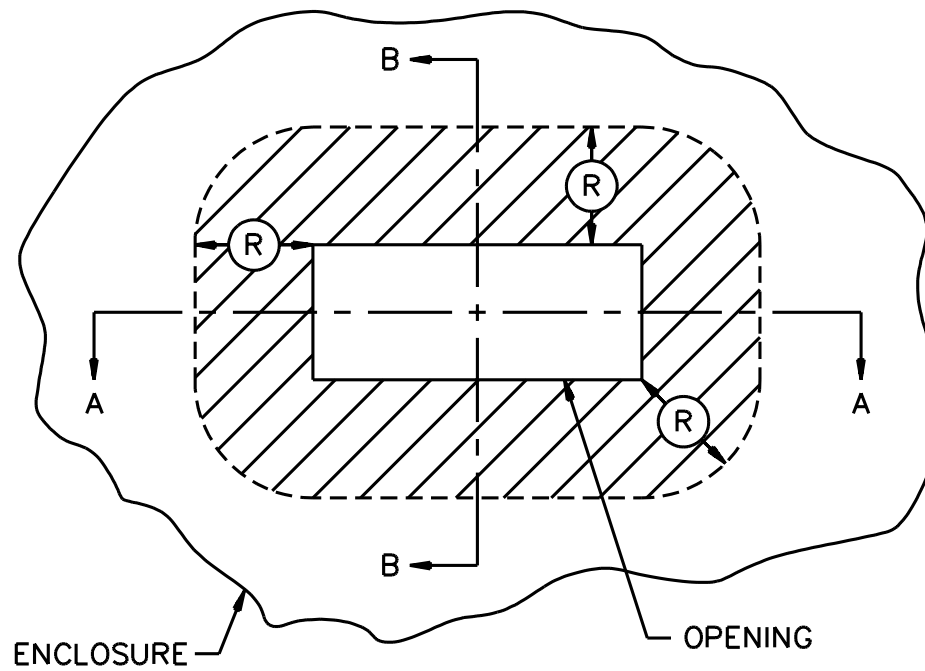
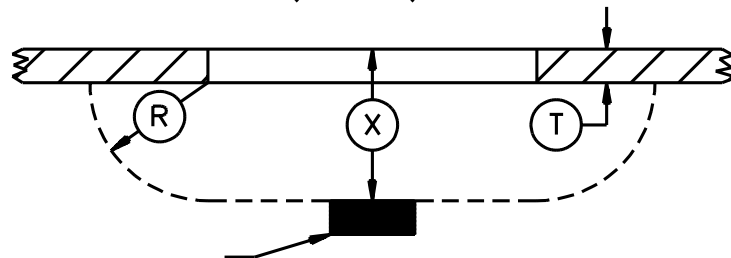


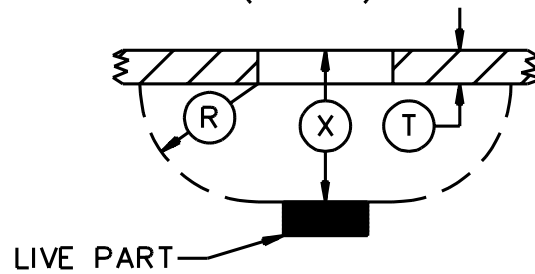
Figure 6.3
Opening in enclosure
proportions exaggerated for clarity



SECTION A-A
($X=R+T$)



SECTION B-B
($X=R+T$)



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7 Assembly

7.1 A switch, lampholder, attachment-plug receptacle, or plug-type connector provided as a part of an appliance shall be mounted securely and prevented from turning by means other than friction between surfaces.

7.2 A lock washer properly applied is acceptable as a means to prevent turning of a stem-mounted switch.

7.3 Uninsulated live parts shall be so secured to the base or surface that they will be prevented from turning or shifting in position as the result of stresses if such motion may result in a reduction of spacings below the minimum required in 20.1.1 and 20.1.2.

7.4 Friction between surfaces is not acceptable as a means to prevent shifting or turning of live parts but a lock washer properly applied is acceptable.

7.5 Unless determined to be acceptable for the purpose, fastening of the handle assembly of a deep-fat fryer, cooker/fryer, or fondue appliance shall not rely on cement or equivalent materials alone. Mechanical means, such as pressure clamping, bosses and lances, and the like, shall be provided.

7.6 A handle assembly that is utilized to lift and tilt a deep-fat fryer, cooker/fryer, or fondue appliance shall comply with the requirements in 7.6 – 7.10, Table 31.1 and Sections 37 and 38.

7.7 A nonmetallic handle or feet of a deep-fat fryer, cooker/fryer, or fondue appliance shall be identified as required by the Standard for Polymeric Materials – Short Term Property Evaluations, UL 746A.

7.8 A handle of a deep-fat fryer, cooker/fryer, or fondue appliance shall be fastened so that a positive stop, interference screw or rivet, or other arrangement is provided so that with minor loosening, disengagement of the handle from the vessel will not result.

7.9 Iron and steel parts of a handle assembly of a deep-fat fryer, cooker/fryer, or fondue appliance shall be provided with corrosion protection in accordance with 8.1 or shall be constructed of stainless steel or other noncorrosive metal acceptable for the application.

7.10 A handle of a deep-fat fryer, cooker/fryer, or fondue appliance secured by a single fastening means shall be prevented from rotating by means other than friction. A lockwasher alone is not acceptable.

7.11 The feet of a deep-fat fryer, cooker/fryer, or fondue appliance shall comply with Deep Fat Fryer, Cooker/Fryer, and Fondue Cycling Test, Section 37.

8 Corrosion Protection

8.1 Iron and steel parts shall be protected against corrosion by enameling, galvanizing, plating, or other equivalent means, if the malfunction of such unprotected parts would increase the risk of fire or electric shock.

Exception: Where the oxidation of steel is not likely to be accelerated due to the exposure of metal to air and moisture or other oxidizing influence— thickness of metal and temperature also being factors – surfaces of sheet steel within an enclosure may not be required to be protected against corrosion. Cast-iron parts are not required to be protected against corrosion. A sheath employed on a heating element operating in air and terminal parts attached directly to the heating element need not be protected against corrosion.

8.2 The aging characteristics of plating or other finish used in an appliance shall be such that deterioration of the finish will not result eventually in unacceptable performance of the appliance.

9 Supply Connections

9.1 General

9.1.1 An appliance shall be provided with a length of attached flexible cord and an attachment plug for connection to the supply circuit, or shall have male pin terminals that accommodate a detachable power-supply cord. The length of attached cord or detachable power-supply cord shall not be less than 2.0 ft (0.6 m), nor greater than 7.0 ft (2.1 m).

9.1.2 A deep fat-fryer, cooker/fryer and fondue shall be provided with a detachable power-supply cord having a cord length a minimum of 2 ft (0.6 m) and a maximum of 3 ft (0.9 m) long.

9.1.3 An appliance provided with a detachable power-supply cord or nondetachable power-supply cord less than 4-1/2 ft (1.4 m) in length shall be provided with instructions in accordance with 51.7.

9.1.4 If a flexible cord or detachable power-supply cord is provided with an appliance, the rating (both current and voltage) of the cord and the fittings, shall not be less than that of the appliance.

9.1.5 An attached flexible cord or a detachable power-supply cord that is provided with an appliance shall be Type HPD, HPN, HSJ, or HSJO or shall have such properties that it will be at least equally as serviceable for the particular application.

9.1.6 A 3- to 2-wire, grounding-type adapter shall not be provided with an appliance.

9.1.7 Supplementary insulation, if employed on a flexible cord, shall not extend more than 1/2 inch (13 mm) outside the appliance (unless provided with additional mechanical protection), shall be prevented from fraying or unraveling and shall not affect adversely the means for providing strain relief.

9.1.8 The attachment plug of the power-supply cord of an appliance provided with a 15- or 20- ampere general use receptacle shall be of the 3-wire grounding type. The attachment plug of the power-supply cord of an appliance provided with a manually operated, line-connected, single pole switch for appliance on-off operation or an Edison-base lampholder shall be of the polarized or grounding type.

9.1.9 If a 3-wire grounding-type attachment plug or a 2-wire polarized attachment plug is provided, the attachment plug connection shall comply with Figure 9.1 and the polarity identification of the flexible cord shall comply with Table 9.2.

9.1.10 The conductor of the power-supply cord that is intended to be grounded shall have the following items connected to it:

- a) The screw shell of an Edison-base lampholder and
- b) The terminal or lead of a receptacle intended to be grounded.

Table 9.2 identifies the supply cord conductor intended to be grounded.

9.2 Strain relief

9.2.1 Strain relief shall be provided to prevent a mechanical stress on an attached flexible supply cord from being transmitted to terminals, splices, or interior wiring.

9.2.2 If wood, pressed board, or other fibrous materials is used to secure the strain-relief assembly, the fibrous material shall be secured to the appliance by a pin, setscrew, or other positive means.

9.2.3 Means shall be provided to reduce the likelihood of an attached supply cord or lead from being pushed into the enclosure of an appliance through the cord-entry hole. To determine compliance with this requirement, the supply cord or lead shall be tested in accordance with Push-Back Relief Test, Section 35.

9.2.4 If a knot serves as strain relief in an attached flexible cord, any surface with which the knot may come in contact shall be free from projections, sharp edges, burrs, fins, and the like, which may cause abrasion of the insulation on the conductors.

9.3 Pin terminals

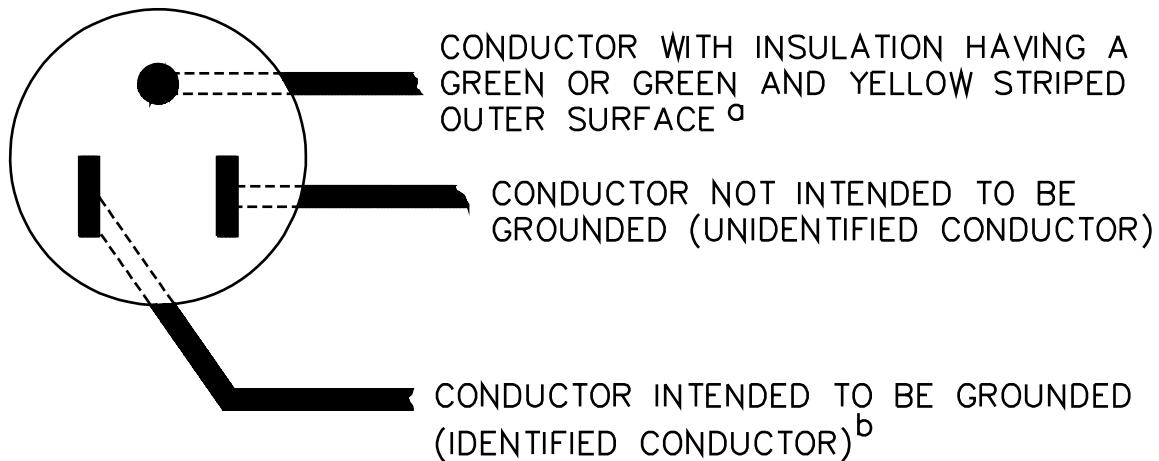
9.3.1 If an appliance is provided with pin terminals, the design of the appliance shall be such that no live parts will be exposed to unintentional contact both during and after the placement of the plug on the pins, in the intended manner.

9.3.2 A pin guard is required, such that:

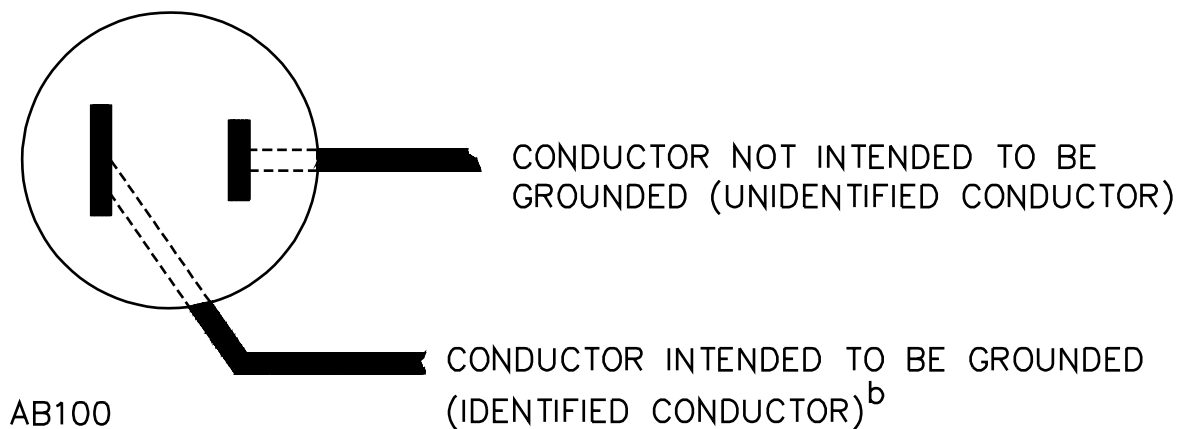
- a) A straight edge placed in any position, across and in contact with edges of the plug opening without the plug in place, cannot be made to contact any current-carrying pin.
- b) With the plug aligned with the pins and the face of the plug in a plane located perpendicular to the end or ends of the farthest projecting current-carrying pin, the probe illustrated in Figure 6.2 should not touch any current-carrying pin while the probe is inserted through any opening with the appliance in any position.

Figure 9.1
Connections to attachment plug

CONNECTIONS OF CORD CONDUCTORS TO GROUNDING – TYPE
ATTACHMENT PLUG (FACE OF PLUG REPRESENTED)



CONNECTIONS OF CORD CONDUCTORS TO POLARIZED
ATTACHMENT PLUG (FACE OF PLUG REPRESENTED)



^a In the above illustration, the blade to which the green conductor is connected may have a U-shaped or circular cross section.

^b Signifies a conductor identified in accordance with Table 9.2.

9.3.3 The plug used in accordance with 9.3.2(b) is to be the plug supplied with the appliance.

9.3.4 If an appliance employs three or more pin terminals intended for use with a plug that covers all the pins, the terminals shall be so spaced that they will not accommodate a flatiron or appliance plug or cord-connected body. The plug that these pins will accommodate shall be appropriate for the particular application.

9.3.5 If an appliance is provided with a user removable heating element, the heating element shall have a guard that shall:

- a) Be securely and rigidly mounted by means other than friction alone, and
- b) Prevent the heating element pins from being damaged, shorting to the appliance enclosure during insertion or removal, and shifting in position relative to each other.

9.3.6 A pin terminal shall be securely and rigidly mounted and shall be prevented from shifting in position by means other than friction between surfaces.

9.3.7 The requirement in 9.3.6 is intended primarily to provide for the maintenance of spacings as given in 20.1.1 and to provide for the maintenance of proper spacings between pin terminals. Under this requirement, consideration is also to be given to the means for locking terminals in position to maintain tightness.

9.3.8 The dimensions of pins and their center-to-center spacings (including the corresponding spacings of the female contacts of general-use plugs that these arrangements of pins will accommodate) are as indicated in Table 9.1.

9.3.9 An appliance provided with three pin terminals, one of which is for grounding, shall not be provided with or capable of being used with a two-conductor detachable power-supply cord.

9.3.10 An appliance provided with two pin terminals shall not be provided with or capable of being used with a three-conductor detachable power-supply cord employing a grounding conductor.

9.4 Bushings

9.4.1 At a point where a flexible cord passes through an opening in a wall, barrier, or enclosing case, there shall be an acceptable bushing or the equivalent that shall be substantial, reliably secured in place, and shall have a smooth, well-rounded surface against which the cord may bear. If Type HPN flexible cord or lighter is employed, if the wall or barrier is of metal, and if the construction is such that the cord may be subjected to strain or motion, an insulating bushing shall be provided. The heat- and moisture-resistant properties of the bushing material shall be such that the bushing is acceptable for the particular application.

9.4.2 If the cord hole is in porcelain, phenolic composition, or other nonconducting material, a smooth, well-rounded surface is considered to be equivalent to a bushing.

9.4.3 Ceramic materials and some molded compositions are acceptable generally for insulating bushings, but a separate bushing of wood, hot-molded shellac and tar composition, or rubber material is not acceptable. Vulcanized fiber may be employed if the bushing is not less than 3/64 inch (1.2 mm) thick, and if it is so formed and secured in place that it will not be affected adversely by conditions of ordinary moisture.

9.4.4 An insulated metal grommet may be accepted in place of an insulating bushing if the insulating material used is not less than 1/32 inch thick (0.8 mm), and completely fills the space between the grommet and the metal in which it is mounted.

Table 9.1
Pins of appliance and flatiron plugs

Type and rating of plug that accommodates the pins	Configuration of pins			Dimensions of pins	
	Number	Arrangement	Spacing between centers, inch (mm)	Diameter, inch (mm)	Length, inch (mm)
Appliance plug rated 10 A at 125 V	2	In line	1/2 (12.7)	0.156 ±0.005 (4.0±0.13)	9/16 – 5/8 (14.3 – 15.9)
Flatiron plug rated 10 A at 125 V	2	In line	11/16 (17.5)	0.188 ±0.005 (4.8 ±0.13)	3/4 – 7/8 (19.0 – 22.2)
Jumbo appliance plug rated 15 A at 125 V and	2	In line	1-1/16 (27.0)	0.188 ±0.005 (4.8 ±0.13)	3/4 – 7/8 (19.0 – 22.2)
Reversible plug (for two-heat control) rated 15 A at 125 V ^a	3	In line	7/8 (22.2)	0.188 ±0.005 (4.8 ±0.13)	3/4 – 7/8 (19.0 – 22.2)
Reversible plug (for two-or three-heat control) rated 15 A at 125 V ^a	3	One pin at apex of an equilateral triangle	7/8 (22.2)	0.188 ±0.005 (4.8 ±0.13)	3/4 – 7/8 (19.0 – 22.2)

^a Usually this plug is made without a contact in one of the holes.

Table 9.2
Polarity identification of flexible cords

Method of identification	Acceptable combinations		
	Wire intended to be grounded ^d		All other wires ^d
Color of braids on individual conductors	A	Solid white or gray – without tracer	Solid color other than white or gray – without tracer
	B	Color other than white or gray, with tracer in braid	Solid color other than white or gray – without tracer
Color of insulation on individual conductors	C ^a	Solid white or gray	Solid color other than white or gray
	C1 ^e	Light blue	Solid color other than light blue, white or gray
Color separators	D ^b	White or gray	Color other than white or gray
Other means	E ^c	Tin or other white metal on all strands of the conductor	No tin or other white metal on the strands of the conductor
	F ^b	A stripe, ridge, or groove on the exterior surface of the cord	

^a Only for cords—other than Type SP-1, and SPT-1—having no braid on any individual conductor.

Table 9.2 Continued on Next Page