



UL1005

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Underwriter's laboratories Inc.
Standard for safety

Electric flatirons



a century of public safety
established 1894



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UL standard for safety for electric flatirons, UL 1005

Fourth edition, dated July 2,2002

Revisions: this standard contains revisions though and including February 18,2004.

Summary of topics

The revisions dated February 18, 2004 were issued to incorporate the following revised requirement:

- Revision of paragraph 12.1.2.10 to delete" natural" from the term "natural gray".
- Revision of paragraph 27.1.1 and 27.1.3 to require the water reservoir of a steam iron be filled to maximum "fill" level during the drop test.
- Revision of paragraphs 43.4.1and 43.4.2 to clarify that, after the endurance test, the water reservoir is filled to determine evidence of deterioration.

Text that has been changed in any manner is marked with a vertical line in the margin. Charges in Requirements are marked with a vertical line in the margin and are followed by an effective date note indicating the date of publication or the date on which the changed requirement becomes effective.

The following table lists the future effective dates with the corresponding item.

Future effective date	References
August 18,2005	27.1.1and 27.1.3

The revised requirements are substantially in accordance with UL's bulletin(s) on this subject dated July 8,2003 and December 22,2003. The bulletin(s)is now obsolete and may be discarded.

The revisions dated February 15,2004 include a reprinted title page (page1) for this standard.

As indicated on the title page (page1), this UL standard for safety is an American national standard. Attention is directed to the note on the title page of this standard outlining the procedure to be followed to retain the approved text of this ANSI/UL standard.

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New product submittals made prior to a specified future effective date will be judged under all of the requirements in this standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued listing, and follow-up services after the effective date, and understanding of this should be signified in writing.

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This ANSI/UL standard for safety, which consists of the fourth edition with revisions through February 18, 2004 is under continuous maintenance, whereby each revision is ANSI approved upon publication. Comments or proposals for revisions on any part of the standard may be submitted to UL at any time. Written comments are to be sent to the UL Northbrook standards department, 333 Pfingsten roads, Northbrook IL 60062.

An effective date included as a note immediately following certain requirements is one established by Underwriter Laboratory Inc.

Revisions of this standard will be made by issuing revised or additional pages bearing their date of issue. A UL standard is current only if it incorporates the most recently adopted revised, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

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FOREWORD

A. This standard contains basic requirements for products covered by underwriter's 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 of these requirements.

D. A product employing materials or having forms of construction which conflict with specific requirements of the Standard cannot be judged to comply with the Standard. A product employing materials or having forms of construction not addressed by this standard may be examined and tested according to the intent of the requirements and, if found to meet the intent of this Standard, may be judged to comply with the Standard.

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F. Many tests required by the standard 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 household electric flatirons and cordless flatirons rated 250v or less and commercial electric flatirons rated 600v or less, to be employed in accordance with the National Electrical Code, NFPA 70.

1.2 These requirements do not cover ironing machines, ironing presses, or other garment finishing appliance that are covered by the standard for garment finishing appliances, UL141.

2 Glossary

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

2.2 AUTOMATIC FLATIRON—a flatiron having some form of automatic temperature control, usually a thermostatic control that operates automatically within predetermined temperature limits to open and close the circuit through the heating element.

2.3 CORDLESS FLATIRON—a flatiron intended to be operated while it is disconnected from the power supply.

3 Components

3.1 Except as indicated in 3.2,a component of a product covered by this standard should comply with the requirements for that component. See appendix A for a list of standards covering components generally used in 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 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 limited, and shall be used only under those specific conditions.

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 code or standard.

CONSTRUCTION

6 General

6.1 A flatiron shall employ materials found by investigation to be acceptable for the application.

7 Frame and enclosure

7.1 A flatiron shall be provided with an enclosure that will house all electrical parts other than the power-supply cord or the terminal pins.

7.2 A flatiron shall be form and assembled so that it will have the strength and rigidity necessary to resist the abuses to which it may be 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.

7.3 An enclosure, an opening, a frame, a guard, a knob, a handle, or the like shall not be sufficiently sharp to cause a risk of injury in maintenance or use of a flatiron or user maintenance of a modular flatiron.

7.4 among the factors to be taken into consideration when an enclosure is investigated for acceptability 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 under conditions of normal or abnormal use.

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

7.5 In addition to being considered with reference to factors as mentioned in 7.4, an enclosure of sheet metal should be investigated with respect to size and shape, thickness of metal, and acceptability for the application, considering the intended use of a flatiron.

7.6 cast –and sheet-metal portions of an enclosure shall not be thinner than specified in table 7.1.

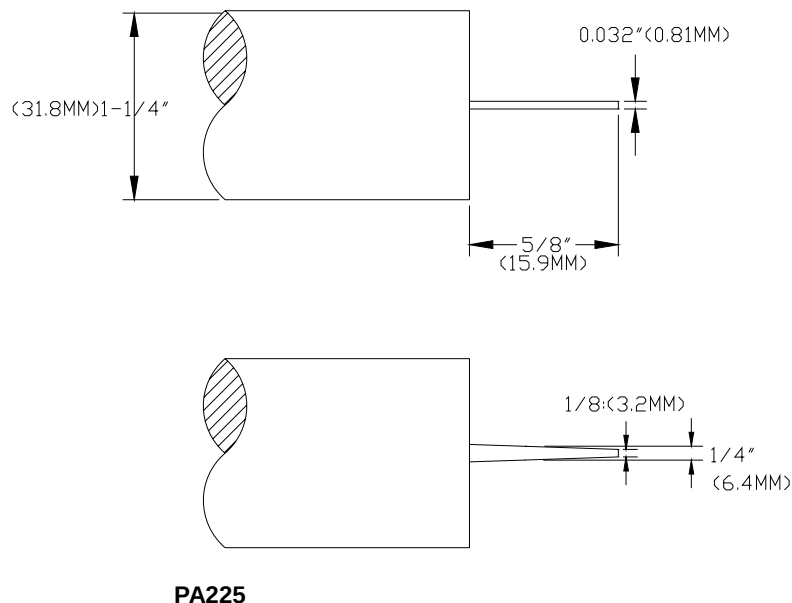
Exception: an enclosure may be thinner if it is found to be acceptable when investigated by considerations such as those mentioned in 7.4 and 7.5.

Table 7.1
Thickness of enclosure metal

Metal	Minimum thickness, in (mm)			
	At surface other than those to which a wiring system is to be connected in the field		At surface to which a wiring system is to be connected in the field	
Die-cast metal	3/64	(1.2)	---	---
Cast malleable iron	1/16	(1.6)	---	---
Other cast metal	3/32	(2.4)	---	---
Uncoated sheet steel	0.026	(0.66)	0.032	(0.81)
Zinc-coated sheet steel	0.029	(0.74)	0.034	(0.86)
Nonferrous sheet metal	0.036	(0.91)	0.045	(1.14)

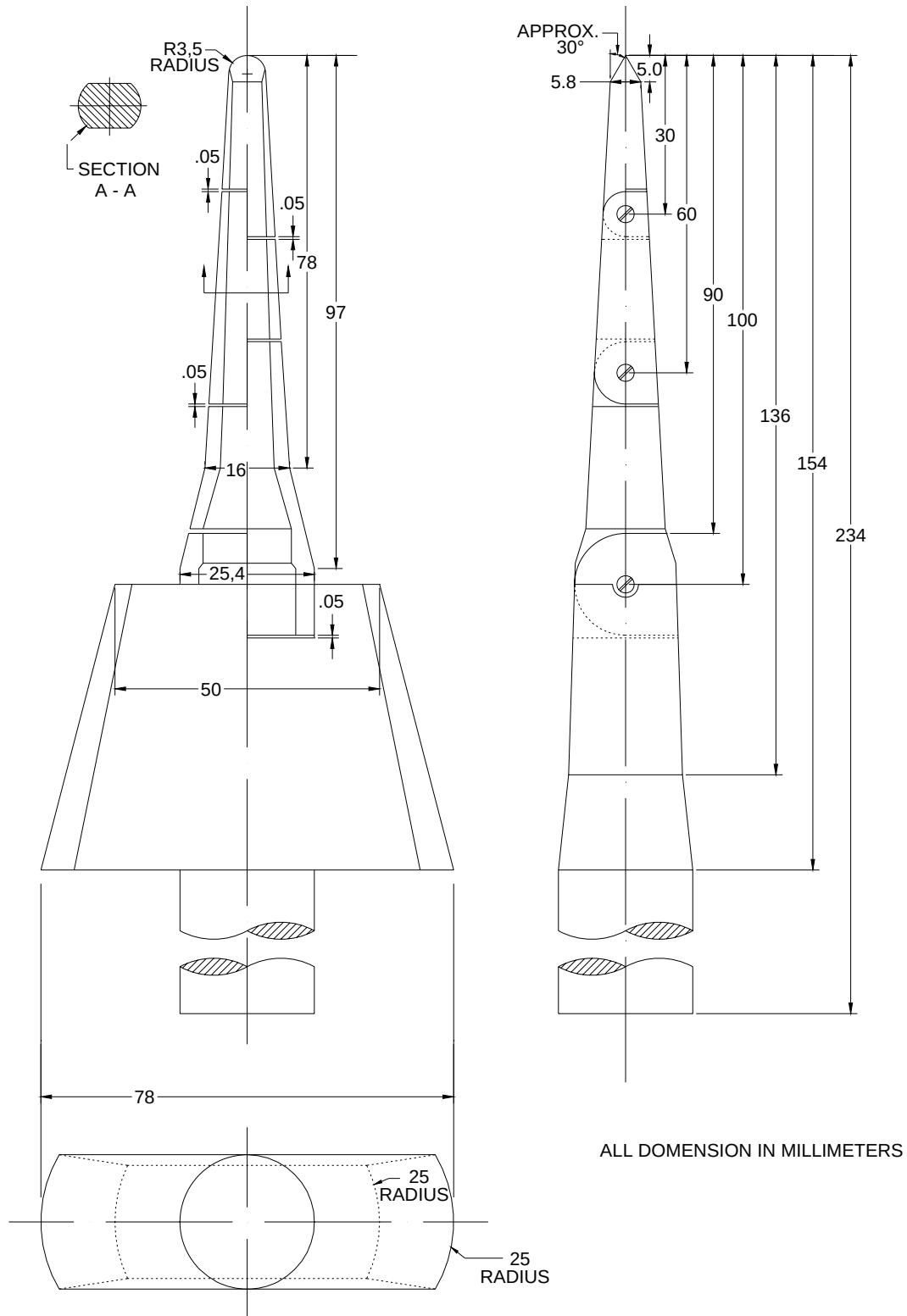
7.7 An opening in the enclosure of a flatiron located within 1 in (25.4mm) of the soleplate surface is acceptable if the probe illustrated in Figure 7.1, when inserted point first, cannot be made to touch any uninsulated live part.

Figure 7.1
Probe



7.8 An opening in an enclosure other than as mentioned in 7.7 shall not permit contact with live part by the probe illustrated in figure 7.2, when applied as described in 7.9.

7.9 With reference to 7.8 the probe illustrated in figure 7.2 is to be applied in any possible configuration and to any depth that the size of an opening will permit. The probe is to be rotated or angled to any possible position before, during, and after insertion through the opening; and, if necessary, the configuration is to be changed after the probe has been inserted through the opening.



8 Mechanical assemblies

8.1 An uninsulated live part and a component such as a switch, a lampholder, an attachment-plug receptacle, a plug-type connector, or the like shall be securely mounted and prevented from turning or shifting in position if such motion may result in:

- a) A reduction of spacing below the minimum acceptable values specified in section 18, Spacing, or
- b) Stress on the conductors of the component, or
- c) Both (a) and (b).

8.2 A properly applied lock washer is acceptable as a means to reduce the likelihood of turning of a stem-mounted switch.

8.3 Flatirons between surfaces are not acceptable as a means to reduce the likelihood of shifting or turning of live parts, but a properly applied lock washer is acceptable.

Exception: a lock washer is not required for securely riveted, integral parts of a stack-type thermostat.

8.4 Rigid connection of a thermostat with a solid wire or a bus bar is acceptable to reduce the likelihood of shifting or turning if the thermostat is otherwise securely mounted.

8.5 In a flatiron of modular design, a module that is likely to need inspection, replacement, or cleaning, by the user and that is intended to be manually operated or adjusted or periodically serviced shall be readily accessible without the use of a tool available only to service personnel. See 47.3.

9 Stands

9.1 A flatiron shall be provided with a stand on which it may be placed when not in use.

9.2 The stand may be a separate device or it may be a stand attached to the appliance, such as a heel rest.

10 Handles

10.1 A handle that may be folded for storage or for traveling convenience shall be provided with a means to lock the handle in the normal operating position.

10.2 A handle that automatically locks when it is raised to the operating position shall make an audible sound when moved into the locked position.

10.3 The means to actuate a mechanism that requires a positive motion by the operator to lock the handle in the operating position shall be evident.

10.4 A positive motion by the operator shall be required to release the locking mechanism to fold the handle. The release mechanism shall be designed and located so as to reduce the possibility of unintentional tripping. This will usually require that the release mechanism not be associated with the gripping area of the handle.

11 Protections against corrosion

11.1 Iron and steel parts shall be protected against corrosion by painting, 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: a sheet-steel surface within a dry flatiron where oxidation is not likely to be accelerated due to exposure to air and moisture or other oxidizing influences – thickness of metal and temperature also being factors – may not be required to be protected against corrosion.

Exception no. 2: cast-iron parts need not be protected against corrosion.

11.2 Deterioration of the plating or other finish due to aging shall not result in any condition that will adversely affect the operation of the flatiron.

12 Supply-connected flatirons

12.1 permanently connected flatirons

12.1.1 General

12.1.1.1 A commercial flatiron may be cord-connected in accordance with 12.2.1.1- 12.2.3.3 or shall be provided with wiring terminal or leads for the connection of conductors of a wiring system that would be acceptable for the flatiron.

12.1.1.2 A terminal box or compartment in which power –supply connections to a permanently connected flatiron is to be made shall be located so that these connections may be readily inspected after the flatiron is installed as intended.

12.1.1.3 A terminal compartment intended for the connection of a supply raceway shall be attached to the flatiron so that it cannot turn.

12.1.1.4 A permanently connected flatiron employing a cord reel shall comply with the requirements in the Standard for cord reel, UL 355.

12.1.2 Wiring terminals and leads

12.1.2.1 Wiring terminal or leads provided on an automatic flatiron intended for permanent connection to the power supply shall be acceptable for the connection of conductors having an ampacity that is not less than the current rating of the appliance. A nonautomatic flatiron shall be provided with wiring terminals or leads having an ampacity of not less than 125 percent of the current rating of the flatiron.

12.1.2.2 A wiring terminal shall be provided with a pressure wire conductor securely fastened in place, for example, firmly bolted or held by a screw.

Exception: a wire-binding screw may be employed at a wiring terminal intended to accommodate a 10 AWG(5.3 mm²) or smaller conductor if upturned lugs or the equivalent are provided to hold the wire in position.

12.1.2.3 A wiring terminal shall be prevented from turning or shifting in position by means other than friction between surfaces. This may be accomplished by:

- a) Two screws or rivets,
- b) Square shoulders or mortises,
- c) A dowel pin, lug or offset,
- d) A connecting strap or clip fitted into an adjacent part, or
- e) Some other equivalent method.

12.1.2.4 A wire –binding screw at a wiring terminal shall not be smaller than a No.10 screw.

Exception No. 1: A No.8 screw may be used at a terminal intended only for the connection of a 14AWG (2.1mm²) conductor.

Exception No.2: A No.6 screw may be used for the connection of a 16AWG (1.3mm²) or 18AWG (0.82 mm²) control-circuit conductor.

12.1.2.5 A wire- binding screw shall thread into metal.

12.1.2.6 For a terminal plate tapped for a wire – binding screw:

- a) The metal shall not be less than 0.050 in (1.27mm) thick.
- b) Each tapped hole shall have two or more full threads in the metal, which may be extruded if necessary to, provided the threads.

Exception: A plate not less than 0.030 in (0.76mm) thick is acceptable provided the tapped threads have equivalent mechanical strength.

12.1.2.7 Upturned lugs or a cupped washer shall be capable of retaining a conductor of the size mentioned in 12.1.2.1 but not smaller than 14AWG(2.1 mm³), under the head of the screw or the washer .

12.1.2.8 A flatiron intended for connection to a grounded power supply and employing a lampholder, a single-pole switch, or a single – pole automatic control shall have one terminal or lead identified as described in 12.12.9 or 12.1.2.10, for connection of the grounded conductor of the supply circuit. The terminal or lead intended to be grounded shall be the one that is connected to screw shells of lampholders, and to which are connected no single-pole switch or single-pole automatic controls.

12.1.2.9 A terminal intended for the connection of a grounded circuit conductor shall be made of or plated with a metal substantially white in color, and shall be readily distinguishable from the other terminals; or proper identification of that terminal shall be clearly shown in some other manner, such as on an attached wiring diagram.

12.1.2.10 A lead intended for the connection of a grounded circuit conductor shall be finished to show a white or gray color and shall be readily distinguishable from the other leads.

12.1.2.10 revised February 18,2004

12.1.2.11 The free length of a lead inside an outlet box or wiring compartment shall be 6 in (152mm) or more if the lead is intended for field connection to an external circuit.

Exception: A lead may be less than 6 in (152mm) long if it is evident that the use of a longer lead might result in a risk of fire or electric shock.

12.1.3 Equipment – grounding conductor

12.1.3.1 A wiring terminal or lead shall be provided for field connection of an equipment–grounding conductor.

12.1.3.2 The surface of an insulated lead intended solely for the connection of an equipment–grounding conductor shall be green with or without one or more yellow stripes, and no other lead shall be so identified.

12.1.3.3 A wire –binding screw intended for the connection of an equipment–grounding conductor shall have a green-colored head that is hexagonal, slotted, or both. A pressure wire connector intended for connection of such a conductor shall be plainly identified, such as by being marked “G,” “GND”, “GR” “Ground” “grounding”, or the like, or by a marking on an attached wire diagram.

12.1.3.4 A wire –binding screw or pressure wire connector intended for the connection of an equipment–grounding conductor shall be located inside the terminal compartment so that it is unlikely that it will be removed during servicing of the flatiron.

12.1.3.5 A terminal solely for connection of an equipment –grounding conductor shall be capable of securing a conductor of the size required for appliance.

12.2 Cord –connected flatirons

12.2.1 General

12.2.1.1 A flatiron intended to be connected to the power- supply circuit by means of a flexible cord shall be provided with an attached flexible cord and an attachment plug for connection to the supply circuit, or shall have male pin terminal that accommodate a cord set intended to be used with the flatiron.

12.2.1.2 A cord –connected flatiron employing a cord reel shall comply with the requirement in the Standard for cord reels, UL 355.

12.2.1.3 A supply cord shall be type HPD, HPN, HS, HSJ, HSJO, HSO, or an equivalent heater cord.

12.2.1.4 The length of an attached cord or a separate cord set shall not be greater than 12 ft (3.66m) and not less than:

- a) 6 ft (1.88m) for a commercial flatiron, and
- b) 8 ft (2.44m) for a household flatiron.

12.2.1.5 The length of the power supply cord is to be measured from the point where the cord enters the appliance to the face of the attachment plug. The length of a cord set is to be measured from the face of the flatiron or appliance plug to the face of the attachment plug.

12.2.1.6 The current and voltage rating of the cord and the fitting of an attached flexible cord or a separate cord set provided with a flatiron shall not be less than that of the flatiron. A 20- A plug is acceptable for a commercial flatiron rated not more than 4000W at 240V.

12.2.1.7 The attachment plug of the power supply cord of an appliance provided with a 15- or 20A rated general –use receptacle shall be of the 3- wire grounding type. The attachment plug of the power supply cord of an appliance shall be of the polarized or grounding type if provided with:

- a) A manually operated, line- connected, single pole switch for appliance on –off operation, or
- b) An Edison –base lampholder.

12.2.1.8 If a 3-wire grounding-type attachment plug or a 2-wire polarized attachment plug is provided, the attachment plug connections shall comply with figure 12.1.

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

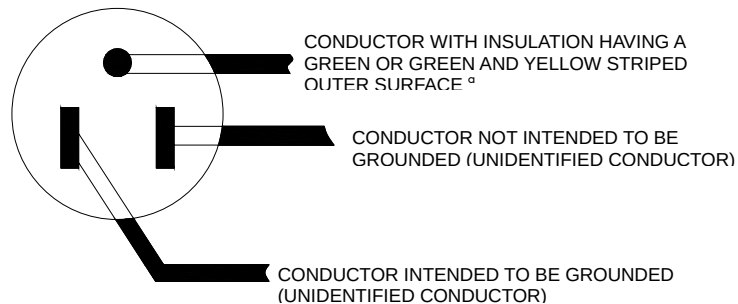
- a) The screw shell of an Edison–base lampholder, and
- b) The terminal or lead of a receptacle intended to be grounded.

12.2.1.10 If a dual voltage flatiron is provided with an adapter for connection to an alternate supply source, the adapter shall comply with the applicable requirements in the standard for attachment plugs and receptacles, UL 498

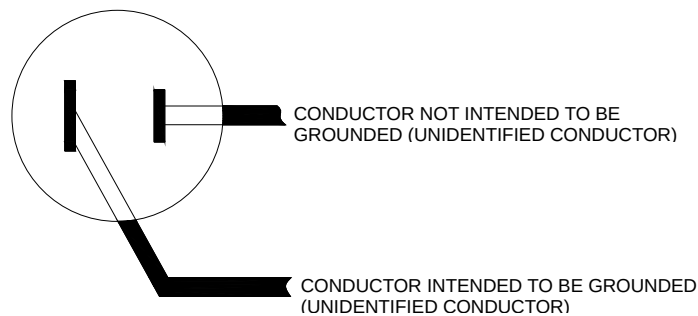
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Figure 12.1
Connection to attachment plug

CONNECTIONS OF CORD CONDUCTORS TO GROUNDING –TYPE
ATTACHMENT PLUG (FACE OFF 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,

12.2.2 Cord guard

12.2.2.1 To reduce sharp bending of the cord at the inlet and to protect the cord from sharp edges or burrs, a flatiron with an attached flexible cord shall be provided with a cord guard.

12.2.2.2 The cord guard shall be held securely in place in the assembled flatiron. The diameter of a spring guard shall accommodate the cord without restriction or unnecessary looseness. A smooth metal grommet or a bushing is acceptable at the free end of a spring guard if it is held securely in place. The guard shall be flexible to conform to the motion of the cord in service without producing a sharp bend at or near the point of attachment to the flatiron.

12.2.3 Strain relief

12.2.3.1 Strain relief shall be provided to reduce the likelihood of mechanical stress on an attached flexible supply cord from being transmitted to terminals, splices, or interior wiring. See Section 40-Strain Relief test.

12.2.3.2 Wood, pressed board, or other fibrous material used to secure the strain-relief assembly, shall be secured to the flatiron by a pin, setscrew, or other positive means.

12.2.3.3 If a knot serves as strain relief for an attached flexible cord, all surfaces that the knot may contact shall be free from projections, sharp, edges, burrs, fins, or the like that may abrade the insulation on the conductors.

12.2.4 Pushback relief

12.2.4.1 Means shall be provided to prevent an attached flexible cord from being pushed into the enclosure of a flatiron through the cord- entry hole when such displacement results in:

- a) Subjecting the cord to mechanical damage;
- b) Exposing the cord to a temperature higher than that for which it is rated;
- c) Reducing spacing, such as to a metal strain- relief clamp, below the minimum required values; or
- d) Damaging internal connections or components.

To determine compliance, the cord shall be tested in accordance with push-back relief test, section 41.

12.2.5 Pin terminal

12.2.5.1 Pin terminals that are provided for connection of an appliance to the power supply shall be guarded or recessed so that any pin, where live, cannot be contacted unintentionally by persons while the cord connector or plug is fully seated or is being removed from or placed on the pins. The guard or recess is to be investigated as specified in 12.2.5.2 and 12.2.5.3.

12.2.5.2 With no plug or cord connector on the pins, a straightedge placed in any position across and in contact with the guard or recess shall not touch any pin that is live when the appliance is connected to a branch circuit.

12.2.5.3 With the contact openings in the plug or cord connector aligned with the pins and with the face of the plug or connector located in the plane perpendicular to the end of the farthest projecting pin that is live when the appliance is connected to a branch circuit, it shall not be possible by means of the probe illustrated in figure 7.2 to touch any pin that is live when the appliance is connected to a branch circuit.

12.2.5.4 The plug specified in 12.2.5.1 is to be either:

- a) A standard flatiron or appliance plug if the pins on the flatiron are of standard flatiron- or appliance – plug configuration, or
- b) The plug supplied with the flatiron, if the pins on the flatiron are not of a standard flatiron – or appliance – plug configuration.

12.2.5.5 If a flatiron employs three or more pin terminal designed for use with a plug that covers all the pins, the terminals shall be spaced so that they will not accommodate a 2- pin flatiron or appliance plug or cord connector .the plug that the pins will accommodate shall be acceptable for the application.

12.2.5.6 A pin terminal shall be prevented from turning or shifting in position by means other than flatiron between surfaces. This may be accomplished by:

- a) Two screws or rivets:
- b) Square shoulder or mortises;
- c) A dowel pin, lug, or offset;
- d) A connecting strap or clip fitted into an adjacent part; or
- e) Some other equivalent method.

12.2.5.7 For a household flatiron, the dimensions of pins and their center- to –center spacing, including the corresponding spacing of the female contacts of general-use plugs that the pins will accommodate, shall be as specified in table 12.1.

Exception: pin terminals are not required to comply with the dimensions specified in table 12.1 if the plug provided on a cord set supplied with the iron is not interchangeable with flatiron plugs and appliance plugs that are commonly supplied with heating appliances.

Table 12.1
Configuration of plugs for cord sets

Type and rating of plug that accommodates pins			Configuration and dimensions of pins				
	Amperes						
	125V	250V	Number	Arrangement	Spacing Between Center, in (mm)	Diameter, in (Mm)	Length, in (mm)
Appliance plug	10	5	2	In line	1/2 (12.7)	5/32±0.005 (4.0±0.1)	9/16 –5/8 (14.3- 15.9)
Flatiron plug	10	5	2	In line	11/16(17.5)	3/16±0.005 (4.8±0.1)	3/4-7/8 (19.0-22.2)
Jumbo appliance plug	10	10	2	In line	1-1/16(27.0)	3/16±0.005 (4.8±0.1)	3/4-7/8 (19.0-22.2)
Reversible Plug- for Two- heat Control ^a	15	10	3	In line	7/8(22.2)	3/16±0.005 (4.8±0.1)	3/4-7/8 (19.0-22.2)
Reversible Plug-for Two- or three-heat Control ^a	15	10	3	Equilateral Triangle	7/8(22.2)	3/16±0.005 (4.8±0.1)	3/4-7/8 (19.0-22.2)
^a Usually this plug is made without a contact in one of the holes.							

12.2.5.8 Pin terminals of a commercial flatiron shall not accommodate a plug that will accommodate the pin terminals described in 12.2.5.7.

12.3 Cordless flatirons

12.3.1 The length of an attached supply cord or separate cord set connected to the power stand of a cordless flatiron shall not be less than 6 ft (1.88m).

13 Current –carrying parts

13.1 A current –carrying part shall be made of metal that is acceptable for the application.

13.2 A current –carrying part made of a corrosion–resistant alloy, such as stainless steel of an austenitic, 18 percent chromium, 8 percent nickel type, is acceptable regardless of temperature.

13.3 Ferrous metal current –carrying parts made of ordinary iron and steel other than mentioned in 13.2 are not acceptable.

Exception: the following parts may be made of iron or steel provided they are acceptable protected against corrosion:

- a) Pin terminals;*
- b) Parts that operate at a temperature higher than 100 °C(212 °F);and*
- c) Parts of a component referred to in 3.1.*

13.4 A live part shall be located or protected so that it will not be subject to wetting caused by deterioration or breakage of a polymeric water reservoir of a flatiron unless the reservoir is of material acceptable for temperatures encountered, and does not develop cracks as a result of aging.

14 Internal wiring

14.1 General

14.1.1 Internal wiring of a flatiron shall consist of wires of a type or types that are acceptable for the application, when considered with respect to the temperature, voltage, and, other conditions of service to which they are likely to be subjected.

14.1.2 The supply cord is not considered to be part of the internal wiring.

14.1.3 A length of flexible heater cord shall be provided between the iron and the terminal compartment of a permanently connected flatiron.

14.1.4 Wires within an enclosure, compartment, raceway, or the like shall be located, secured, or protected so that no damage to conductor insulation can result from contact with any rough, sharp, or moving part,