

UL 817

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Cord Sets and Power-Supply Cords

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SR1-SR2	March 16, 2001

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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 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.

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 power-supply cords for use as supply connections for appliances in accordance with the National Electrical Code.

1.2 These requirements also cover cord sets for use in extending a branch circuit supply to the power-supply cord of a portable appliance by means of flexible cord in accordance with the National Electrical Code.

1.3 When a specific section makes reference to a general section, and there is a conflict of requirements, the requirements of the specific section shall apply.

1.4 Unless otherwise noted, cord sets and power-supply cords shall be considered to be intended for indoor use.

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.

Hospital Grade Attachment Plugs

1.6 The requirements in Sections 106 – 113 cover molded-on attachment plugs intended for hospital use in other than hazardous locations in accordance with Article 517 of the National Electrical Code, ANSI/NFPA 70. They are applicable only to nonlocking type devices of conventional configuration (Standard for Wiring Devices – Dimensional Requirements ANSI/NEMA WD 6) rated 15 or 20 A, 125 or 250 V. Attachment plugs shall be of the straight type (longitudinal axis of flexible cord parallel to that of the line blades), molded onto flexible cord.

1.7 Other types such as locking-type configurations or devices for hazardous locations can be investigated based on the Hospital Grade test program in this standard along with any modifications needed to adequately represent the expected use of the device.

2 Glossary

2.1 ADAPTER CORD SET – A cord set, without a switch, for use on construction sites to provide power from a single outlet to between two and 6 outlets, convert from one contact configuration to another, or both. (See Sections 36 – 41).

2.2 ANTENNA POWER-SUPPLY CORD – A nondetachable power-supply cord consisting of a 2-pole, nongrounding-type (15 A, 125 V) attachment plug molded to a 3-conductor parallel-type flexible cord with the third connector terminating inside the body of the attachment plug without being electrically connected to a terminal. (See Sections 48 and 51).

2.3 ATTACHMENT PLUG – A male contact device for the connection of a flexible cord to an outlet device.

2.3 added March 16, 2001

2.4 CORD CONDUCTORS – The total number of conductors in a cord.

2.5 CORD CONNECTOR – A female contact device that is wired on flexible cord.

2.5 added March 16, 2001

2.6 CORD SET – A length of flexible cord assembled:

- a) With an attachment plug or current tap as a line fitting, and a cord connector as a load fitting, and with or without a through-cord switch, or
- b) With a series-connected current tap and a pendant switch.

2.7 CURRENT-CARRYING CONDUCTOR – A cord conductor excluding both the grounding conductor and the neutral conductor which carries only the unbalanced current from the other conductors.

2.8 CURRENT TAP – A male and female contact device that is wired on flexible cord.

2.8 added March 16, 2001

2.9 DETACHABLE POWER-SUPPLY CORD – A length of flexible cord assembled with an attachment plug or current tap as a line fitting and with a single outlet appliance coupler as a load fitting, with or without a through-cord switch. The load fitting is intended to mate with the motor attachment cap of an appliance. (See Sections 64 – 79).

2.10 GENERAL-USE CORD SET – A cord set consisting of the following:

- a) Flexible cord of one of the Types in Table 20.1 and either No. 18, 17, 16, 14, 12, or 10 AWG conductors.
- b) Line and load fittings of the same configuration, rated 15 or 20 A, 125 or 250 V, and of the C1.1, C1.5, C1.6, C1.9, or C1.10 configuration as specified in the Standard for Wiring Device Configurations, UL 1681.
- c) Not be more than three outlets total, unless minimum No. 12 AWG, Type SJ or equivalent flexible cord is employed, in which case the maximum number of outlets is six.
- d) Overcurrent protection, when No. 18 or 17 AWG flexible cord is employed.

- e) With or without a through-cord or pendant switch rated not less than "6 A, 120 V – 3 A, 250 V", or "10 A, 120 V AC."
- f) With or without intermediate devices such as fuses, provided that they are not of the automatic resetting type.

2.10 revised March 16, 2001

2.11 GROUNDED CONDUCTOR – The circuit conductor that is intentionally grounded.

2.12 NONDETACHABLE POWER-SUPPLY CORD – A length of flexible cord assembled without a load fitting (appliance coupler) but with an attachment plug or current tap as a line fitting, with or without a through-cord switch for direct connection to an appliance. (See Sections 48– 51).

2.13 OUTDOOR-USE CORD SET – A cord set that is intended to supply power to portable outdoor-use appliances, consisting of the following:

- a) Outdoor-use flexible cord of the types SOW, SOOW, STW, STOW, STOOW, SEW, SEOW, SEOOW, SJOW, SJOOW, SJTW, SJTOW, SJTOOW, SJEW, SJEOW or SJEOWW Type and No. 18, 16, 14, 12, or 10 AWG conductors.
- b) Line and load fittings that are of the same configuration; rated 15 or 20 A, 125 or 250 V of the C1.1, C1.5, C1.6, C2.1, C2.3, C2.4, C2.6, or C2.7 configuration as specified in the Standard for Wiring Device Configurations, UL 1681; resistant to sunlight and mechanical abuse; and exclude moisture from entering the bodies.
- c) Not be more than three outlets, total.
- d) Overcurrent protection, when smaller than 16 AWG flexible cord is employed.
- e) With or without a through-cord or pendant switch rated not less than "6 A, 120 V – 3 A, 250 V," or "10 A, 120 V AC" and do not permit water to enter the enclosure so as to contact live parts.
- f) With or without intermediate devices such as fuses, provided that they are not of the automatically resetting type and do not permit water to enter the enclosure so as to contact live parts.

2.13 revised March 16, 2001

2.14 OUTDOOR-USE POWER-SUPPLY CORD – A power-supply cord that is intended to be used to supply power to portable outdoor use appliances. (See Section 54).

2.15 OVERCURRENT – Any current in excess of the rated current (ampacity) which may result from an overload or a short circuit condition.

2.16 OVERLOAD – Operation at a current exceeding rated ampacity.

2.17 POWER-SUPPLY CORD FOR MOBILE HOMES – A nondetachable power-supply cord for use with mobile homes. (See Sections 58– 61).

2.18 POWER-SUPPLY CORD FOR RECREATIONAL VEHICLES – A nondetachable power-supply cord for use with recreational vehicles. (See Sections 55 – 57).

2.19 RECREATIONAL-VEHICLE CORD SET – A cord set for use with recreational vehicles. (See Sections 42 and 43).

3 Components

3.1 Except as indicated in 3.2, a component of a product covered by this standard shall comply with the requirements for that component.

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 limits, 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 that code or standard.

CONSTRUCTION

6 General

6.1 Each cord set and power-supply cord shall employ materials throughout that are acceptable for the particular use, and shall be made and finished with the degree of uniformity and grade of workmanship practicable in a well-equipped factory.

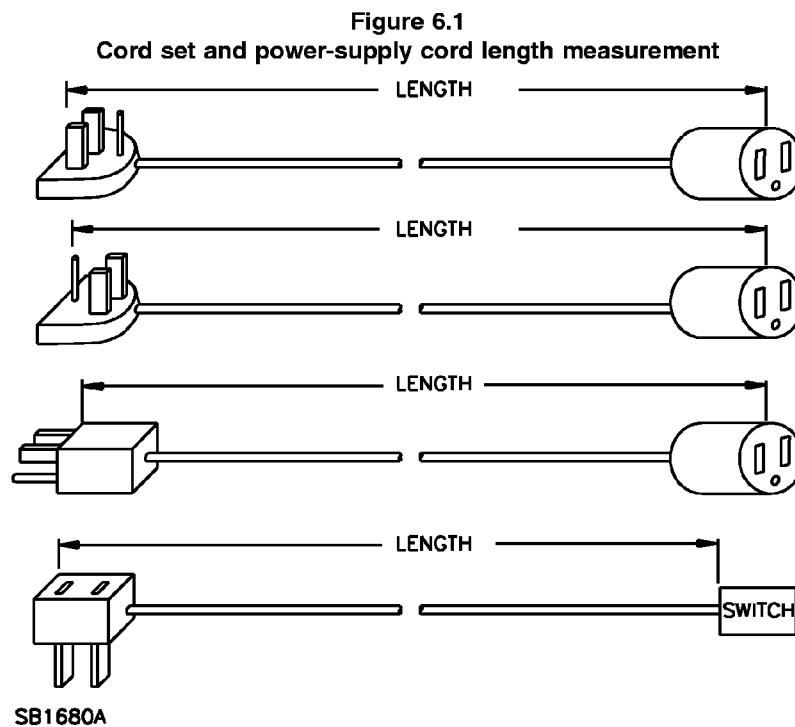
6.2 A blade used in a 15 or 20 A attachment plug cap shall comply with the Standard for Attachment Plug Blades for Use in Cord Sets and Power-Supply Cords, UL 1659.

Exception No. 1: A blade which has crimp connections that are also soldered or welded need not comply with the performance requirements in the Standard for Attachment Plug Blades for Use in Cord Sets and Power-Supply Cords, UL 1659.

Exception No. 2: A blade which is welded or is made mechanically secure and soldered directly to the conductor connections need not comply with the performance requirements in the Standard for Attachment Plug Blades for Use in Cord Sets and Power-Supply Cords, UL 1659.

6.3 Each cord set intended for use with a television receiver shall comply with 15.7 and 18.5. Each power-supply cord intended for use with a television receiver shall comply with 44.6, 45.1, 62.2, 63.3, 75.1, and 79.2.

6.4 The length of each cord set or detachable power-supply cord shall be taken as the overall length including the fittings for both line and load connections. See Figure 6.1.



6.5 The length of a nondetachable power-supply cord is to be measured from the end of the line fitting to the point at which the outer covering of the cord is removed.

7 Configurations

7.1 The Figures referenced as Sections C1– C3 contain configurations of various attachment plugs and receptacle combinations and are found in the Standard for Wiring Device Configurations, UL 1681.

8 Flexible Cord

8.1 A flexible cord shall be continuous from line fitting to load fitting.

Exception: Flexible cord need not be continuous if the construction involves Switches, Section 18, Joints, Section 39, General, Section 74, or the adapter cord set described in 36.2(b).

9 Fittings

9.1 A fitting that is a part of a cord set or a power-supply cord shall be investigated for use with the type and size of cord used in the assembly.

9.2 A fitting that is part of a cord set, and each part of that portion of a power-supply cord outside the appliance for which it is intended, shall not have a hole, indentation, or projection that could be used for permanent or hang-up mounting of the fitting.

Exception: A load fitting of a cord set may be provided with a means, such as a hole, hook, indentation, projection, or similar means, molded to the cord connector body, to facilitate temporary positioning during use. A projection shall not be more than 7 inches (178 mm) in length. A hole shall have a minimum inside diameter of 3/8 inch (9.5 mm).

9.3 Molded-on outlet devices of elastomeric or thermoplastic material and employing contacts of a 2-pole, 2-wire polarized configuration or a standard, 2-pole, 3-wire, grounding configuration, shall prevent the improper insertion of the mating attachment plug, the insertion of a ground pin, or both into any contact opening so that it might contact live parts. Compliance shall be determined by the test described in Improper Insertion Test, Section 93.

9.4 A rigid barrier, molded securely within the body of the connector may be used to meet the requirement in 9.3.

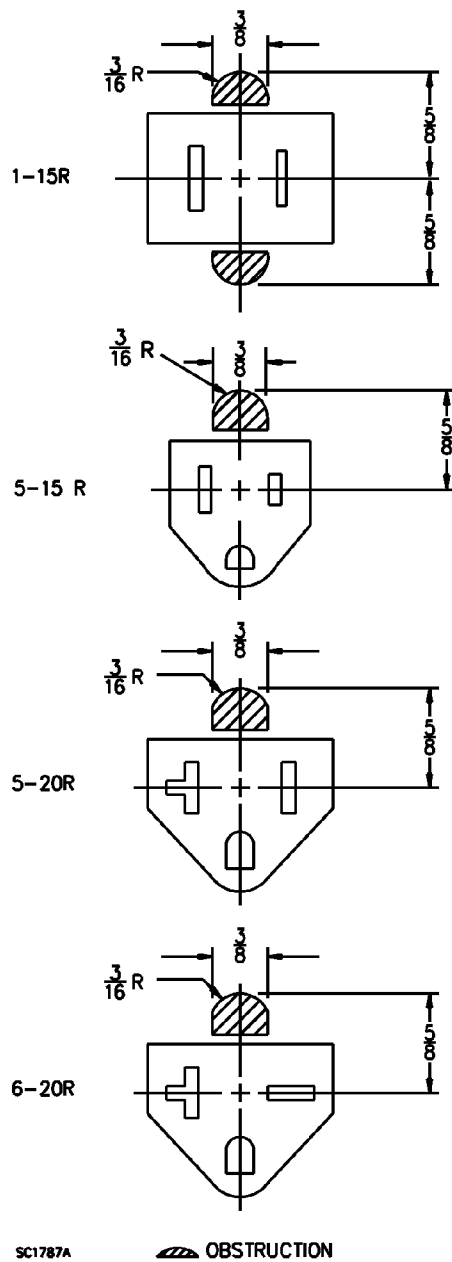
9.5 The face of a nongrounding outlet device of the type illustrated in Figure C1.1 shall obstruct the insertion of a grounding attachment plug of the type illustrated in Figure C1.5. The faces of grounding outlet devices of the types illustrated in Figures C1.6 and C1.10 (rated 125- and 250-V) shall obstruct the insertion of grounding attachment plugs of the type illustrated in Figures C1.10 and C1.6 (rated 250- and 125-V), respectively. The obstructions shall prevent the mating of dissimilarly rated devices by deliberate manual forces and manipulation to deflect the grounding pin to the outside of the face when attempting to insert the line blades.

Exception: The load fitting of a detachable power-supply cord need not meet the requirements in 9.5.

9.6 An outlet device having a face that includes the shaded areas indicated in Figure 9.1 is considered to comply with 9.5. The portion of the face located in the shaded areas shall be coplanar with the portion of the face having the slots or shall be recessed from the face not more than 3/32 inch (2.4 mm). The area of the face that provides the obstruction shall not contain any holes, grooves, thin or flexible areas, or other features that defeat the requirement in 9.5. The overall shape of the face or the obstruction is not otherwise limited by this requirement.

Figure 9.1
Faces of outlet devices showing smallest acceptable obstructions

Figure 9.1 revised March 16, 2001



Inch	$\frac{3}{16}$	$\frac{3}{8}$	$\frac{5}{8}$
mm	4.8	9.5	15.9

9.7 A nonpolarized, 2-wire, parallel-slot outlet device as shown in Figure C1.1 shall not accommodate an attachment plug having polarized blades to the extent that the wider blade can make electrical contact with either outlet device contact.

9.8 Two-wire fittings for use on Type SJ, SJO, SJOO, SJT, SJTO, SJTOO, SJE, SJEO, SJEOO, SP-3, SPT-3, SPE-3, or heavier flexible cord, other than the load fitting of a detachable power-supply cord, shall have a face size equal to, or larger than, that indicated in Figures 25.3 and 26.1.

9.8 revised March 16, 2001

9.9 The grounding blade or pin of a 15- or 20-A nonlocking type attachment plug shall not contain surface discontinuities that would tend to interfere with insertion into, or withdrawal from a grounding contact of an outlet device. Abrupt surface transitions such as gaps, steps, offsets, detents, holes or sharp chamfers are specifically prohibited in the following areas shown in Figure 9.2:

- a) The shaft, and
- b) The transition zone between the tip and the shaft which is likely to engage the grounding contact during insertion or withdrawal.

9.9 revised March 16, 2001

9.10 A polymeric material used in the fittings of a cord set or power-supply cord shall have a minimum flammability rating of HB, in accordance with the requirements in the Standard for Tests of Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94.

Exception: A polymeric material that has been subjected to the 12 mm or 3/4 inch end-product flame tests described in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C, need not have a flame rating.

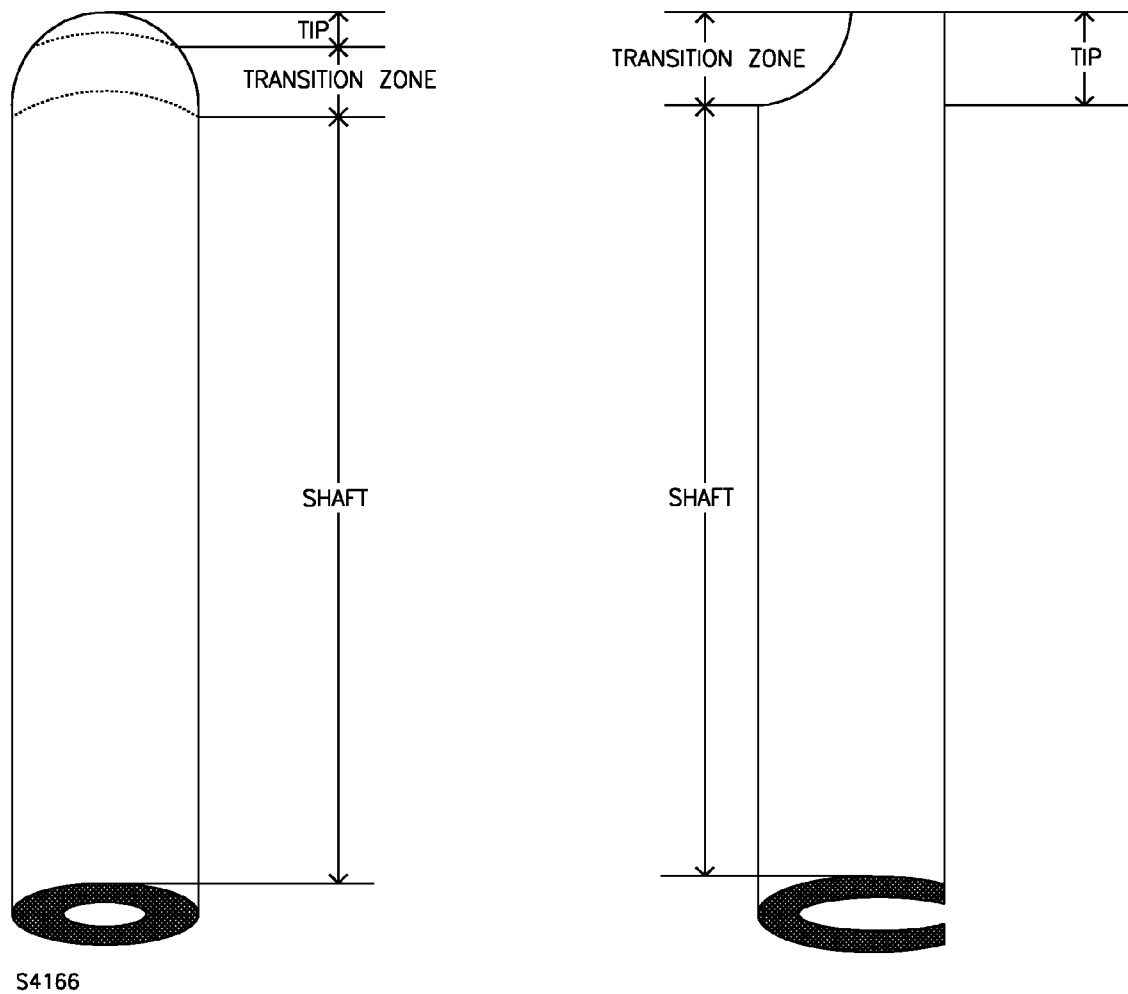
10 Connections to Fittings

10.1 Each conductor shall be fastened to the terminals of fittings in a manner that:

- a) Keeps strands of any conductor from contacting either uninsulated live parts of opposite polarity or dead metal parts.
- b) Provides mechanical security in accordance with Conductor Secureness Test, Section 81.
- c) Provides adequate ampacity in accordance with Temperature Test, Section 87.
- d) Keeps strands from surfacing in a molded-on fitting.

Figure 9.2
Grounding pin profiles

Figure 9.2 added March 16, 2001



S4166

11 Identification and Wiring

11.1 A terminal on a device which is identified for the connection of either a grounded conductor, or a grounding conductor shall be correctly connected to the corresponding identified conductor of the cord.

11.2 If a flexible cord is assembled to a fitting that has any of the configuration contacts as illustrated in Figures C1.1 – C1.38, C2.1 – C2.42, and C3.1 – C3.8, both of the following conditions shall be met:

- a) The conductor in the cord that
 - 1) is finished to show a white or natural grey color,
 - 2) is covered by a white or natural grey braid, or
 - 3) is equivalently identified by
 - i) a white or natural grey separator,
 - ii) a stripe, ridge, or groove on the outside surface of the insulation, or
 - iii) a tin or other white metallic coating on each strand shall be connected either to the contact designated by the letter W in the illustration (signifying the grounded circuit conductor), or, if there is no contact designated W in the illustration, to a contact designated X, Y, or Z or to any contact that is not designated by a letter.
- b) The conductor in the cord that either:
 - 1) is green with or without one or more yellow stripes, or
 - 2) is covered by a green braid with or without one or more yellow tracers shall be connected only to the contact designated by the letter G in the illustration (signifying the grounding conductor).

Exception: The grounded conductor (item a) of a power-supply cord or a single-outlet cord set may have light blue colored or light blue coated insulation if:

- a) The cord has a jacket that is not integral with the circuit conductor insulation,*
- b) The power-supply cord or cord set is to be factory installed in, or packaged with, an appliance, and*
- c) The shipping package is marked in accordance with 15.5.*

11.3 Flexible cord containing a grounding conductor shall not be assembled:

- a) To a 30-A, 3-pole, 3-wire, 125/250-V fitting with a contact configuration illustrated in Figure C1.18, or
- b) To a 50-A, 3-pole, 3-wire, 125/250-V fitting with a contact configuration illustrated in Figure C1.19.

12 Treatment of Cord-Conductor Coverings

12.1 The insulation, braid, or both on any individual conductor shall be removed only to the extent necessary to make the proper wire connection.

13 Strain-Relief Clamps

13.1 A strain-relief clamp shall not be applied on Types SPT-1, NISPT-1, SPT-2, or NISPT-2 cords or on tinsel cords, and shall not affect the thermoplastic jacket adversely when used with Type SVT, SJT, or ST cord.

Exception No. 1: A strain-relief means can be used that is part of a wiring device that has been previously investigated and found acceptable.

Exception No. 2: A strain-relief means can be used that complies with 13.3.

13.1 revised March 16, 2001

13.2 A metal clamp is acceptable with Type SP-1, NISP-1, SP-2, or NISP-2 cord and other thermoset-insulated cords lighter than Type SJ, only if additional insulation is provided between the clamp and the cord for mechanical protection. See 84.3.1.

13.2 revised March 16, 2001

13.3 Metallic or nonmetallic strain-relief clamps are acceptable for use on Types SPT-1, NISPT-1, SPT-2, NISPT-2, and SVT thermoplastic-insulated cords only with supplementary insulation investigated as described in 84.3.1. For heavier types of thermoplastic-insulated cords, the tests described in 84.3.1 are not required, except where the design of the clamp is judged to be injurious to the cord.

13.3 revised March 16, 2001

13.4 Metal clamps with rigid nonconducting inserts bearing against the cord are acceptable for use with rubber-insulated cord if strain relief is provided and with thermoplastic insulated cord if the investigation described in 84.3.1 is conducted with acceptable results.

13.5 At least one layer of supplementary insulation shall be provided between a flexible cord and a metallic strain-relief clamp.

Exception: For Type C and heavier general-use cords, and for Types HSJ and HS heater cords, the supplementary insulation can be omitted if the construction of the clamp is such that the cord insulation will not be adversely affected.

13.6 A fibrous material, such as cotton, varnished cambric, and similar materials, in either tubular or tape form, is acceptable for use as the supplementary insulation mentioned in 13.2, 13.3, and 13.5. A thermoplastic material is not acceptable as such insulation unless it provides protection in the particular application.

14 Fittings Intended to Accommodate Fuses or Other Overcurrent Protective Devices

14.1 An acceptable enclosure shall be provided for each overcurrent protective device provided on a cord set or power-supply cord.

14.2 The enclosure of an overcurrent protective device shall be comprised of material that meets the requirements of the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C, and shall have a minimum flammability rating of V-2.

Exception: Materials of molded-on bodies of attachment plugs or current taps that serve as the enclosure of the overcurrent protective device are acceptable if they operate within their recognized temperature limits during the normal temperature test (with a rated fuse installed) and do not flame or melt to the extent that:

- a) Live parts are exposed to contact or*
- b) A replaceable fuse cannot be replaced.*

14.3 An overcurrent protective device enclosure shall:

- a) Be of a material having moisture absorptive, flammability, and mechanical strength properties acceptable for the purpose and shall retain these properties when exposed to the maximum temperatures and other conditions of normal use.
- b) Reduce the risk of persons unintentionally contacting uninsulated live parts of the fuse and fuseholder.
- c) Confine the effects of a fuse rupture to the interior of the enclosure.

14.4 With regard to 14.3(a):

- a) Fiber and similar absorptive materials are not considered to have moisture-absorptive properties acceptable for use as the enclosure of a fuse.
- b) Polymeric materials classified as Type V-0, V-1, V-2, or 5V are considered to have acceptable flammability properties for use as the enclosure of a fuse.
- c) Molded phenolic and similar thermosetting polymeric materials are considered to have both moisture-absorptive and flammability properties acceptable for use as a fuse enclosure.

14.5 The construction of a fusible fitting that has male pins or blades, such as an attachment plug or current tap, shall be such that the fuse or fuses are not removable when the pins or blades are energized.

14.6 A fuseholder, attachment plug, or current tap intended to accommodate replaceable fuses shall be plainly and permanently marked "Use only with a fuse rated ____ amperes, ____ volts." The values to be inserted in the blanks shall be those appropriate to the product.

14.7 The enclosure of an overcurrent protective device intended for use on an outdoor-use cord set or power-supply cord shall be constructed so that water does not enter a through-cord fuseholder or that portion of an attachment plug or current tap which serves as the enclosure of the protective device (fuse or supplementary protector) so as to contact live parts as determined using the test described in 101.6.1 – 101.6.4.

MARKING

15 General

15.1 Each cord set or power-supply cord shall be marked where it will be plainly visible with the name or trademark of the manufacturer and, where practical, with the catalog number or equivalent.

15.2 If a manufacturer produces or assembles cord sets or power-supply cords at more than one factory, each finished cord set or power-supply cord shall have a distinctive marking, which may be in code, by which it can be identified as the product of a particular factory.

15.3 The manufacturer of a cord set or power-supply cord is considered to be the one who completes the assembly of the cord and fittings.

15.4 Each cord set or power-supply cord that terminates in an attachment plug or fitting having a movable, self-restoring grounding member shall be marked "For hand-held tools and hand-held appliances." The marking shall be on the plug, flag, bracelet, or other acceptable location where it will be readily visible after the power-supply cord has been put into use.

15.5 The smallest unit shipping package containing a cord set or power-supply cord with a grounded conductor having a light blue colored insulation shall be marked to indicate its destination and shall also be marked with the following statement (or equivalent):

This package contains cords having a grounded conductor with a light blue colored insulation instead of the usual white or grey colored insulation.

15.6 Illustrations of outdoor applications, illustration of appliances that are generally used outdoors, and other references to, suggestions of, or both outdoor use shall not appear on any cord set or power-supply cord or on any label, package, wrapper, or other item attached to, associated with, or otherwise giving information on a cord set or power-supply cord, unless the cord set or power-supply cord in question complies with Sections 28 – 35.

15.7 Illustration and other reference or implication of applications involving a cord set (consisting of a series-type current tap and a pendant switch) for use in the remote control of a television receiver, shall not appear on any label, package, wrapper, or be otherwise attached to a cord set unless the switch employed complies with 18.5.

CORD SETS

16 General

16.1 Each cord set shall comply with the general requirements of Sections 6 – 15.

16.2 In a cord set there shall be a conductor attached to each terminal in each fitting, and a terminal in each fitting for each conductor.

16.3 Corresponding terminals of line and load fittings shall be connected to the same conductor of the cord.

16.4 The line and load fittings of a cord set shall both be acceptable for use at identical electrical ratings but may be of different blade/slot configurations (for example, parallel-blade line fitting with locking-type load fitting). Line and load fittings on a cord set shall be for the same purposes with respect to polarity and grounding (for example, a nonpolarized line fitting cannot be employed on a cord set with a polarized load fitting).

16.5 Projections are acceptable on the load fitting of a cord set if there are no holes in the projections and no means (skin easily broken through, and similar means) for making holes.

16.6 A cord set may employ shielded cord provided the shield or drain wire is bonded, along with the grounding conductor, to the grounding contact of both the attachment plug and cord connector.

16.7 A cord that is shielded is identified by the presence of the word "shielded" marked on the outer surface of the cord.

GENERAL-USE CORD SETS

17 General

17.1 General-use cord sets shall comply with the general requirements for cord sets in General, Section 16.

17.2 Each general-use cord set shall consist of general-purpose fittings for line and load connection (see Section 19) assembled to a length of general-use flexible cord (see Table 20.1), and it may include a through-cord or pendant switch or other intermediate devices such as fuses, provided that they are not of the automatically resettable type.

17.3 A general-use cord set may consist of two separate lengths each no greater than 6 ft (1.8 m) of 2-conductor, No. 18 or 16 AWG, Type SP-2, NISP-2, SPT-2, NISPT-2, SPE-2, or NISPE-2 flexible cord connected in parallel to a single 2-wire parallel-blade molded-on attachment plug, with each length terminating in a cord connector. See also 22.2, 22.3, and 23.4.

17.3 revised March 16, 2001

17.4 The length of a general-use cord set less than 6 ft (1.8 m) shall be marked in accordance with 23.11. The marked length of any general-use cord set shall not be less than its measured length as determined by 6.4.

17.5 A general-use cord set may consist of a length of flexible cord having a series-connected or series-multiple current tap at one end and a switching device of other than the dimmer type at the other end to provide remote outlet switching (see 18.7).

17.6 A dimmer cord set consists of the cord set described in 17.5 except that the switching device is that described in 18.6. The series-connected or series-multiple current tap shall be of the polarized type employing both polarized line blades and a polarized slot configuration as shown in Figure C1.1 or C1.5.

18 Switches

18.1 A through-cord or pendant switch used as indicated in 17.2 shall be rated not less than "6 A, 120 V – 3 A, 250 V," or "10 A, 120 V AC."

18.2 A switch in a cord set that does not use polarized fittings shall simultaneously open all of the supply conductors.

18.3 A switch in a polarized cord set shall either simultaneously open all of the supply conductors or shall open only the unidentified conductors.

18.4 A switch shall not open a grounding conductor of a cord set.

18.5 A pendant or through-cord switch on a general-use cord set for use with a television receiver shall have a minimum rating of TV-5.

18.6 A dimmer switch for use only with an incandescent lamp load, having a rating of at least 300 W, and marked in accordance with 23.9, shall be used as the pendant switching device on the dimmer cord set described in 17.6.

18.7 A switching device used on the general-use cord set described in 17.5 shall be a pendant switch other than the dimmer type.

19 Fittings Other Than Switches

19.1 The fitting for line connection shall be an attachment plug, a nonseparable attachment plug, or a multiple-connected current tap. The load fitting shall be a cord-connector.

Exception: A series-connected or a series/multiple-connected current tap may be provided on a general-use cord set if the series-connected flexible cord terminates in a pendant switch and the flexible cord is not less than 6 ft (1.8 m) long when measured as described in 6.4.

19.2 The outlets of a cord connector on a polarized cord set may be controlled by a single-pole pendant switch located on a flexible cord. The unidentified (switched) conductor of the flexible cord is to be continuous from the attachment plug, through the cord connector, to the switch.

19.3 An outlet fitting, such as a cord connector, shall not be connected in the cord between the end fittings of a general-use cord set.

19.4 The total number of outlets in a general-use cord set shall not be more than three.

Exception: Up to six outlets may be provided in a general-use extension cord set employing No. 12 AWG, Type SJ or equivalent flexible cord.

19.5 The line and load fittings of a general-use extension cord set having more than three outlets shall both be for use at identical ratings and shall employ the same configuration. The rating shall be 15 A, 125 V (or 250 V, depending on the configuration of the fittings).

19.6 If an assembly-screw hole extends all the way through a cord connector in the form of a table tap, the assembly screw shall be sealed, staked, or held in place by equivalent means.

19.7 Two-pole, 2-wire, 15-A, 125-V, parallel-configuration fittings employed on general-use cord sets shall be polarized.

20 Flexible Cord

20.1 The flexible cord of a general-use cord set shall be one of the types listed in Table 20.1.

Table 20.1
Flexible cord for general-use cord sets^a

Table 20.1 revised March 16, 2001

C	SO	SPT-3 ^c
PD	SOO	SPE-2 ^c
HPN ^c	ST	NISPE-2 ^c
SJ	STO	SPE-3 ^c
SJO	STOO	SV
SJOO	SE	SVO
SJT	SEO	SVOO
SJTO	SEOO	SVT
SJTOO	SP-2 ^c	SVTO
SJE	NISP-2 ^c	SVTOO
SJEO	SP-3 ^c	SVE
SJEOO	SPT-2 ^{b, c}	SVEO
S	NISPT-2 ^c	SVEOO

^a A cord with any of the following markings is not to be used in a general-use cord set:

(1) The phrase "For mobile-home use:___amperes." See General, Section 64.

(2) The phrase "For recreational-vehicle use:___amperes." See General, Section 48 and Rating, Section 61.

^b Cord constructions that can be demonstrated to be equivalent to integral Type SPT-2 flexible cord may be used in general-use cord sets having a retractile (coiled) cord construction.

^c These 3-conductor parallel cord types are not acceptable for use on cord sets more than 15 feet (4.5 m) in length.

21 Overcurrent Protection

21.1 A general-use cord set (see Sections 17 – 27) employing flexible cord having No. 18 or No. 17 AWG conductors shall be provided with overcurrent protection (short circuit and overload protection) rated equal to or less than the ampacity of the flexible cord.

21.2 The overcurrent protective device shall have a minimum short circuit rating of 1000 A and shall be of the replaceable or manually resettable type. A replaceable fuse shall be of a readily available type to reduce the likelihood of the plug being replaced with one that is unfused. The overcurrent protective device shall not be of the automatic resetting type.

Revised 21.2 effective June 1, 2003

21.3 The overcurrent protective device shall be located in the attachment plug or current tap, or be of a through-cord design located so it is not more than 6 inches (152 mm) from the face of the plug to the rear of the fuseholder.

21.4 Supplementary overcurrent protection is an acceptable method of providing the protection required in 21.1, however, thermal cutouts, thermal relays, and other devices not intended to open short circuits shall not be used.

21.5 The overcurrent protective device shall provide protection for each ungrounded circuit conductor but not for any grounded circuit conductor or grounding conductor.

Exception: An overcurrent protective device may be used if it opens all circuit conductors – including the grounded circuit conductor(s)– and cannot open the grounded circuit conductor without opening all ungrounded circuit conductors.

22 Rating

22.1 Each general-use cord set shall be rated in amperes, volts, and watts.

22.2 The rating of the general-use cord set described in 17.3 shall not be more than 125 V, 15 A.

22.3 Each individual leg of the general-use cord set described in 17.3 may be rated equal to or less than the ampacity of the cord (see Tables 114.1 – 114.3), provided the total does not exceed 15 A.

22.4 The voltage rating of the cord set shall be determined by the voltage rating of the line-fitting configuration and shall not exceed that of the flexible cord or switch (if provided), whichever is less.

22.5 The cord-set ampere rating is to be determined by the ampere rating of the attachment plug, flexible cord, or switch (if provided), whichever is less.

22.6 When provided with a switch rated for alternating current only the cord-set rating shall also include "AC."

22.7 The wattage rating of a general-use cord set is to be determined by multiplying the ampacity of the cord (see Tables 114.1 – 114.3) or ampere rating of a switch (if provided), whichever is less, by the voltage rating of the load fitting – for example, for No. 18 AWG, Type SPT-2: 10 (amperes) × 125 (volts) = 1250 watts (for a load fitting rated 125 volts); and 10 (amperes) × 250 (volts) = 2500 watts (for a load fitting rated 250 volts).

23 Marking

23.1 Each general-use cord set is to be marked with its electrical rating.

23.2 The electrical rating shall be printed on one of the marker devices described in 23.6.

23.3 Each general-use cord set employing Type SP-2, SP-3, SPT-2, SPT-3, SPE-2, or SPE-3 flexible cord, employing No. 30 AWG stranded conductors, shall be permanently and legibly marked according to 23.6 "FOR USE ONLY WHERE NOT SUBJECT TO FREQUENT FLEXING," or the equivalent.

23.4 The general-use cord set described in 17.3, and rated in accordance with the requirements in 22.2 and 22.3, shall be marked with the rating printed on one of the marker devices described in 23.6.

23.5 The wattage of the general-use cord set described in 17.3 is to be determined as described in 22.7.

23.6 The electrical rating of a general-use cord set may be on one of the following:

- a) Printed on a doughnut-, flat-, or bracelet-type label.
- b) Printed on a tag of tough paper, cloth, or the equivalent (of any color) having a hole large enough to accommodate the cord, and not resembling the shapes described in item c. The tag is not to be slit from the edge of the hole to the edge of the tag. The cord is to be passed through the hole in the tag prior to assembly of the end fittings on the cord set.
- c) Printed in a contrasting color on a background of a solid color other than blue, green, or yellow on one of the following:
 - 1) A ring-shaped (doughnut) tag of tough paper, cloth, or the equivalent having a hole large enough to accommodate the cord. The tag is not to be slit from the edge of the hole to the edge of the tag. The cord is to be passed through the hole in the tag prior to the assembly of the end fittings of the cord set.
 - 2) A flag-type tag with an adhesive back. The tag is to be wrapped around and adhere to the cord, and the ends of the tag are to adhere to each other and project as a flag.
 - 3) A bracelet wrapped around and affixed to the cord with an adhesive.

23.7 A nonrewireable (molded-on or factory-assembled) load fitting may be marked with a current rating only if the ampacity of the flexible cord and any through-cord switch is equal to or higher than that of the fitting configuration.

23.8 A nonrewireable (molded-on or factory-assembled) line fitting may be marked with a current rating only if all the following conditions are met:

- a) The ampacity of the flexible cord and any through-cord switch is equal to or higher than that of the fitting configuration,
- b) The load fitting is marked with its current rating,
- c) The electrical current rating of both fittings are identical and are the same as that specified for the particular configuration involved, and
- d) The marked rating is the same as that of the fitting configuration.

23.9 Except as noted in 23.10, the dimmer switch described in 18.6 shall be indelibly marked where plainly visible on or directly adjacent to the load fitting with the following marking or its equivalent: "CAUTION – To reduce the risk of fire, use with ____ watt maximum incandescent lamp load only." The word "CAUTION" shall be in letters not less than 3/32 inch (2.4 mm) high. The maximum wattage inserted in the blank shall not exceed the rated wattage of the dimmer switch.

23.10 The marking required in 23.9 may be provided on a permanent tag attached to the dimmer switch, the current tap, or the flexible cord. The tag shall be attached in a manner that it cannot be easily removed. The tag shall have the added marking in letters not less than 3/32 inch (2.4 mm) high "Do not remove this tag."

23.11 The length of a general-use extension cord set that is shorter than 6 ft (1.8 m) shall be plainly and permanently marked on the individual wrapper, tag, or equivalent attached to the cord set.

23.12 General-use cord sets having 2-pole, 2-wire fittings of the 15-A, 125-V polarized configuration shall be marked with the following information:

This is a POLARIZED cord set.

It has a polarized plug (one blade is wider than the other) and a polarized outlet (one slot is longer than the other).

The polarized plug is not intended to be mated with nonpolarized outlets (having both slots the same size).

A polarized outlet is intended to mate with a polarized plug in only one way (the longer slot with the wider blade).

23.13 The markings required in 23.12 shall be legible, distinct and prominently displayed on (1) the outer surface of the smallest unit package or (2) an included stuffer sheet or tag (or its equivalent) in which case the word POLARIZED shall appear on the outer surface of the smallest unit package. The markings shall comply with the following:

a) The words "POLARIZED" and "CAUTION" in the first element of each marking or where they appear separately are to be of boldface capital letters a minimum of 9/64 inch (3.6 mm) high and the remaining words are to be a minimum of 1/16 inch (1.6 mm) high.

b) The color of the letters shall contrast with a solid color background.

23.14 A general-use cord set that employs fittings of the C1.1, C1.5, C1.6, C1.9, or C1.10 configuration as specified in the Standard for Wiring Device Configurations, UL 1681, shall be provided with a tag as shown in Figure 23.1. The tag shall be tear-resistant and permanently affixed to the cord set. The leading edge of the tag shall be located within 18 inches (46 cm) of the point where the cord enters the body of the attachment plug. The marking itself shall be indelible. See Test for Permanence of Cord Tag, Section 102.

Revised 23.14 effective March 16, 2003

23.15 The marking mentioned in 23.14 is acceptable if:

a) All letters shown as capitals, in boldface, or both in Figure 23.1 are as such on the tag.

Figure 23.1
Marking tag

DANGER: ELECTRICAL CORDS CAN BE HAZARDOUS

Misuse Can Result In FIRE or DEATH
by ELECTRICAL SHOCK
Please Read BOTH SIDES Carefully and
Follow All Directions.

BEFORE USE

- A Cord Set Not Marked For Outdoor Use Is To Be Used Indoors Only. See Label For Outdoor Marking.
- Inspect Thoroughly Before Each Use.
DO NOT USE IF DAMAGED.
- Look For the **NUMBER OF WATTS** On Appliances To Be Plugged Into Cord.
- See **LABEL On Cord** for **SPECIFIC WATTAGE.**
- Do Not Plug More Than the **SPECIFIED NUMBER OF WATTS** Into This Cord.
- Do Not Run Through Doorways, Holes in Ceilings, Walls or Floors.
- Make sure Appliance is OFF Before Connecting Cord to Outlet.
- **FULLY INSERT** Plug Into Outlet.
- Do Not Remove, Bend or Modify Any Metal Prongs or Pins of Cord.
- Do Not Use Excessive Force to Make Connections.
- Do Not Connect a Three-Prong Plug to a Two-Hole Cord. 

THIS IS A POLARIZED CORD

SM401

DANGER: ELECTRICAL CORDS CAN BE HAZARDOUS

Misuse Can Result In FIRE or DEATH
by ELECTRICAL SHOCK
Please Read BOTH SIDES Carefully and
Follow All Directions.

DURING USE

- Keep Away From Water.
- **DO NOT USE WHEN WET.** 
- Keep Children and Pets Away From Cord.
- Do Not Plug One Extension Cord Into Another
- **AVOID OVERHEATING.** Uncoil Cord and Do Not Cover It With Any Material.
- Do Not Drive, Drag or Place Objects Over Cord.
- Do Not Walk on Cord. 

AFTER USE

- **GRASP PLUG** to Remove From Outlet
- Always Store Cord **INDOORS.**
- Always Unplug When Not In Use.
- Do Not Unplug By Pulling On Cord. 

DO NOT REMOVE THIS TAG

- b) The words "**DANGER: ELECTRICAL CORDS CAN BE HAZARDOUS**" are a minimum of 9/64 inch (3.6 mm) high, and the remaining words are a minimum of 1/16 inch (1.6 mm) high.
- c) The lettering and illustrations are black with a solid white background.
- d) The markings are preceded by a solid red octagon, oriented so as to resemble a "stop" sign, a minimum of 5/16 inch (7.9 mm) across.
- e) The required illustrations are located within red circles a minimum of 7/16 inch (11.1 mm) in diameter crossed by a red diagonal line.

23.16 The marking in 23.14 shall be provided in either of the following forms:

- a) A hang-type tag having a hole to permit securement to the cord by a plastic strap or equivalent. The strap shall not be removable without cutting.
- b) A flag-type tag with an adhesive back. The tag is to be wrapped around and adhere to the cord. The ends of the tag are to adhere to each other and project as a flag.

GENERAL-USE CORD SETS – 2-WIRE PARALLEL AND VACUUM CLEANER (SV) FLEXIBLE CORD TYPES

24 General

24.1 These requirements are intended to cover 2-wire general-use cord sets with polarized parallel-blade and parallel-slot fittings rated 15 A, 125 V and employing 2-conductor

No. 18 AWG, Types HPN, SP-2, NISP-2, SPT-2, NISPT-2, SPE-2, NISPE-2, SV, SVO, SVOO, SVT, SVTO, SVTOO, SVE, SVEO, SVEOO,

No. 17 AWG, Types HPN, SV, SVO, SVOO, SVT, SVTO, SVTOO, SVE, SVEO, SVEOO,

No. 16 AWG, Types HPN, SP-2, NISP-2, SPT-2, NISPT-2, SPE-2, flexible cord.

24.1 revised March 16, 2001

24.2 These requirements are supplemental to requirements applicable to general-use cord sets (Sections 17 – 23).

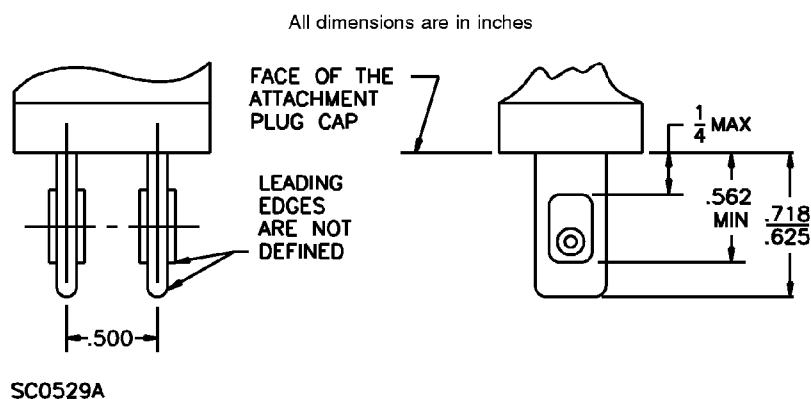
24.3 The attachment plug requirements in Attachment Plug, Section 25 and the cord connector requirements in Cord Connectors, Section 26 are also applicable to current taps employed on the cord sets mentioned in 24.1.

25 Attachment Plug

25.1 Blades

25.1.1 The blades shall be located as shown in Figure 25.1 and parallel to one another (compliance shall be determined by full insertion, as described in 26.6.1, into the cord connector described in 26.1.1) and shall comply with the dimensional requirements in the Standard for Attachment Plug Blades for Use in Cord Sets and Power-Supply Cords, UL 1659.

Figure 25.1
Blade construction of 2-pole, 2-wire attachment plug
(15 A, 125 V)



				0.718
inch	0.250	0.500	0.562	0.625
mm	6.35	12.7	14.3	18.2
				15.9

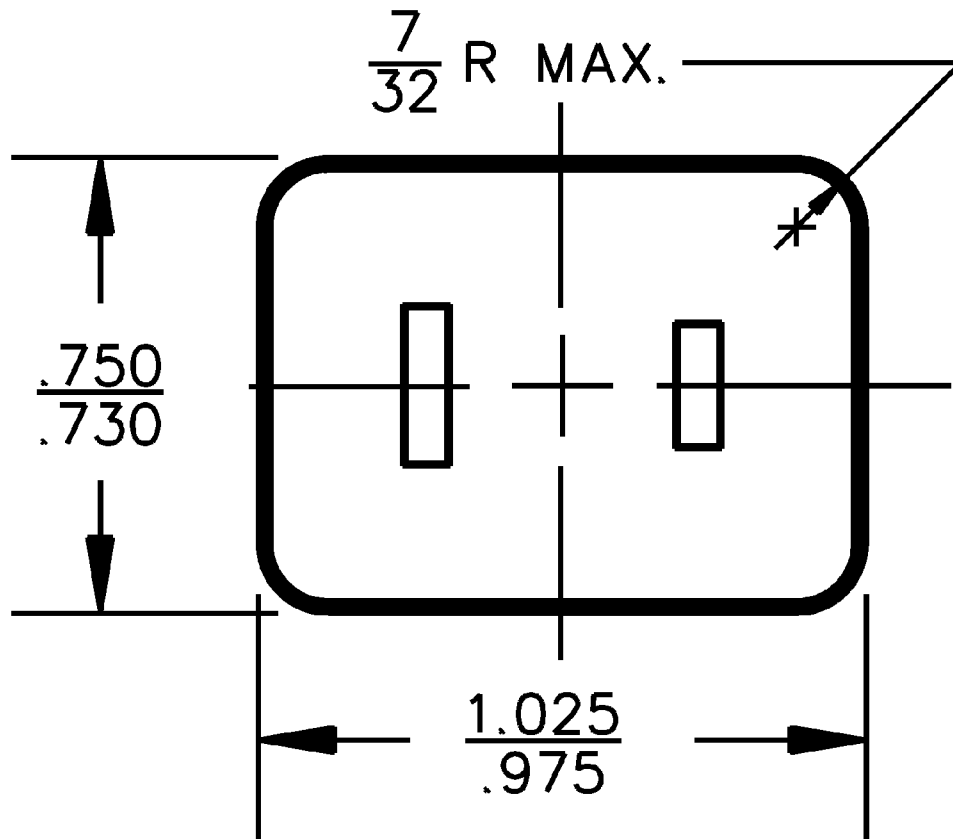
25.2 Face

25.2.1 The face of a 2-wire parallel-blade attachment plug shall be in a plane perpendicular to the major axis of the blades (compliance shall be determined by full insertion, as described in 26.6.1, into the cord connector described in 26.1.1) and shall be 1.000 ± 0.025 by 0.750 plus 0.000 minus 0.020 inch (25.40 ± 0.64 by 19.05 plus 0.00 minus 0.51 mm) with the blades centered, with a maximum $7/32$ inch (5.6 mm) radius at the corners. The 1-inch (25.4 mm) dimension shall be perpendicular to the width of the blades. See Figure 25.2.

Exception: A larger face size may be provided on a shallow-bodied right-angle plug.

Figure 25.2
Male fitting face dimensions

All dimensions are in inches



SA0527A
BLADES
CENTERED

Inch	$\frac{7}{32}$	$\frac{0.750}{0.730}$	$\frac{1.025}{0.975}$
mm	5.6	$\frac{19.05}{18.54}$	$\frac{26.04}{24.77}$

25.3 Grip

25.3.1 The body of a 2-wire parallel-blade attachment plug shall be shaped so that it is not likely to be grasped at the face periphery but rather invites gripping at a section formed for such a purpose. The gripping area shall extend over a distance of at least $11/16$ inch (17.5 mm) located between two higher sections. The section at the rear shall provide a sharply defined projection at least $3/32$ inch (2.4 mm) high with a base of at least 0.062 inch (1.57 mm) and an overall width of at least $1/4$ inch (6.4 mm). See Figure 25.3. In place of the gripping area, a finger grip in the form of a substantial closed loop capable of accommodating one or more fingers may be provided. Other gripping surfaces are acceptable provided they meet the Attachment Plug Grip Test, Section 94. A grip or gripping surface may need to be additionally investigated for the ability to withstand the conditions of normal use such as flexing, mechanical strength, and similar conditions.

26 Cord Connector

26.1 Slots

26.1.1 The parallel slots in the face of a cord connector shall be spaced 0.500 ± 0.005 inch (12.7 ± 0.13 mm) on centers. Unpolarized slots shall be 0.075 inch (1.9 mm) minimum, 0.095 inch (2.4 mm) maximum in width and 0.265 inch (6.7 mm) minimum, 0.285 inch (7.2 mm) maximum in length. Polarized slots shall be 0.075 inch (1.9 mm) minimum, 0.095 inch (2.4 mm) maximum in width and 0.330 inch (8.4 mm) minimum, 0.350 inch (8.9 mm) maximum in length.

26.2 Outlet face

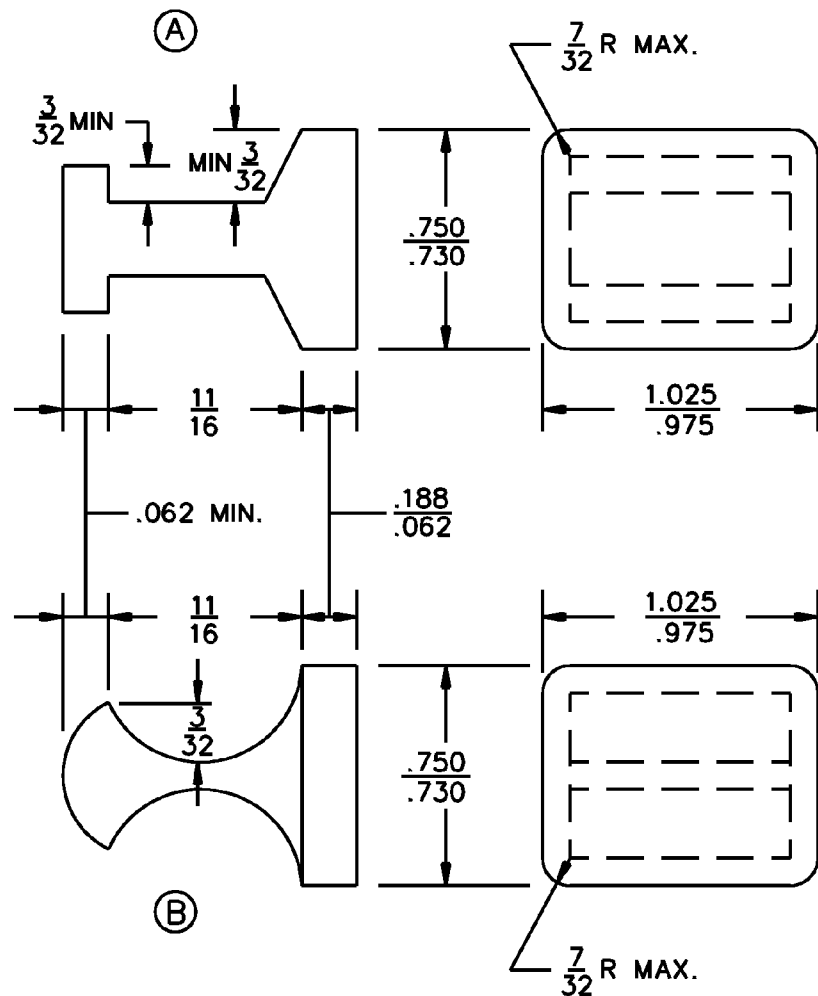
26.2.1 The perimeter of the outlet face shall at least encompass a total area consisting of a 1-by- $3/4$ inch (25.4-by-19.1 mm) rectangle with a $7/32$ inch (5.6 mm) maximum radius at corners and expanded by a $3/16$ inch (4.8 mm) radius half-circle projection from the center of each of the 1 inch (25.4 mm) sides. The parallel-outlet configuration slots shall be located as a pair in the center of the total covered area with the slots parallel to the $3/4$ inch (19.1 mm) sides of the rectangle. Refer to Figure 26.1.

26.3 Recess of contacts

26.3.1 The female contacts of a 2-wire parallel-slot cord connector shall be recessed at least $1/4$ inch (6.4 mm) from the face of the fitting.

Figure 25.3
Attachment plug finger grip and blade guards

All dimensions are in inches



$\frac{3}{32}$ MIN-MATERIAL OVER LIVE PARTS

SB0528A

			0.188			0.750	1.025
Inch	0.062	3/32	0.062	7/32	11/16	0.730	0.975
mm	1.57	2.4	4.78	5.6	17.5	19.05	26.04
			1.57			18.54	24.77

26.4 Depth of cavity

26.4.1 A cord connector shall accommodate a parallel-blade attachment plug without any blade exposure between the faces of the fittings. The determination shall be made by insertion of a depth gauge in each slot. The depth gauge shall have a cross section of 0.260 by 0.065 inch (6.6 by 1.7 mm) for checking nonpolarized slots and 0.322 by 0.065 inch (8.2 by 1.7 mm) for checking polarized slots. Each gauge shall have a scribed mark located 0.718 inch (18.2 mm) from the end of the gauge inserted in the slot. A force of not more than 15 lbf (67 N or 6.8 kgf) may be used to determine if the gauge is fully inserted into the slot; after full insertion, the scribed mark shall not be located outside the plane of the face of the cord connector.

26.5 Outlet separation

26.5.1 When two or more parallel-slot outlets are on the same surface of a cord connector they shall be spaced apart so that adjacent plugs with the dimensions in Figure 25.2 can be fully inserted with no exposed blades.

26.6 Insertion and withdrawal forces

26.6.1 The force needed for the initial insertion of an attachment plug into a cord connector shall not exceed 20 lbf (89 N or 9.1 kgf). The pull to withdraw the plug after the first insertion and subsequent insertions shall not exceed 15 lbf (67 N or 6.8 kgf). The force needed for subsequent insertions of the attachment plug shall not exceed 15 lbf (67 N or 6.8 kgf). After application of the insertion force a gap of not more than 0.010 inch (0.25 mm) shall exist between the face of the attachment plug and the face of the cord connector. After 10 conditioning cycles of insertion and withdrawal of the attachment plug, a pull of 3 lbf (13 N or 1.4 kgf) in a direction perpendicular to the face of the cord connector and tending to withdraw the plug is to be applied for 1 minute. The results are unacceptable if there is any displacement of the plug.

26.7 Closing of openings

26.7.1 If a cord connector employed on a cord set has more than one outlet, the contact openings of all, or all but one, of the outlets shall be reliably and effectively closed.

26.7.2 The closing means shall be formed of insulating material and shall have physical properties to withstand the rigors of use and reasonably foreseeable abuse.

26.7.3 The closing means mentioned in 26.7.2:

- a) Shall, when the closing means is positioned as intended, obstruct a straight steel wire 0.010 inch (0.25 mm) in diameter (No. 30 AWG) from touching any female contact.
- b) Shall in no case be removable from the cord set. A closure that is removable from the outlet shall remain within 6 inches (152.4 mm) of the cord connector when not in use. See Cord Connector Closure Test, Section 103.
- c) Shall be capable of displacement from (complete removal when appropriate) and return (insertion when appropriate) to the outlet in the intended manner without breakage or damage both before and after the cord connector and closing means have been conditioned for 7 hours at $70.0 \pm 1.0^{\circ}\text{C}$ ($158.0 \pm 1.8^{\circ}\text{F}$) in a full-draft circulating-air oven. Each of three representative cord connectors is to be conditioned. When the closing means is removable from the outlet, the conditioning shall be conducted with the closing means positioned in the cord connector; three

additional representative closing means not positioned in the outlet are also to be subjected to the conditioning. The displacement and return operation after conditioning, described in (d), shall be conducted after the parts have cooled to room temperature.

d) Shall not impair the performance of the cord connector. The cord connector is to be examined after three simulated cycles of use to determine whether or not damage has occurred. Each cycle of use shall consist of the displacement and return of the closing means in the intended manner.

e) Shall not serve as a tab or handle used to open another closing means on the cord connector.

Revised 26.7.3 effective June 1, 2002

26.7.4 If the closing means mentioned in 26.7.3 consists of an insulating closure, it shall not be provided with handles, loops, knobs, or similar hardware that might facilitate removal. A straight pull of less than 1 lbf (4.4 N or .454 kgf) perpendicular to the face of the outlet shall not remove the closure from the outlet.

27 Marking

27.1 These marking requirements are intended to cover 2-wire general-use cord sets as described in 24.1.

27.2 A 2-wire general-use cord set as described in 24.1 shall comply with 23.14 – 23.16.

27.3 In addition to the marking required by 27.2, a 2-wire general-use cord set shall be marked as indicated below. The blank shall be filled in with the appropriate wattage.

ATTENTION: INSTRUCTIONS FOR PROPER USE

COVER UNUSED OUTLETS
FULLY EXTEND BEFORE USING
RATED 125-VOLTS
USE WITHIN THE ELECTRICAL RATING
MARKED ON THE CORD SET

DO NOT PLUG MORE THAN TOTAL OF _____ WATTS IN THIS CORD SET

If watts not marked on appliance, multiply ampere rating (on nameplate) by 125 to determine equivalent watts. Add determined watts for each plugged-in appliance or lamp (sum of watts on bulbs) to find total watts being used.

Exception No. 1: A single outlet cord set longer than 20 feet (6.1 m) need not comply with this requirement.

Exception No. 2: If the cord set employs only one outlet, the statement "Add determined watts for each plugged-in appliance or lamp (sum of watts on bulbs) to find total watts being used." may be omitted.

Exception No. 3: "RE-COVER UNUSED OUTLETS" may be used in place of "COVER UNUSED OUTLETS."

Exception No. 4: If the cord set employs only one outlet, or the outlets are self-closing, "COVER UNUSED OUTLETS" or "RE-COVER UNUSED OUTLETS" may be omitted.

Exception No. 5: If a cord set is so packaged that it is not likely to be used while coiled, "FULLY EXTEND BEFORE USING" may be omitted.

27.4 The marking in 27.3 shall be on one of the following:

- a) The surface of the load fitting,
- b) An individual wrapper, or
- c) A tag attached to the cord set.

The tag or wrapper may be removable from the cord set. Each element in the marking is to be an obvious individual item. The marking itself shall be either:

- d) Indelible on the wrapper or tag or
- e) Integral with the surface of the load fitting. If the marking is included on the tag in Figure 23.1, it shall comply with 23.14– 23.16.

27.5 All of the elements of the marking required by 27.3 need not be provided on a single surface. These elements may appear at separate locations. "DO NOT PLUG MORE THAN TOTAL OF _____ WATTS IN THIS CORD SET" and the explanation of wattage determination shall be provided entirely on a single surface. If any of the individual elements appear at different locations, then "ATTENTION: INSTRUCTIONS FOR PROPER USE" shall be provided at each location.

27.6 The marking mentioned in 27.3 shall be legible to the user during the procedures usually followed in preparation for use (unwrapping, unhanking, and so forth).

27.7 The marking mentioned in 27.3 is to be considered acceptable if:

- a) All letters are boldface capital letters except for the explanation of wattage determination.
- b) The letters are a minimum of 1/16 inch (1.6 mm) high.
- c) The letters whether indelible, embossed, or indented contrast with a solid-color background surrounded by a contrasting-color border at least 1/8 inch (3.2 mm) wide. The letters may be the same color as the border.

Exception: The 1/8 inch (3.2 mm) border of contrasting color need not be provided if the required marking remains sufficiently distinctive to draw the reader's immediate attention to each element.

OUTDOOR-USE CORD SETS

28 General

28.1 Outdoor-use cord sets shall meet the general requirements of General, Section 16.

29 Overcurrent Protection

29.1 Outdoor-use sets employing flexible cord having No. 18 or No. 17 AWG conductors shall be provided with integral overcurrent protection and shall comply with applicable requirements in Fittings Intended to Accommodate Fuses or Other Overcurrent Protective Devices, Section 14; Overcurrent Protection, Section 21; and Overcurrent Protective Devices, Section 101.

29.2 An outdoor-use cord set is intended to be used in conjunction with portable electric equipment that is intended for use outdoors. The cord set is intended for use outdoors only while the portable equipment is in operation. It is intended to be stored indoors where it is not exposed to sunlight, weather, or both while not in use. It can also be used indoors.

29.3 An outdoor-use cord set shall be either of the nongrounding type containing two circuit conductors or of the grounding type containing two or three circuit conductors.

29.4 An outdoor-use cord set shall consist of a length of flexible cord that complies with Flexible Cord, Section 30 and is attached to an attachment plug and cord connector each having the same contact configuration. The attachment plug shall comply with Attachment Plug, Section 31. The cord connector shall comply with Cord Connector, Section 32.

29.5 An outdoor-use cord set may incorporate a through-cord or pendant switch provided the switch enclosure is suitable for outdoor-use as determined by the requirements in Switches, Section 33.

29.6 An outlet fitting, such as a cord connector, shall not be connected between the end fittings of an outdoor-use cord set.

Exception: An adapter cord set described in 36.2(b) is able to be provided with outlet fittings connected between the end fittings.

29.7 An outdoor-use cord set shall have a minimum length of 6 ft (1.8 m).

29.8 An outdoor-use cord set with a 3-outlet cord connector (see 32.3) shall have a maximum length of 100 ft (30.5 m).

30 Flexible Cord

30.1 The flexible cord shall be Type SOW, SOOW, STW, STOW, STOOW, SEW, SEOW, SEOOW, SJOW, SJOOW, SJTW, SJTOW, SJTOOW, SJEW, SJEOW, or SJEOOW. All cord conductors shall be of the same size and shall not be smaller than indicated in Table 30.1. In addition, the flexible cord shall comply with one of the following requirements:

- a) A 2-wire type of outdoor-use cord set shall contain two insulated circuit conductors.
- b) The cord of a grounding-type outdoor-use cord set shall contain two or three insulated circuit conductors and one insulated grounding conductor. The insulation on the grounding conductor in the cord shall be finished to show a green color with or without one or more yellow stripes.

30.1 revised March 16, 2001

30.2 Deleted March 16, 2001

30.3 Flexible cord marked with the word "outdoor" is only for use in cord sets that are for outdoor use.

Table 30.1
Smallest acceptable conductor size with respect to fittings used on outdoor-use cord sets and outdoor-use power-supply cords^e

Table 30.1 revised March 16, 2001

Ampere rating of fittings	Number of cord conductors	Number of current-carrying conductors in cord ^a	Grounding required	Maximum number of outlets in cord connector when provided	Smallest acceptable conductor size (AWG)		Ampacity rating of cord (Amperes)
					6 – 50 ^b ft (1.8 – 15.2 Meters)	Over 50 ft (Over 15.2 Meters)	
15	2	2	No	1	—	18	7
	3 or 4	2	Yes	1	—	18	7
	4	3	Yes	1	—	18	7
	2	2	No	1	18	16	10
	3 or 4	2	Yes	1	18	16	10
	4	3	Yes	1	18	16	7 (10) ^c
	2	2	No	1	16	14	13
	3 or 4	2	Yes	3	16	14 ^c	13
	4	3	Yes	1	16	14	10 (13) ^c
	2	2	No	1	14	12	15
	3 or 4	2	Yes	1	14	12	15
	4	3	Yes	1	14	12	15
20	3	2	Yes	3	14	12 ^c	15
	3 or 4	2	Yes	1	12	10	20
	4	3	Yes	1	12	10	20
30	3 or 4	2	Yes	1	10	8	30

Table 30.1 Continued on Next Page

Table 30.1 Continued

Ampere rating of fittings	Number of cord conductors	Number of current-carrying conductors in cord ^a	Grounding required	Maximum number of outlets in cord connector when provided	Smallest acceptable conductor size (AWG)		Ampacity rating of cord (Amperes)
					6 – 50 ^b ft (1.8 – 15.2 Meters)	Over 50 ft (Over 15.2 Meters)	
50	4	2	Yes	1	10	8	30
	3 or 4	2	Yes	1	6	4	50
	4	3	Yes	1	4	2	50
60	4	2	Yes	1	4	2	60
	4	3	Yes	1	4	2	60
^a For the purpose of this table, a conductor that is used to carry the unbalanced current from the other conductors is not counted as a circuit conductor. ^b Lengths specified are for outdoor-use cord sets only. ^c The ampacity rating for over 50 ft (15.2 m). ^d The maximum length of a cord set with 3 outlets in the cord connector shall be 100 ft (30.5 m). ^e See the applicable Section for the specific requirements for each type of outdoor-use cord set.							

31 Attachment Plug

31.1 The attachment plug shall be resistant to sunlight, mechanical abuse, moisture, and shall exclude moisture by adhering tightly to the jacket of the cord at the point that the jacket or the cord enters the plug (see test in 60.2).

31.2 A molded attachment plug of butyl rubber, neoprene or polyvinyl chloride is acceptable if it complies with the adhesion test in 60.2. Molded-on plugs of other materials are acceptable if determined so by the results of an appropriate investigation.

31.3 The plug for a 2-wire outdoor-use cord set shall have the 2-wire polarized configuration rated 15 A at 125 V. For other than a 2-wire outdoor-use cord set, the attachment plug shall be of the grounding type.

32 Cord Connector

32.1 The cord connector shall be resistant to sunlight and mechanical abuse, and shall exclude moisture by tightly adhering to the jacket of the cord at the point that the cord enters the body (see 60.2).

32.2 The cord connector may have a maximum of 3 outlets. The configuration of the contact members shall be the same for the cord connector as the attachment plug.

32.3 The outlet faces of a cord connector employed on an outdoor-use cord set shall remain in a vertical plane (the outlet faces shall not land face up or face down) when tested as described in the Random Drop Test, Section 98.

Exception No. 1: A single-outlet cord connector having the outlet face positioned directly opposite the cord entry (in-line) is considered to comply with this requirement and need not be subjected to the Random Drop Test.

Exception No. 2: A 3-outlet grounding-type cord connector using the parallel-slot configuration rated 15 A, 125 V need not comply with this requirement if:

- a) The length and width dimensions are at least three times the maximum thickness dimensions (the thickness shall not include the grounding-pin obstruction or obstructions);*
- b) There is no outlet in the surfaces formed by the length and width dimensions; and*
- c) The angle between the adjacent faces containing outlets is not less than 135 degrees. See Figure 32.1.*

32.4 A molded-on cord connector of butyl rubber, neoprene, or polyvinyl chloride shall comply with the adhesion test of 60.2. Molded-on cord connectors of other materials are acceptable if determined so by the results of an appropriate investigation.

32.5 The cord connector of a 2-wire outdoor-use cord set shall have the 2-wire, polarized, 15-A, 125-V configurations. For other than a 2-wire outdoor-use cord set, the cord connector shall be of the grounding type.

32.6 When two or more parallel-slot outlets are on the same surface of a cord connector, they shall be spaced apart so that adjacent plugs having the minimum face size shown in Figure 25.2 can be fully inserted with no exposed blades.

32.7 To prevent a 3-wire grounding-type attachment plug of a NEMA 5-15P, 6-15P, or 6-30P configuration from being inserted into a grounding cord connector in reverse or into a 2-wire nongrounding-type cord connector (thereby enabling the grounding pin not to engage a grounding contact within the cord connector), one obstruction shall be provided on a grounding-type cord connector and two obstructions shall be provided on a 2-wire cord connector. Each obstruction shall be sufficiently large and substantial to prevent deliberate displacement of the grounding pin, other attachment plug contact members, or both during, and as a result of, improper mating of the attachment plug with the cord connector. An obstruction shall not contain any holes, grooves, thin or flexible areas, or other means that make it possible to defeat the intent of this requirement. The shape of an obstruction is not specified but shall meet the minimum requirements for the cord connectors as shown in Figure 32.2.