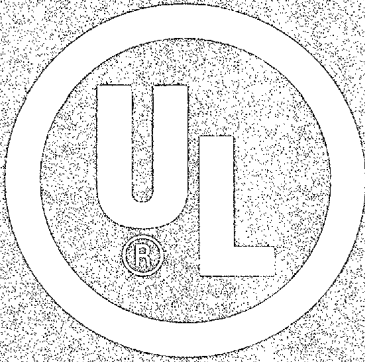


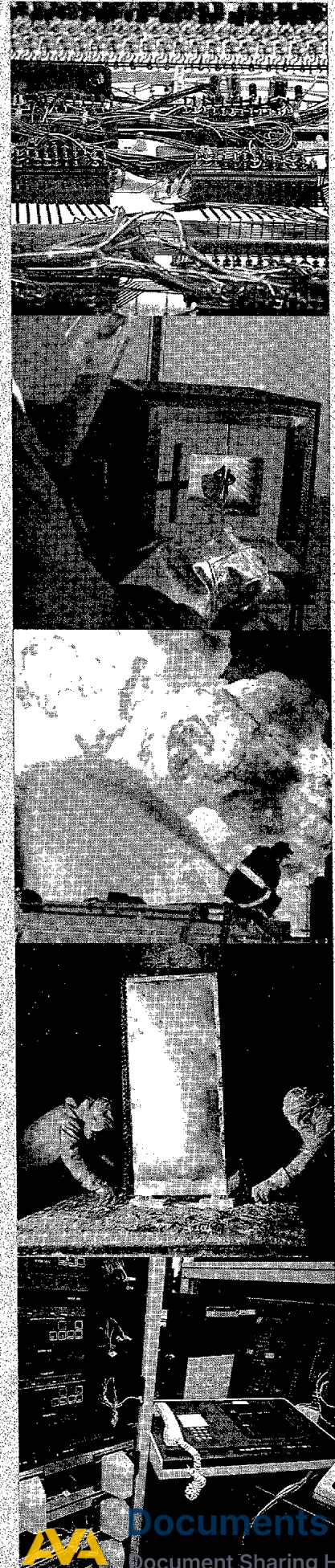
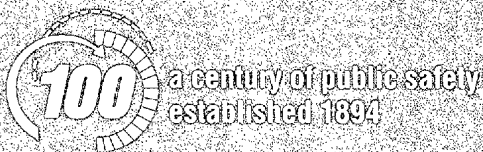


UL 1448

ISBN 1-55989-583-7

Underwriters Laboratories Inc.
Standard for Safety

Electric Hedge Trimmers



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UL Standards for Safety are developed under a procedure which provides for participation and comment from the affected public as well as industry. The procedure takes into consideration a survey of known existing standards and the needs and opinions of a wide variety of interests concerned with the subject matter of the standard. Thus manufacturers, consumers, individuals associated with consumer-oriented organizations, academicians, government officials, industrial and commercial users, inspection authorities, insurance interests and others provide input to UL in the formulating of UL Standards for Safety, to keep them consonant with social and technological advances.

May 26, 1999 – UL 1448

tr1

Underwriters Laboratories Inc. (UL)
333 Pfingsten Road
Northbrook, IL 60062-2096

UL Standard for Safety
for
Electric Hedge Trimmers, UL 1448

Fourth Edition, Dated June 20, 1994

Revisions: This Standard contains revisions through and including May 26, 1999. UL is in the process of converting its Standards for Safety to the Standard Generalized Markup Language (SGML). SGML – an international standard (ISO 8879-1986) – is a descriptive markup language that describes a document's structure and purpose, rather than its physical appearance on the page. Significant benefits that will result from UL's use of SGML are increased productivity, reduced turnaround times, and data and information consistency, reusability, shareability, and portability. The changes noted in these revised pages are needed to modify the format and layout of this Standard to allow it to be converted to SGML. These editorial changes are now in effect.

A change is indicated by a note following the affected item. The note is preceded and followed by an asterisk.

The revisions dated May 26, 1999 include a reprinted title page (page 1) for this Standard.

The revisions dated May 26, 1999 include removing the "94" prefix from the flammability classifications. This type of flame classification has become familiar globally, therefore there is no need to retain the "94" designation.

The revisions dated June 25, 1996 were also issued to include Type W cords as an alternative to Type W-A cords and eliminate the oxygen bomb test.

As indicated on the title page (page 1), 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 procedures to be followed to retain the approved text of this ANSI/UL Standard.

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

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 Standard consists of pages dated as shown in the following checklist:

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2	June 25, 1996
3 – 6	May 26, 1999

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9 – 11	May 26, 1999
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UL 1448

Standard for

Electric Hedge Trimmers

First Edition – March, 1976

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Fourth Edition

June 20, 1994

Approval as an American National Standard (ANSI) covers the numbered paragraphs on pages dated June 20, 1994. These pages should not be discarded when revised or additional pages are issued if it is desired to retain the ANSI approved text.

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

Approved as ANSI/UL 1448-1979, April 25, 1979

Approved as ANSI/UL 1448-1988, January 27, 1988

Approved as ANSI/UL 1448-1995, August 24, 1995

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 revisions, 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 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.

PART 1 – ALL HEDGE TRIMMERS

INTRODUCTION

1 Scope

1.1 These requirements cover cord-connected, electrically operated hedge trimmers rated for a nominal 120 volts to be employed in accordance with the National Electrical Code, ANSI/NFPA 70. These requirements also cover battery-operated hedge trimmers and battery-operated shrub clippers.

1.2 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this Standard, and that involve a risk of fire, electric shock, or injury to persons shall be evaluated using the appropriate additional component and end-product requirements as determined necessary to maintain the acceptable 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 cannot be judged to comply with this Standard. Where considered appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this Standard.

2 Glossary

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

2.2 ACCESSIBLE PART – A part located so that it can be contacted by a person, either directly or by means of a probe. See Section 4, Frame and Enclosure.

2.3 BASIC INSULATION – The insulation applied to live parts to provide basic protection against electric shock.

2.3 revised June 25, 1996

2.4 DOUBLE INSULATION – An insulation system composed of both basic insulation and supplementary insulation, with the two insulations physically separated and arranged so that they are not simultaneously subjected to the same deteriorating influences (temperature, contaminants, and the like) to the same degree. See Figure 2.1.

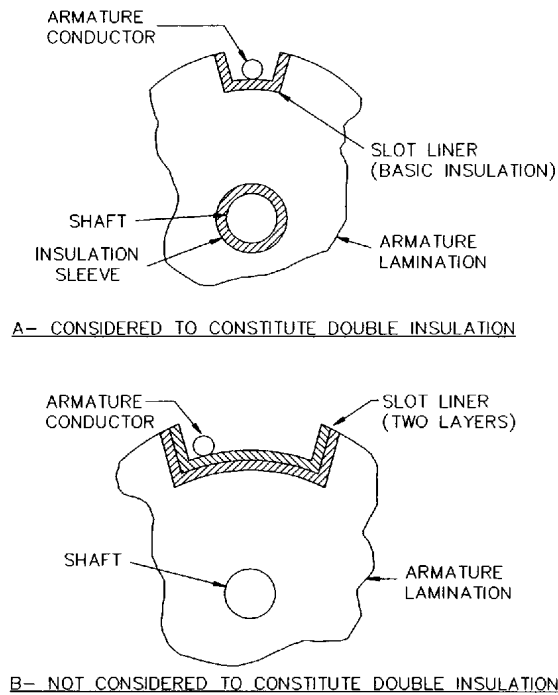
2.5 ENCLOSURE – That portion of the hedge trimmer that:

- a) Renders inaccessible all or any part that otherwise presents a risk of electric shock or injury to persons, or
- b) Reduces the likelihood of flame propagation initiated by electrical disturbances occurring within, or
- c) Both.

2.6 HAND-SUPPORTED APPLIANCE – An appliance that is completely supported by the user during intended operation.

2.7 HEDGE TRIMMER (See Figure 2.2) – A hand-supported gardening appliance having an effective cutting length greater than 6.0 inches (152.4 mm) and used primarily for trimming and pruning hedges and shrubs.

Figure 2.1
Examples illustrating 2.4



S0723A

2.8 LEAKAGE CURRENT – All current or currents, including capacitively-coupled currents, that may be conveyed between exposed conductive surfaces of a hedge trimmer and ground or other exposed conductive surfaces of the hedge trimmer.

2.9 LIVE PART – An energized part operating at a potential of more than 30 volts rms (42.4 volts peak).

2.10 MANUFACTURER – The organization responsible for the design and assembly of the hedge trimmer.

2.10.1 ORDINARY TOOLS — Tools which may normally be expected to be available to the user, such as flat-bladed and Phillips screwdrivers, hammers, nut drivers, hex wrenches, and pliers.

2.10.1 added April 19, 1995

2.11 REINFORCED INSULATION – Improved basic insulation with such mechanical and electrical qualities that it, in itself, provides the same reduction in risk of electric shock as double insulation. It is acceptable in place of double insulation only in accordance with 53.2.

2.12 SHRUB CLIPPER – A hand-supported, battery-operated gardening appliance having an effective cutting length less than or equal to 6 inches (152 mm), and used primarily for short-term clipping of new growth on hedges and shrubs.

2.13 SUPPLEMENTARY (PROTECTIVE) INSULATION – An independent insulation provided in addition to the basic insulation to reduce a risk of electric shock in case of breakdown of the basic insulation. An enclosure of insulating material may form a part or the whole of the supplementary insulation.

Figure 2.2
Example of hedge trimmer

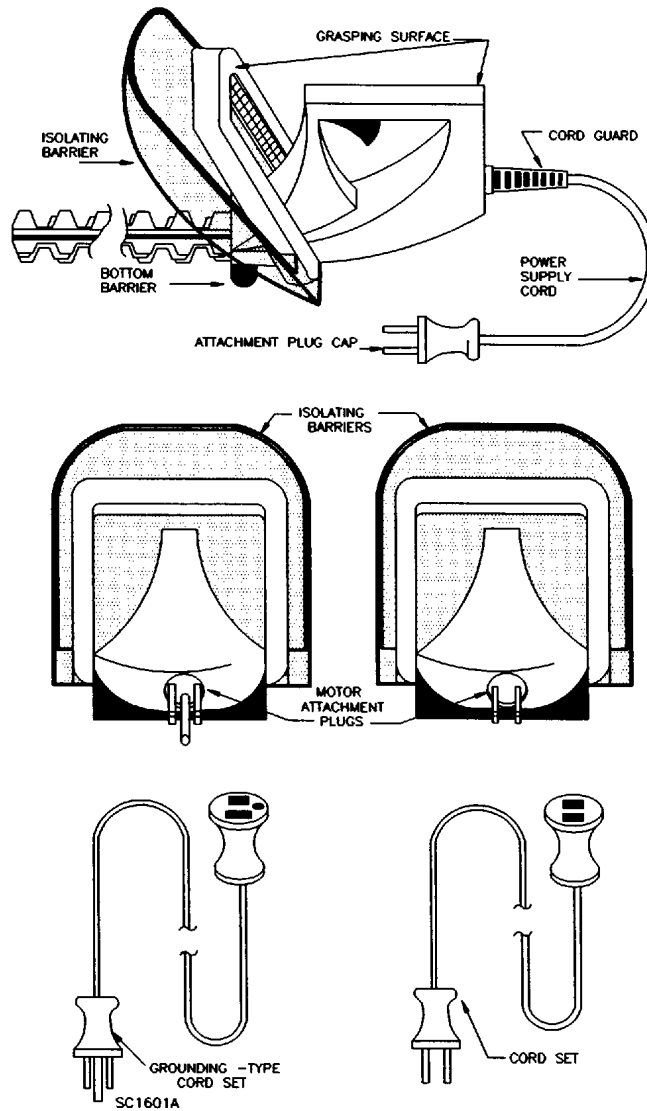


Figure 2.2 revised May 26, 1999

3 General

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. See Appendix A for a list of standards covering components generally used in the products covered by this Standard.

3.2 A component need not comply with a specific requirement that:

- a) Involves a feature or characteristic not needed 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 recognized rating established for the intended conditions of use.

3.4 Specific components are recognized as being 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 for which they have been recognized.

3.5 Calibration of meters and tolerances of test equipment shall be such that test values and measurements are within the limits specified in the standard.

3.6 If a value for measurement in these requirements is followed by a value in other units in parentheses, the second value may be only approximate. The first stated value is the requirement.

CONSTRUCTION

4 Frame and Enclosure

4.1 A product shall be formed 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.

4.2 Among the factors taken into consideration when a frame or enclosure is judged are its:

- a) Mechanical strength,
- b) Resistance to impact, abrasion, or both,
- c) Moisture-absorptive properties,
- d) Combustibility and resistance to ignition from electrical sources,
- e) Resistance to corrosion,
- f) Resistance to degradation and/or distortion at temperatures to which the enclosure may be subjected under conditions of normal or abnormal use, and
- g) Dielectric properties, insulation resistance, and resistance to arc tracking.

Materials that will be exposed to environments such as moisture, solvents, or cleaning agents as part of the use or application of the hedge trimmer shall not be adversely affected by these environments as determined by appropriate tests.



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5 Metallic Enclosures

5.1 Cast and sheet-metal portions of the enclosure shall not be thinner than specified in Table 5.1 unless the enclosure is found to be acceptable when judged under the considerations mentioned in 4.2.

Table 5.1
Thickness of metal enclosure

Metal	Minimum thickness	
	Inch	Millimeters
Die-cast metal	0.047	1.19
Cast malleable iron	0.0625	1.59
Other cast metal	0.094	2.38
Uncoated sheet steel	0.026	0.66
Galvanized sheet steel	0.029	0.74
Nonferrous sheet metal	0.036	0.91

6 Polymeric Enclosures

6.1 A polymeric enclosure shall be of a material as defined by the tests in 42.2.1 – 42.5.7, or of a material classified HB in accordance with UL 94, the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, and as defined by the tests in 43.2.1 – 43.8.5.

6.1 revised May 26, 1999

6.2 The material used as the enclosure shall be investigated for use at the maximum temperature to which it is exposed in use. Material exposed to temperatures in excess of 80°C (176°F) shall be investigated to determine whether it is acceptable with respect to aging.

7 Exposed Surfaces

7.1 The surfaces most likely to be contacted by the user during operation of a hedge trimmer shall be of or covered with an insulating material that complies with the requirements in 7.3, 7.4, and 25.1.1 – 25.1.3 and the dielectric voltage withstand test in 65.1 and the second entry in Table 65.1.

Exception: The surfaces indicated in 7.1 may be of electrically conductive material if:

a) Insulation complying with the requirements for supplementary insulation is interposed between the surfaces and:

- 1) The cutting member, and*
- 2) Any metallic guard for the cutting member; and*

b) The surfaces:

- 1) Are double-insulated from live parts, or*
- 2) Do not enclose electrical components and are separated from all inaccessible dead metal parts that enclose electrical components by insulation complying with the requirements for supplementary insulation.*

7.2 With reference to the requirement in 7.1, a surface on the user side of the isolating barrier – see 9.7 – is considered to be a surface that is likely to be contacted by the user during operation unless it is demonstrated otherwise.

7.3 Insulating material as mentioned in 7.1 that overlies and is in intimate contact with dead metal shall not be less than 0.078 inch (1.98 mm) thick.

Exception: The thickness may be less than 0.078 inch (1.98 mm) if the material is found to be acceptable when judged under the considerations mentioned in 4.2.

7.4 An assembly screw in an area likely to be grasped that secures a covering of insulating material to a metal enclosure and threads into:

- a) A metal enclosure that contacts another metal enclosure containing electrical components, or
- b) A metal enclosure containing live parts,

shall be recessed not less than 0.125 inch (3.175 mm) behind the outer surface of the insulating material if the opening will not admit a 0.375 inch (9.53 mm) diameter cylindrical rod. For openings that will admit a 0.375 inch diameter cylindrical rod, the assembly screw shall be recessed so that it is not accessible to the probe illustrated in Figure 8.2 when inserted to a depth of 1 inch (25.4 mm) or less.

8 Accessibility of Live Parts

8.1 Electrical parts of a hedge trimmer shall be located or enclosed so that unintentional contact with uninsulated live parts does not occur.

Exception: Insulated brush caps do not require an additional enclosure. See 16.3, 25.4.1, 25.4.2, 38.1 and 38.2.

8.2 An opening anywhere in the enclosure of a hedge trimmer is acceptable if the probe illustrated in Figure 8.1, when inserted as far as possible into the opening:

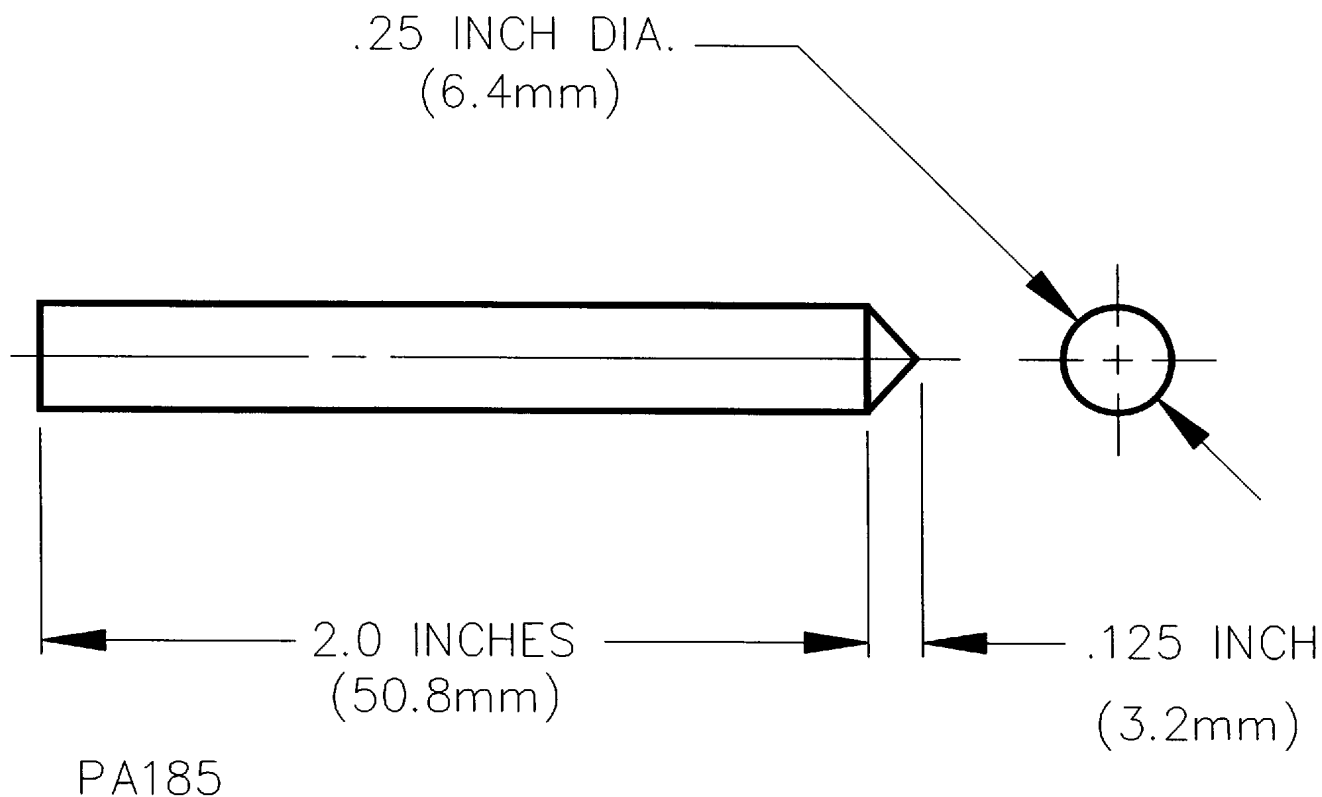
- a) Does not enter the opening for a distance of more than 0.125 inch (3.2 mm), and
- b) Does not touch any uninsulated live part or film-coated wire.

8.3 With reference to the requirement in 8.1 and except as indicated in 8.2, an opening is acceptable if:

- a) A probe as illustrated in Figure 8.2 cannot be made to touch any uninsulated live part or any film-coated wire when inserted through the opening in any possible direction using no appreciable force, and
- b) A probe as illustrated in Figure 8.3 cannot be made to touch any uninsulated live part when inserted through the opening in any possible direction using no appreciable force.

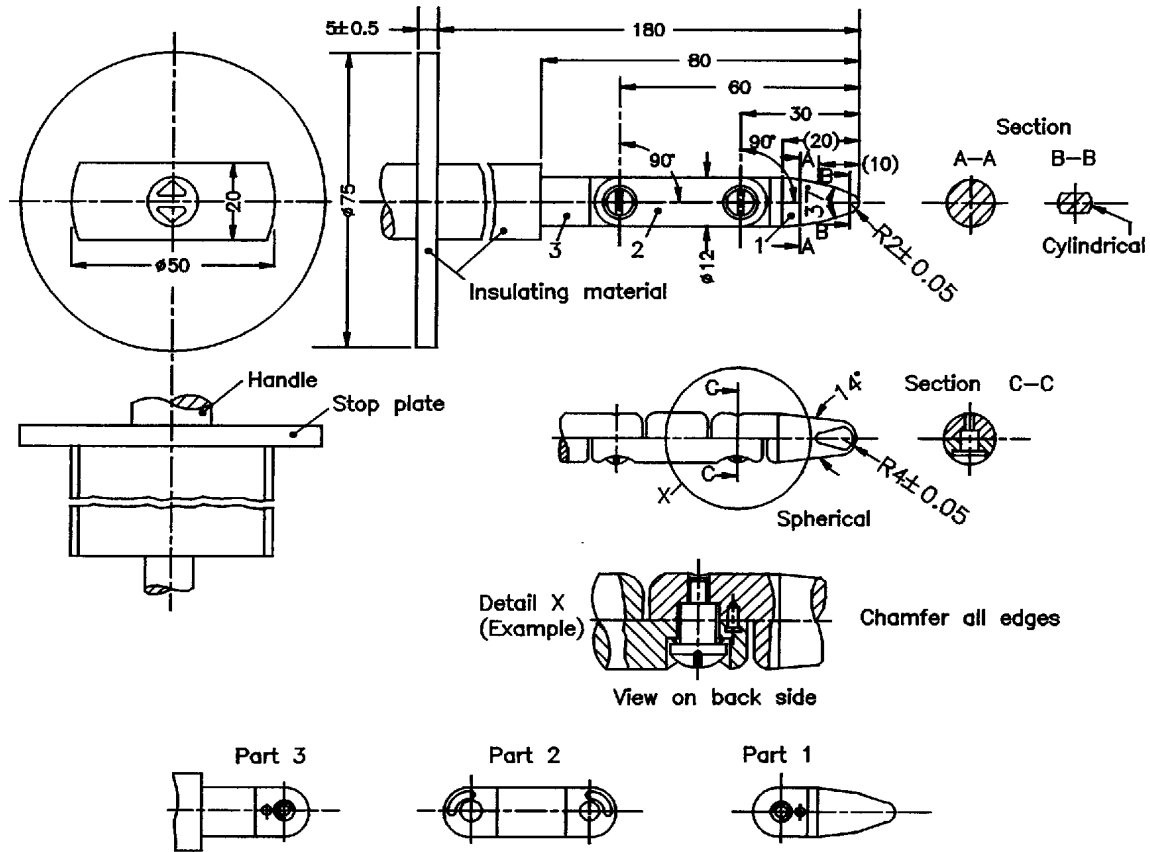
8.3 effective August 1, 1996

Figure 8.1
0.250 inch (6.4 mm) diameter probe



8.4 During the examination of a hedge trimmer in connection with the requirements in 8.1 and 8.2, a part of the outer enclosure that may be removed without the use of tools by the user of the hedge trimmer to allow access to means for making operating adjustments or for other similar reason is to be disregarded – that is, it will not be assumed that the part reduces the risk of electric shock.

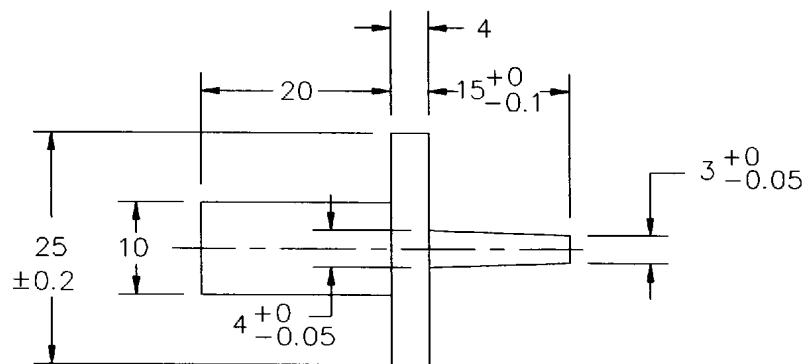
Figure 8.2
IEC articulate probe



S3404

Figure 8.2 effective August 1, 1996

Figure 8.3
IEC test pin



S2962

Dimensions in millimeters

Figure 8.3 revised May 26, 1999

9 Accessibility of Moving Parts

9.1 Moving parts, other than cutting blades, shall be guarded, enclosed, or isolated from the user so as to reduce the likelihood of injury to persons.

9.2 Among the factors to be considered in judging the acceptability of moving parts are:

- a) Degree of exposure.
- b) Sharpness of the moving part.
- c) The likelihood of unintentional contact therewith.
- d) The speed of the moving part.
- e) The likelihood that fingers, arms, feet, or clothing would be endangered by the moving part.
- f) The contribution of the part to the basic function of the hedge trimmer.

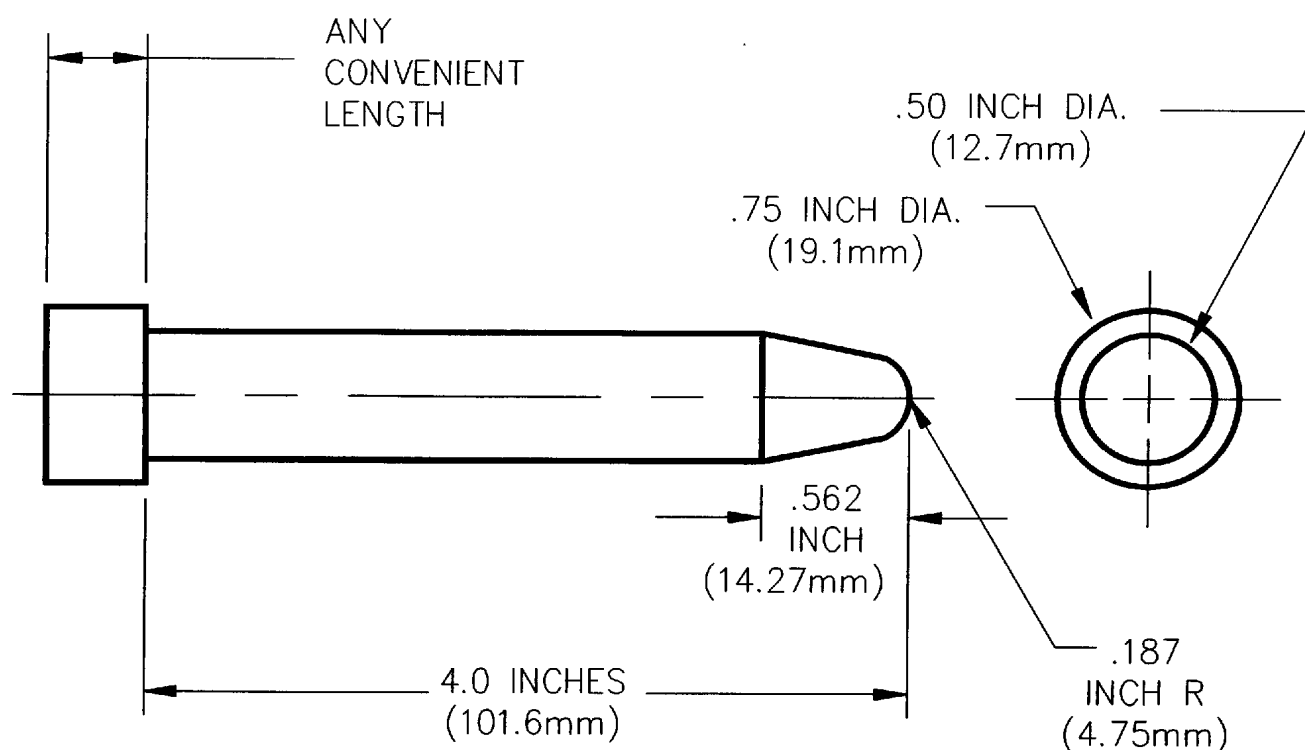
9.3 The enclosure or guard of a rotating member shall be complete and shall have such strength as to contain and deflect parts that may become loose or separated from a rotating part.

9.4 An opening in a guard or enclosure around a moving part capable of causing injury to persons – a pulley, a gear, a chain, or the like – shall have a minor dimension less than 1 inch (25.4 mm). The unobstructed distance from the opening to the moving part shall not be less than $8D - 1.5$ inches (38.1 mm) in which D is the minor dimension of the opening in inches (mm).

Exception: A fan is considered to be acceptably guarded if the blade cannot be contacted with the probe illustrated in Figure 9.1 when applied in accordance with 9.5.

9.5 When evaluating the accessibility of a fan blade, a part of the enclosure that may be opened or removed by the user without using a tool (to attach an accessory, to make an operating adjustment, or for other reasons) is to be opened or removed. The probe shall be applied to any depth that the opening will permit, and shall be angled before, during, and after insertion through the opening to any position that is necessary to examine the enclosure.

Figure 9.1
Probe – moving parts other than cutting blades



PA135

Figure 9.1 revised May 26, 1999

9.6 The distance between any portion of a handle intended to be grasped and the cutting blades, exclusive of the isolating barrier mentioned in 9.7, shall not be less than 5 inches (127 mm). For the purpose of this test, any section of the isolating barrier that prevents this measurement is to be removed prior to making the measurement.

Exception: The isolating barrier need not be removed if:

- a) The barrier is subjected to two additional impacts as described in Section 25, Impact Test; and*
- b) The barrier is integral to the unit such that it is not removable with ordinary tools (see 2.10.1).*

9.6 revised April 19, 1995

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9.7 An isolating barrier – see Figure 2.2 – shall be provided between the cutting blades and the sections of the hedge trimmer contacted by the user in exercising physical control of the hedge trimmer during use. The barrier shall not be removable without the use of tools. The barrier shall isolate the user from the cutting blades at least to the extent required by application of the probes as described in 9.10.

Exception: An isolating barrier is optional for a shrub clipper intended for one hand use and provided with only one handle.

9.8 The isolating barrier mentioned in 9.7 shall be constructed so that it will not likely be used as a grasping surface.

9.9 An acceptable distance shall be provided between the grasping surface and the isolating barrier to provide hand clearance. A distance of at least 2 inches (50.8 mm) shall be provided between the isolating barrier and portions of the grasping surface to which the 5-inch (127 mm) probe referenced in 9.10 is applied. A distance of at least 3 inches (76.2 mm) shall be provided between the isolating barrier and portions of the grasping surface to which the 12-inch (304.8 mm) probe referenced in 9.10 is applied.

Exception: For a construction in which the isolation barrier and the auxiliary handle are mounted to the blade support, the 3-inch (76.2-mm) distance requirement may be waived when the user's fingers that grasp the auxiliary handle are not pointing towards the cutting side of the moving blade when picking up and operating the hedge trimmer.

9.9 revised April 19, 1995

9.10 The isolating barrier mentioned in 9.7 shall conform to the following requirements. The probes illustrated in Figure 9.2 are applied to all portions of the handles intended to be grasped in attitudes simulating hand gripping. Surfaces A and B shall be in contact with the handle. Tip C shall not touch a shearing edge of the cutting blades. The 5-inch (127 mm) probe is to be applied to grasping portions of the handles falling within the range of 75 – 90 degrees away from the shearing plane. See Figure 9.3. The 12-inch (304.8 mm) probe is to be applied to all other grasping portions.

Exception: For a construction in which the isolation barrier and the auxiliary handle are mounted to the blade support, the 12-inch (304.8-mm) probe need not be applied when the user's fingers that grasp the auxiliary handle are not pointing towards the cutting side of the moving blade when picking up and operating the hedge trimmer.

9.10 revised April 19, 1995

9.11 The isolating barrier mentioned in 9.7 shall not be shipped unassembled to the hedge trimmer enclosure unless it is an integral part of an unassembled handle or an unassembled handle cannot be assembled and function without the barrier being in the intended position.

9.12 A barrier shall be provided on the underside of the hedge trimmer between the blades and the underside of the hedge trimmer likely to be held by the user. The barrier shall extend out 1/2 inch plus 1/8 inch, minus 0 inch (12.7 mm, plus 3.2 mm, minus 0 mm) from the bottom surface. See Figure 2.2.

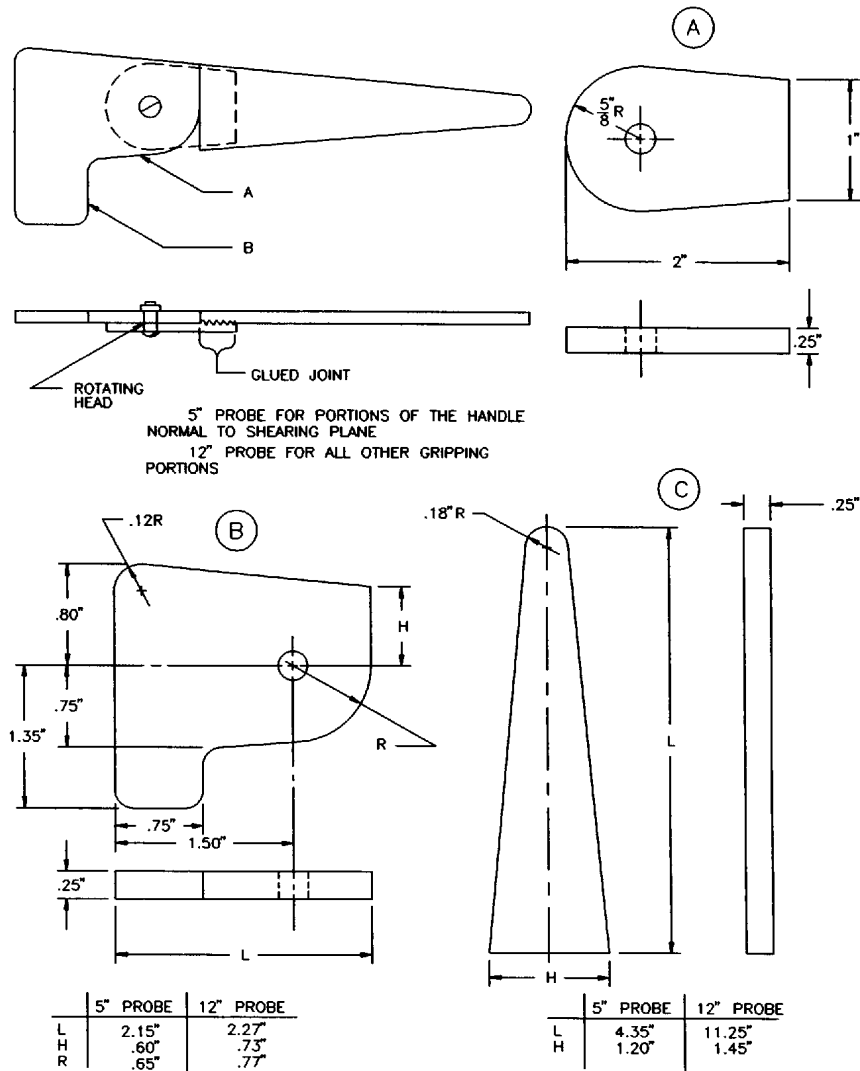
Exception: The barrier may extend up to 1-1/4 inch (31.8 mm) downward from the bottom surface if the barrier configuration is such that it is unlikely to be used as a gripping surface and it does not interfere with the intended function of the trimmer.

9.13 If damage to or breakage of an enclosure, including a guard, a handle, a barrier, or the like, could result in a risk of injury to persons, the material of the part shall have the properties required to meet the expected use conditions.

9.14 Features of guards and barriers that will require additional consideration include:

- a) Removability without the use of tools;
- b) Removability for servicing and likelihood of replacement;
- c) Strength and rigidity;
- d) Completeness; and
- e) Creation of an additional risk of injury to persons such as pinch points and the necessity for additional handling because of the increased need for servicing, such as cleaning, unjamming, and the like.

Figure 9.2
Probes – cutting blades



PA250

Inch	0.12	0.18	0.25	0.6	0.625	0.65	0.73	0.75	0.77	0.8	1.0	1.2	1.35	1.45
Millimeters	3	4.6	6.4	15.2	15.9	16.5	18.5	19.1	19.6	20.3	25.4	30.5	34.3	36.9
Inch	1.5	2.0	2.15	2.27	4.35	5.0	11.25	12.0						
Millimeters	38.1	50.8	54.6	57.7	110.5	127.0	285.8	304.8						

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Figure 9.3
Probe application diagram

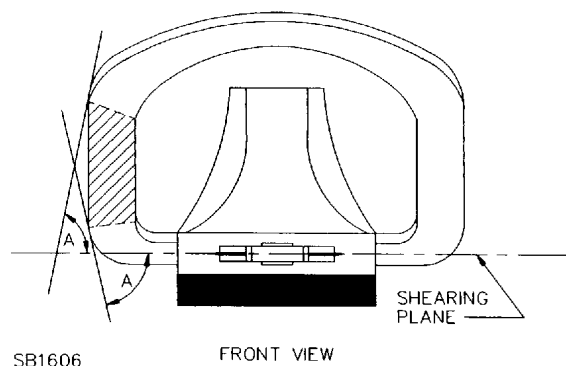


Figure 9.3 revised May 26, 1999

10 Mechanical Assembly

10.1 A component that is handled by the user shall be mounted securely and shall be provided with a means other than friction between the component and its mounting surfaces such that the component does not turn or move.

10.2 An adhesive that is used to secure a part which if dislodged would result in a risk of electric shock, fire, or injury to persons shall comply with the requirements for adhesives in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.

10.3 The requirement in 10.2 also applies to an adhesive used to secure a conductive part that may, if loosened or dislodged:

- a) Energize an accessible dead metal part,
- b) Make a live part accessible,
- c) Reduce spacings below the minimum acceptable values, or
- d) Short-circuit live parts.

10.4 A hedge trimmer shall be so constructed that user-maintenance can be accomplished without the likelihood of:

- a) Pinching leads,
- b) Reducing spacings to values less than those indicated in Section 21, Spacings,
- c) Mislocating or damaging the means for accomplishing strain relief, and
- d) Mislocating or damaging a guard or other similar device.

10.5 User-maintenance is considered to consist of inspection of or replacement of motor brushes or fuses and other service that is recommended in the instruction manual to be performed by the user. It does not include maintenance that the instruction manual recommends be done by authorized service personnel.

10.6 Compliance with the requirements in 10.4 may be accomplished by routing of wires, provision of wire channels, provision of locating wells for components, use of barriers, use of restraints, securing of components, and other means.

10.7 Routing as mentioned in 10.4 is acceptable if the construction is such that after the wire has been put into the intended position prior to reassembling the hedge trimmer so that the reassembly procedure will not result in the wire contacting a moving part or being pinched. This does not mean that the wire must be of such length or so clamped that it cannot reach the pinch point or the moving part.

10.8 A hedge trimmer employing a soft rubber, neoprene, or polyvinyl chloride pressure pad to hold down or maintain permanent position of an electrical part, such as a motor, to provide for intended functioning of the hedge trimmer shall be tested in accordance with 29.2. If the pressure pad is exposed to grease, it shall also be tested in accordance with 29.3.

Exception: The test is not required if a risk of fire or electric shock does not result from deterioration of the pad as determined by the test in 29.1.

11 Cutting Blades

11.1 The blade assembly of a hedge trimmer shall be such that a 0.75-inch (19.1-mm) diameter cylinder probe applied to the blade assembly with its axis normal to the shearing plane does not contact the shearing area. The shearing area is the area between the blades. See Figure 11.1. This shall be checked for the full cycle of movement of the blade. For a shrub clipper, the probe is to be 1/2 inch (12.7 mm) in diameter.

11.2 A movable blade shall stop within 3 seconds after opening of the control switch. Refer to 50.2.1 and 51.2 for related marking requirements.

11.3 To provide blade visibility during use, at least 50 percent of the area of the top surface of the cutting blade assembly, excluding areas occupied by a warning label and the surfaces wiped by blade motion, shall be colored a highly visible durable bright-red, -yellow, or -orange color which sharply contrasts with green. The colored portion shall extend for at least 90 percent of the length of the blade assembly measured from the outboard end.

11.3 revised June 1, 1995

11.4 The outer edges of the blades capable of being contacted by the probe described in 11.1 shall be flat or smoothly round. The probe shall be applied to the blades with the hedge trimmer not energized. See 11.6.

11.5 A rotating member shall be formed and constructed of materials of a strength that will reduce the likelihood of its release or loosening in a manner likely to cause a risk of injury to persons.

11.6 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 normal maintenance or use.

Exception: A sharp edge that must be exposed to enable the hedge trimmer to perform its intended function need not comply with this requirement.

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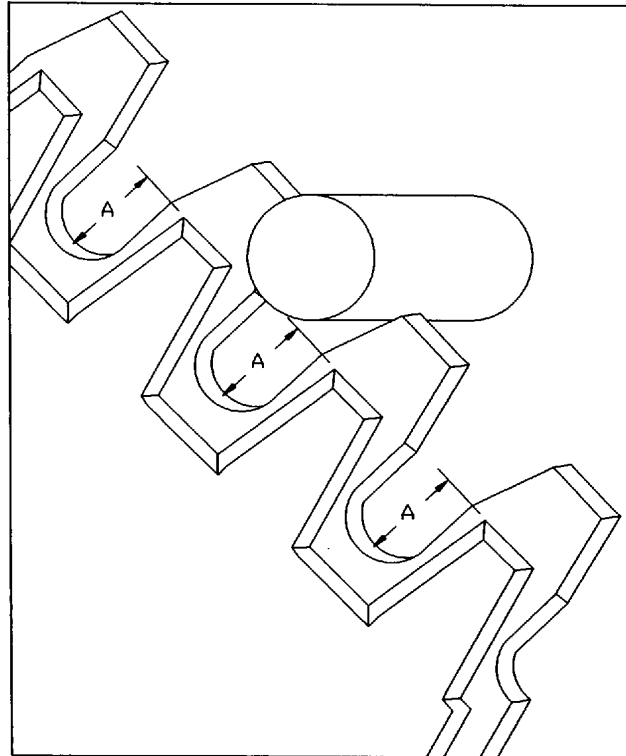
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ELECTRIC HEDGE TRIMMERS - UL 1448

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Figure 11.1
Application of probe to blade assemblies



A = SHEARING AREA

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12 Protection Against Corrosion

12.1 Iron and steel parts, including fasteners, shall be protected against corrosion by enameling, galvanizing, plating, or other equivalent means if corrosion of such unprotected parts would result in a risk of fire, electric shock, or injury to persons.

Exception No. 1: In certain instances in which the oxidation of iron or steel due to the exposure of the metal to air and moisture is not likely to be appreciable – thickness of metal and temperature also being factors – surfaces of sheet steel and cast-iron parts within an enclosure may not be required to be protected against corrosion.

Exception No. 2: The requirement does not apply to bearings, laminations, or to minor parts.

13 Supply Connections

13.1 Connection means

13.1.1 A hedge trimmer shall have either a power-supply cord or a motor attachment plug for attachment of a cord set. The terminal pins of the motor attachment plug shall not accommodate a standard flatiron plug or appliance plug. For dimensions of pins that will accommodate a standard flatiron plug or a standard appliance plug, see the Standard for Attachment Plugs and Receptacles, UL 498. For illustration of a power-supply cord, a cord set, and a motor attachment plug, see Figure 2.2.

13.1.2 A hedge trimmer shall be designed so that its cord exits the hedge trimmer at a point farthest from the cutting blades and in a direction away from the cutting blades.

13.1.3 A power-supply cord, if used, shall be of a length that does not permit its contact with the cutting blades. It shall not be less than 8 inches (203 mm) nor more than 18 inches (457 mm) long.

13.1.4 A cord set shall be provided with or shall be made available for use with a hedge trimmer by the manufacturer. The cord set shall not be less than 10 feet (3.05 m) long.

13.2 Flexible cord

13.2.1 A flexible cord provided with or made available for use with a hedge trimmer shall:

- a) Be Type SOW-A, STW-A, SJOW-A, SJTW-A, STOW-A, or SJTOW-A; or
- b) Be Type SOW, STW, SJOW, SJTW, STOW, or SJTOW.

13.2.1(b) acceptable alternative to 13.2.1(a) until 13.2.1(b) supersedes 13.2.1(a) effective July 2, 1998

13.2.2 A flexible cord provided with or made available for use with a hedge trimmer shall:

- a) Be rated for use at a voltage not less than the rated voltage of the hedge trimmer; and
- b) Have an ampacity not less than the current rating of the hedge trimmer.

13.2.2 added June 25, 1996

13.3 Attachment plug

13.3.1 An attachment plug shall be rated for use at a current not less than the rated current, and at the rated voltage of the hedge trimmer.

13.3.2 The attachment plug shall be of the polarized- or 3-prong grounding type.

Effective date for 13.3.2 changed from May 2, 1994 to August 1, 1996

13.3.3 The overall dimensions of the face of a 2-wire parallel-blade attachment plug of a power-supply cord shall be 0.975 by 0.730 inch (24.8 by 18.5 mm) minimum, with a maximum 7/32-inch (5.6-mm) radius at the corners. The body of the plug shall be shaped so that it is not likely to be gripped at the periphery of the face but is likely to be gripped at a section formed for such 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 sharp defined projection at least 3/32 inch (2.38 mm) high with a base of at least 1/16 inch (1.6 mm). See Figure 13.1.

13.3.4 The face and body dimensions of a plug of other than the type described in 13.3.3 shall provide equivalent distance from the perimeter of the face to the line blades and shall provide equivalent gripping means.

13.3.5 An attachment plug may be of the locking type.

13.3.6 A three- to two-wire grounding adapter shall not be provided with the hedge trimmer.

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Figure 13.1
Attachment plug

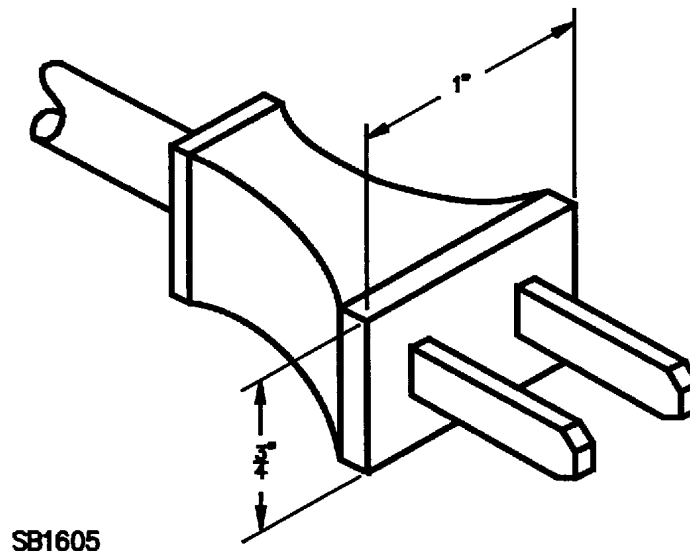


Figure 13.1 revised May 26, 1999

13.3.7 An attachment plug on the supply cord of a hedge trimmer shall be constructed so that, when inserted in the connector of a cord set, the blades will not be energized until they are inaccessible to contact by persons. See Attachment Plug Test, Section 26.

13.4 Strain relief

13.4.1 Strain relief shall be provided so that stress on a flexible cord will not be transmitted to terminals, splices, or internal wiring in the hedge trimmer.

13.4.2 A metal strain-relief clamp or band without auxiliary protection is acceptable with a power-supply cord, unless it is judged that the clamp is damaging to the cord insulation.

13.4.3 Means shall be provided so that the flexible cord cannot be pushed into the hedge trimmer through the cord-entry hole if such displacement is likely to subject the cord to mechanical damage or to exposure to a temperature higher than that for which the cord is rated, or is likely to reduce spacings (such as from a live part to a metal strain-relief clamp) below the minimum acceptable values. See 27.1 and 27.2.

13.5 Cord guard and bushings

13.5.1 The edges of the entry hole for the power-supply cord, including the cord-entry hole in a bushing, shall be smooth and free from burrs, fins, and sharp edges. Unless an insulating bushing of a material that has been found acceptable for the application is provided, the hole in the metal in which the bushing is mounted shall be smooth and free from burrs, fins, and sharp edges.

13.5.2 Power-supply cords shall be provided with a cord guard of insulating material so that the cord will not bend excessively at the inlet opening of the hedge trimmer. See 27.4 and 27.5.

14 Current-Carrying Parts

14.1 A current-carrying part shall be of aluminum, silver, copper, copper alloy, or other equivalent material. A current-carrying part in a battery-operated hedge trimmer shall be resistant to any corrosive agents to which it might be subjected in the application.

14.2 Stainless steel or plated iron or steel may be used for a current-carrying part within a motor, or if acceptable in accordance with 4.2.

14.3 An uninsulated current-carrying part and its support shall be secured to the base or mounting surface so that it will not turn or shift in position if such motion may result in a reduction of spacings below the minimum acceptable values.

14.4 Friction between surfaces is not acceptable as the sole means to prevent the turning of an uninsulated current-carrying part but a lock washer or a factory-assembled press-fit, if applied as intended, is acceptable for this purpose.

15 Internal Wiring

15.1 General

15.1.1 The insulated wiring and connections between component parts of a hedge trimmer shall be protected or enclosed. Magnet wire is considered as a live part unless it is covered with insulating tubing or sleeving.

15.1.2 With reference to exposure of insulated internal wiring through openings in the enclosure of a hedge trimmer, the protection of the wiring required in 15.1.1 is considered to exist if a probe as represented by Figure 8.2 cannot touch the internal wiring when inserted through the opening.

15.1.3 Insulated internal wiring shall not be located near a hole in the hedge trimmer where it can be damaged by a screw, nail, or other device intended to support the hedge trimmer during storage and the like.

15.1.4 Insulated wiring shall be protected from sharp edges including screw threads, burrs, fins, moving parts, and other agencies that may cause abrasion of the insulation on conductors.

15.1.5 Insulated wires may be bunched and passed through a single opening in a metal wall within the enclosure of the hedge trimmer.

15.1.6 Insulated internal wiring shall be acceptable for the application when considered with respect to:

- a) The temperature and voltage to which the wiring is likely to be subjected,
- b) Exposure to oil, grease, or other substances likely to have a deleterious effect on the insulation,
- c) Exposure to moisture, and
- d) Other conditions of service to which it is likely to be subjected.

15.1.7 Thermoplastic-insulated wire and neoprene-insulated wire employed for internal wiring shall be building wire or appliance wiring material rated for the application, and shall comply with Table 15.1.

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Table 15.1
Characteristics of internal wiring

Insulation	Nominal wall thickness of insulation, inch	Braid or jacket required	Nominal thickness of braid or jacket, inch
Thermoplastic or neoprene	1/32 1/64	No Yes	– 1/64
Rubber	1/32 ^a	Yes ^a	1/64 ^a
^a For heat-resistant rubber, other than a silicone type, the nominal wall thickness shall not be less than 3/64-inch (1.2 mm) and no braid is required.			

15.1.8 Type AF and Type CF wire shall not be used.

15.1.9 Insulating tubing employed in lieu of wire insulation shall be acceptable for the application and shall have a wall thickness of not less than 1/32 inch (0.8 mm).

15.2 Splices and connections

15.2.1 All splices and connections shall be mechanically secure and shall provide electrical continuity. If breaking or loosening of the connection may result in a risk of fire, electric shock, or injury to persons, the soldered connection shall be made mechanically secure before being soldered. Consideration shall be given to vibration, and the like, when judging electrical connections.

15.2.2 An open-end spade lug is not acceptable unless additional means, such as an upturned lug or the like, is provided to hold the lug in place should the wire-binding screw or nut become slightly loosened. In any case, an ordinary open-end lug with a lock washer is not acceptable with respect to maintaining required spacings. See 21.1.

15.2.3 A splice shall be provided with insulation equivalent to that of the wires involved if spacing between the splice and other metal parts of the hedge trimmer may not be maintained.

15.2.4 The thickness of insulation on a splice shall be 1/32 inch (0.8 mm) or more. In determining if splice insulation consisting of coated-fabric, thermoplastic, or other tubing is acceptable, consideration is given to such factors as its dielectric properties, heat-resistant and moisture-resistant characteristics, and the like. Thermoplastic tape wrapped over a sharp edge is not acceptable.

15.2.5 The means of connecting stranded internal wiring shall be such that loose strands of wire cannot contact live parts of opposite polarity and dead metal parts.

15.2.6 Aluminum conductors, insulated or uninsulated, used as internal wiring, such as for interconnection between current-carrying parts or as motor windings, shall be terminated at each end by a method acceptable for the combination of metals involved at the connection.

15.2.7 A wire-binding screw, a pressure wire connector, or the like that is used as the terminating device mentioned in 15.2.6, shall be acceptable for use with aluminum under the conditions involved; for example, temperature, heat cycling, vibration.