

UL 1086

Household Trash Compactors

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Underwriters Laboratories Inc. (UL)
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UL Standard for Safety for Household Trash Compactors, UL 1086

Fifth Edition, Dated June 28, 2005

Revisions: This Standard contains revisions through and including August 10, 2007.

SUMMARY OF TOPICS

Revisions are being issued to:

- 1) Delete paragraph 14.5 which corresponds to obsolete AF wire
- 2) Remove the reference to asbestos as an acceptable insulating material in paragraph 15.2
- 3) Add paragraph 52.5 to give the option of supplying installation and user manuals in electronic format in addition to the required printed materials

UL Standards for Safety are developed and maintained in 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 a page. Due to formatting differences resulting from the use of UL's new electronic publishing system, please note that additional pages (on which no requirements have been changed) may be included in revision pages due to relocation of existing text and reformatting of the Standard.

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

The revised requirements are substantially in accordance with UL's Proposal(s) on this subject dated May 18, 2007.

The revisions dated August 10, 2007 include a reprinted title page (page1) for this Standard.

The revisions dated May 9, 2006 editorially replace all references to UL 1020 with the reference to UL 60691.

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.

As indicated on the title page (page1), this UL Standard for Safety has been adopted by the Department of Defense.

The UL Foreword is no longer located within the UL Standard. For information concerning the use and application of the requirements contained in this Standard, the current version of the UL Foreword is located on ULStandardsInfoNet at: <http://ulstandardsinfo.net/ul.com/ulforeword.html>

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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:

Page	Date
1	August 10, 2007
2-25	June 28, 2005
26-27	August 10, 2007
28-56	June 28, 2005
57-58	August 10, 2007
59-60	June 28, 2005
A1	May 9, 2006
A2	June 28, 2005
CRG1-CRG8	June 28, 2005

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UL 1086

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Fifth Edition

June 28, 2005

The most recent designation of ANSI/UL 1086 as an American National Standard (ANSI) occurred on August 8, 2007. The ANSI approval for this standard does not include the cover page, transmittal pages, title page, or Canadian Requirements Comparison Guide.

This ANSI/UL Standard for Safety, which consists of the fifth edition (with revisions through August 10, 2007), is under continuous maintenance, whereby each revision is ANSI approved upon publication.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc. and is not part of the ANSI standard.

The Department of Defense (DoD) has adopted UL 1086 on August 12, 1994. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

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. Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <http://csds.ul.com>.

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UL AND CANADIAN STANDARDS FOR HOUSEHOLD TRASH COMPACTORS	CRG1
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INTRODUCTION

1 Scope

1.1 These requirements cover trash compactors that are rated 250 V or less and intended for household use to reduce the volume of waste prior to disposal; and that are intended to be employed in accordance with the National Electrical Code, ANSI/NFPA 70.

2 General

2.1 A component used with an appliance covered by this standard shall comply with the standard or other requirements for the component. See Appendix A for a list of standards covering components generally used in the products covered by this standard.

Exception: A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

2.2 A component shall be used in accordance with its rating established for the intended conditions of use.

2.3 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

3 Units of measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 References

4.1 In the following text, a requirement that applies only to a specific type of trash compactor is so identified by a specific reference in that requirement to the type involved. Absence of such specific reference or use of the term appliance indicates that the requirement applies to all trash compactors covered by this standard unless the context indicates otherwise.

4.2 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.

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5 Glossary

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

5.2 CONVERTIBLE APPLIANCE – A free-standing or portable appliance that is intended to be converted to an undercounter or recessed appliance.

5.3 FREESTANDING APPLIANCE – An appliance that is not intended for attachment to the building structure or to adjacent cabinets or appliances.

5.4 PORTABLE APPLIANCE – A cord-connected appliance mounted on wheels, casters, or the equivalent, and intended to be moved about.

5.5 RECESSED APPLIANCE – An appliance that is intended for installation and use with the rear and both sides located adjacent to cabinets, walls, or other appliances. A recessed appliance may be such as to permit location under a countertop.

5.6 UNDERCOUNTER APPLIANCE – An appliance intended for installation under a countertop, and for attachment to the building structure or to adjacent cabinets, walls, or appliances.

CONSTRUCTION

6 General

6.1 An appliance shall employ materials that are acceptable for the use.

7 Frame And Enclosure

7.1 An appliance 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 a risk of fire, electric shock, or injury to persons due to total or partial collapse with resulting reduction of spacings, loosening or displacement of parts, or other serious defects.

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

7.3 Among the factors to be taken into consideration when an enclosure is being judged are the:

- a) Mechanical strength,
- b) Resistance to impact,
- c) Moisture-absorptive properties,
- d) Combustibility,
- e) Resistance to corrosion, and
- f) Resistance to distortion at temperatures to which the enclosure may be subjected during normal or abnormal use.

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

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7.4 A cast- or sheet-metal section of an enclosure shall have a thickness not less than that specified in Table 7.1.

Exception: An enclosure or part of an enclosure that complies with 29.6 – 29.8 is not required to comply with this requirement.

7.5 Electrical parts of an appliance shall be located or enclosed so that protection against unintentional contact with uninsulated live parts and internal wiring will be provided.

7.6 The enclosure of an appliance shall be such as to prevent molten metal, burning insulation, flaming particles, or the like from falling on combustible materials, including the surface upon which the appliance is supported and inside the compacting compartment.

Table 7.1
Thickness of metal enclosure

Metal	Minimum thickness					
	At small, flat unreinforced surfaces and at surfaces of a shape or size that provides adequate mechanical strength		At surfaces to which a wiring system is to be connected in the field		At relatively large unreinforced flat surfaces	
	inch	(mm)	inch	(mm)	inch	(mm)
Die-cast metal	3/64	(1.2)	–		5/64	(2.0)
Cast malleable iron	1/16	(1.6)	–		3/32	(2.4)
Other cast metal	3/32	(2.4)	–		1/8	(3.2)
Uncoated sheet steel	0.026	(0.66)	0.032	(0.81)	0.026	(0.66)
Galvanized sheet steel	0.029	(0.74)	0.034	(0.86)	0.029	(0.74)
Nonferrous sheet metal other than copper	0.036	(0.91)	0.045	(1.14)	0.036	(0.91)
Copper	0.033	(0.84)	0.043	(1.09)	0.033	(0.84)

7.7 The requirement in 7.6 necessitates that a switch, a relay, a solenoid, or the like, be completely and individually enclosed except for terminals, unless it can be shown that breakdown of the component would not result in a risk of fire, or unless there are no openings in the enclosure through which molten metal, burning insulation, flaming particles, or the like, can fall. See 45.1.1 and 45.1.2. It will also necessitate the use of a barrier of noncombustible material:

a) Under a motor unless:

- 1) The structural parts of the motor or of the appliance provide the equivalent of such a barrier;
- 2) The protection provided with the motor is such that no burning insulation or molten material falls to the surface that supports the appliance or into the compacting compartment when the motor is energized under each of the following fault conditions:
 - i) Open main winding,
 - ii) Open auxiliary winding,
 - iii) Starting switch short-circuited, and

iv) Capacitor of a permanent-split-capacitor motor short-circuited and the rotor locked – the short-circuit is to be applied before the motor is energized; or

3) The motor is provided with a thermal motor protector – a protective device that is sensitive to temperature and current – that will prevent the temperature of the motor windings from exceeding:

i) 125°C (257°F) when the motor is running at the maximum load at which it can operate without causing the protector to cycle, and

ii) 150°C (302°F) with the rotor of the motor locked.

b) Under wire, unless its insulation is flame-retardant, such as neoprene- or thermoplastic-insulated wires.

7.8 The barrier mentioned in 7.7 shall be horizontal, shall be located as illustrated in Figure 7.1, and shall have an area in accordance with that illustration. Openings for drainage, ventilation, and the like, may be employed in the barrier provided such openings would not permit molten metal, burning insulation, or the like to fall on combustible material.

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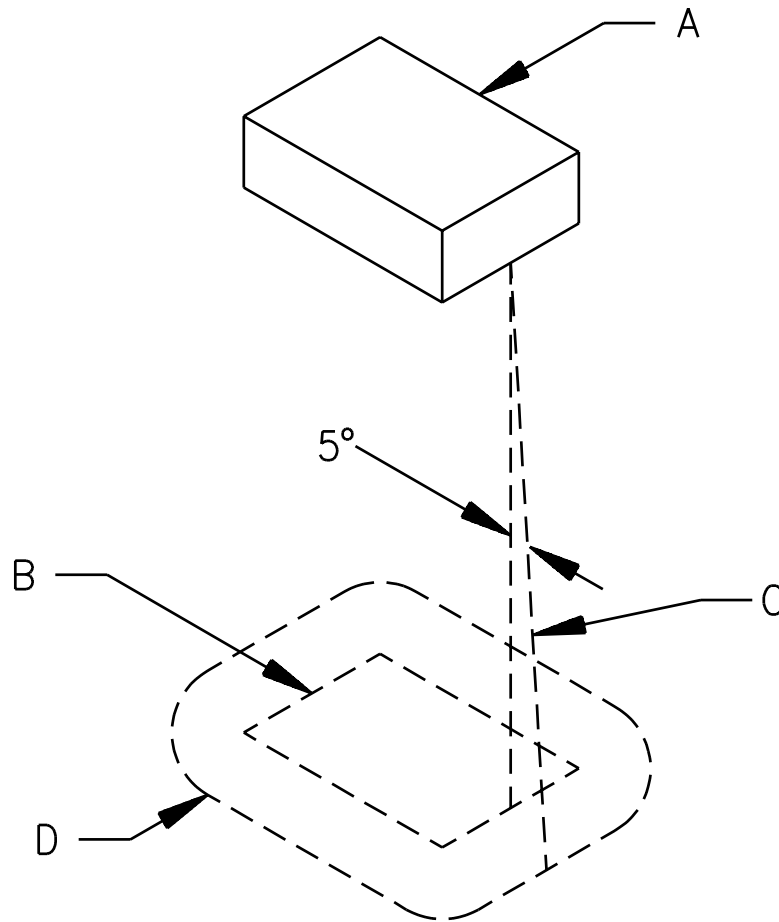
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Figure 7.1
Location and extent of barrier



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NOTES –

A – Region to be shielded by barrier. This will consist of the entire component if it is not otherwise shielded, and will consist of the unshielded portion of a component which is partially shielded by the component enclosure or equivalent.

B – Projection of outline of component on horizontal plane.

C – Inclined line that traces out minimum area of barrier. When moving, the line is always:

- 1) tangent to the component,
- 2) 5 degrees from the vertical, and
- 3) so oriented that the area traced out on a horizontal plane is maximum.

D – Location (horizontal) and minimum area for barrier. The area is that included inside the line of intersection traced out by the inclined line C and the horizontal plane of the barrier.

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8 Accessibility Of Uninsulated Live Parts And Film-Coated Wire

8.1 To reduce the likelihood of unintentional contact that may involve a risk of electric shock from an uninsulated live part or film-coated wire, an opening in an enclosure shall comply with either (a) or (b).

- a) For an opening that has a minor dimension (see 8.5) less than 1 in (25.4 mm), such a part or wire shall not be contacted by the probe illustrated in Figure 8.1.
- b) For an opening that has a minor dimension of 1 in (25.4 mm) or more, such a part or wire shall be spaced from the opening as specified in Table 8.1.

Exception: A motor other than one used in a hand-supported portion of an appliance need not comply with these requirements if it complies with the requirements in 8.2.

8.2 With respect to a part or wire as mentioned in 8.1, in an integral enclosure of a motor as mentioned in the exception to 8.1:

- a) An opening that has a minor dimension (see 8.5) less than 3/4-in (19.1 mm) is acceptable if:
 - 1) Film-coated wire cannot be contacted by the probe illustrated in Figure 8.2;
 - 2) In a directly accessible motor (see 8.6), an uninsulated live part cannot be contacted by the probe illustrated in Figure 8.3; and
 - 3) In an indirectly accessible motor (see 8.6), an uninsulated live part cannot be contacted by the probe illustrated in Figure 8.4.
- b) An opening that has a minor dimension of 3/4 in (19.1 mm) or more is acceptable if a part or wire is spaced from the opening as specified in Table 8.1.

8.3 The probes mentioned in 8.1 and 8.2 and illustrated in Figures 8.1 – 8.4 shall be applied to any depth that the opening will permit, and shall be rotated or angled before, during, and after insertion through the opening to any position that is necessary to examine the enclosure. The probes illustrated in Figures 8.1 and 8.3 shall be applied in any possible configuration; and, if necessary, the configuration shall be changed after insertion through the opening.

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Figure 8.2
Probe for film-coated wire

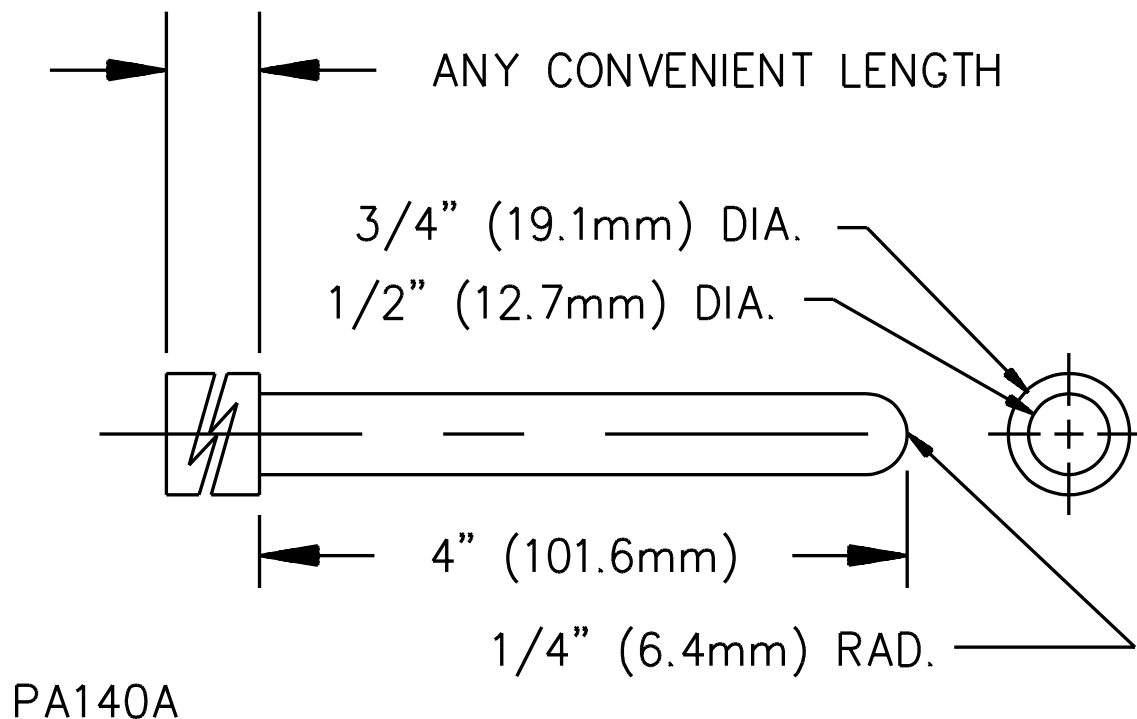
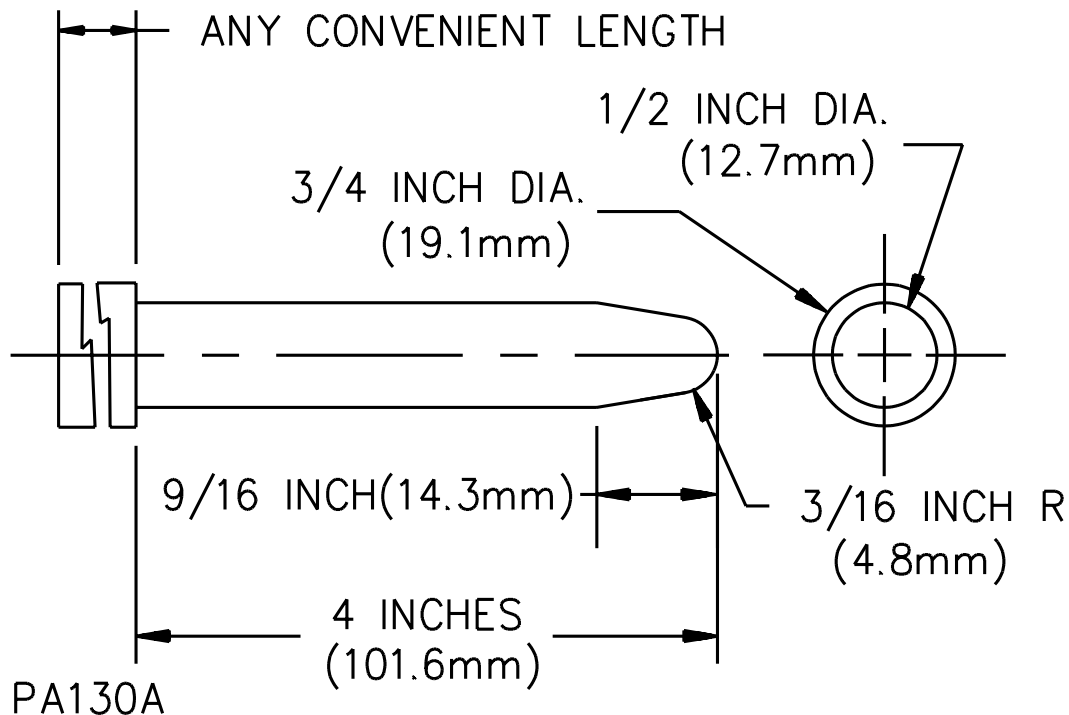


Table 8.1
Minimum acceptable distance from an opening to a part that may involve a risk of electric shock

Minor dimension ^a of opening		Minimum distance from opening to part	
Inch	(mm) ^b	Inch	(mm) ^b
3/4 ^c	(19.1)	4-1/2	(114)
1 ^c	(25.4)	6-1/2	(165)
1-1/4	(31.8)	7-1/2	(190)
1-1/2	(38.1)	12-1/2	(318)
1-7/8	(47.6)	15-1/2	(394)
2-1/8	(54.0)	17-1/2	(444)
d		30	(762)

^a See 8.5.
^b Between 3/4 in (19.1 mm) and 2-1/8 in (54.0 mm), interpolation is to be used to determine a value between values specified in the table.
^c Any dimension less than 1 in (25.4 mm) applies to a motor only.
^d More than 2-1/8 in (54.0 mm), but not more than 6 in (152 mm).

Figure 8.4
Probe for uninsulated live parts



8.4 The probes mentioned in 8.3 and 8.5 shall be used as measuring instruments to judge the accessibility provided by an opening, and not as instruments to judge the strength of a material; they shall be applied with the minimum force necessary to determine accessibility.

8.5 With reference to the requirements in 8.1 and 8.2, the minor dimension of an opening is the diameter of the largest cylindrical probe having a hemispherical tip that can be inserted through the opening.

8.6 With reference to the requirements in 8.2, an indirectly accessible motor is a motor that is accessible only by opening or removing a part of the outer enclosure, such as a guard or panel, that can be opened or removed without using a tool, or is located at such a height or is otherwise guarded or enclosed so that it is unlikely to be contacted. A directly accessible motor is a motor that can be contacted without opening or removing any part or is located so as to be accessible to contact.

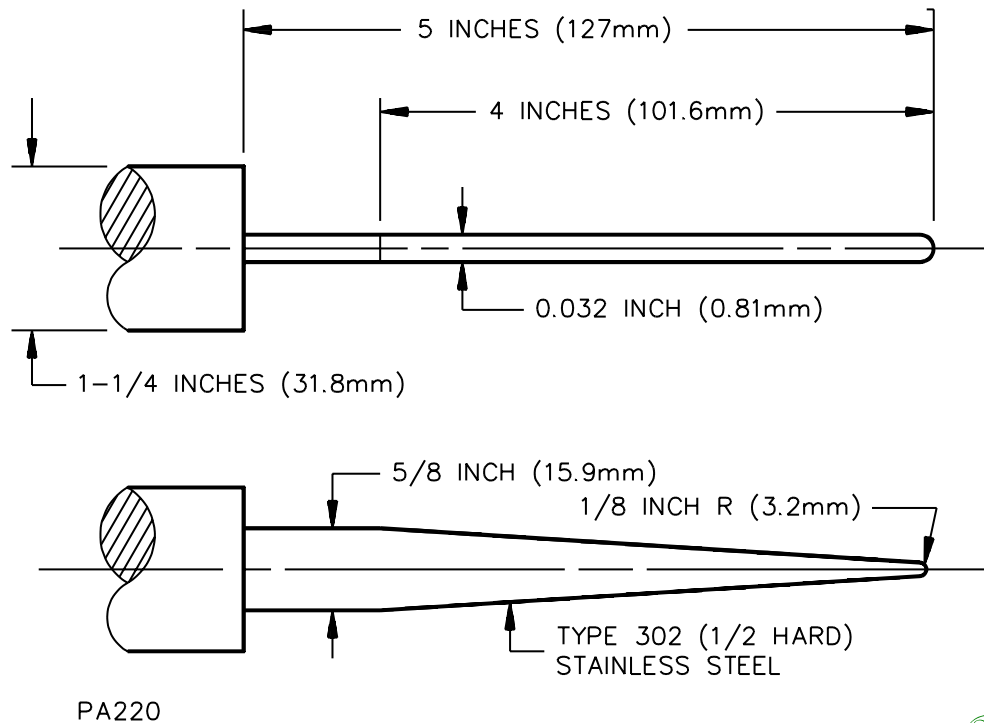
8.7 During the examination of an appliance to determine whether it complies with the requirements in 8.1 or 8.2, a part of the enclosure that may be opened or removed by the user without a tool (to attach an accessory, to make an operating adjustment, or for other reasons) is to be opened or removed.

8.8 With reference to the requirements in 8.1 and 8.2, insulated brush caps are not required to be additionally enclosed.

8.9 In an appliance, an opening as described in 8.10 that will not permit the entrance of a 1-in (25.4-mm) diameter rod is acceptable if a probe as illustrated in Figure 8.5, when inserted through the opening with a force of 5 lb (22.24 N) and any force less than 5 lb, cannot be made to:

- a) Touch any uninsulated live part or film-coated wiring; or
- b) Deform or relocate any dead metal part so as to:
 - 1) Permit the probe or dead metal part to touch an uninsulated live part or film-coated wiring; or
 - 2) Reduce electrical spacings below the minimum acceptable value.

Figure 8.5
Knife probe



8.10 The requirement in 8.9 applies to an opening in:

- a) The interior surfaces of the compacting compartment and door or door assembly that are accessible when the loading door is open; and
- b) The following exterior surface with decorative parts in place:
 - 1) For an under counter and a recessed appliance, the front and those portions of the sides accessible from the front when the appliance is installed in a simulated cabinet enclosure with a 3/8-in (9.5-mm) clearance between each side and the simulated enclosure.

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2) For any other appliance, the back, sides, and front.

Exception: The front of a rear-mounted control panel need not comply.

9 Overload-Protective Devices

9.1 An overcurrent- or thermal-protective device acceptable for the application shall be provided as part of an appliance.

9.2 A protective device, the intended functioning of which requires replacement or resetting, shall be in a readily accessible location.

Exception No. 1: This requirement does not apply to an appliance that complies with all applicable requirements in this standard with the protective device, such as a supplementary fuse, shunted out of the circuit.

Exception No. 2: This requirement does not apply to a protective device that is located where the user would not typically know of the device because of its location and reference to the device is not included in the operating instructions for the appliance.

9.3 A protective device shall be inaccessible from outside the appliance without opening a door or cover, and resetting shall not require exposure of normally protected or enclosed live parts.

Exception: The operating handle of a circuit breaker, the operating button of a manually operable motor protector, and similar parts may project outside the enclosure.

9.4 A door or cover of an enclosure shall be hinged or attached in an equivalent manner if it gives access to any overload protective device, the intended functioning of which requires renewal, or if it is necessary to open the cover in connection with the normal operation of the protective device.

9.5 Means shall be provided for holding a door or cover over a fuseholder closed, and the door or cover shall fit tightly.

10 Mechanical Assembly

10.1 An appliance shall be assembled so that it will not be adversely affected by the vibration of normal operation. Brush caps shall be tightly threaded or otherwise intended to prevent loosening.

10.2 A switch, a lampholder, a motor-attachment plug, and similar components shall be mounted securely, and shall be prevented from turning or shifting. See 10.3.

Exception No. 1: The requirement that a switch be prevented from turning may be waived if all four of the following conditions are met:

- a) The switch is a plunger or other type that does not tend to rotate when operated – a toggle switch is considered to be subject to forces that tend to rotate the switch during intended operation of the switch;*
- b) The means of mounting the switch makes it unlikely that operation of the switch will loosen it;*
- c) Spacings are not reduced below the minimum acceptable values if the switch does rotate; and*