



UL 1480A

STANDARD FOR SAFETY

Speakers for Commercial and Professional Use

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UL Standard for Safety for Speakers for Commercial and Professional Use, UL 1480A

First Edition, Dated February 3, 2016

Summary of Topics

This is the First Edition of the Standard for Safety for Speakers for Commercial and Professional Use, UL 1480A, that covers speakers intended only for commercial and professional use.

The new requirements are substantially in accordance with Proposal(s) on this subject dated October 9, 2015.

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FEBRUARY 3, 2016

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ANSI/UL 1480A-2016

UL 1480A

Standard for Speakers for Commercial and Professional Use

Prior to this first edition, the requirements for the products covered by this standard were included in the Standard for Speakers for Fire Alarm, Emergency, and Commercial and Professional Use, UL 1480.

First Edition

February 3, 2016

This ANSI/UL Standard for Safety consists of the First Edition.

The most recent designation of ANSI/UL 1480A as an American National Standard (ANSI) occurred on February 3, 2016. ANSI approval for a standard does not include the Cover Page, Transmittal Pages and Title Page.

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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INTRODUCTION

1 Scope

1.1 These requirements cover speakers for indoor and/or outdoor use in dry, damp, wet, or underwater locations and are intended for one or more of the following:

- a) Commercial and professional audio systems providing non-emergency sound reinforcement and reproduction in accordance with the National Electrical Code, NFPA 70 (this includes equipment for institutional, industrial use);
- b) Non-fire emergency voice-warning systems in accordance with NFPA 70; examples of non-fire emergency-warning systems include, but are not limited to:
 - 1) Critical process monitoring (nuclear plant, oil refinery, hazardous chemical processing);
 - 2) Distress alert systems (help for handicapped, for life safety, for rape, for robbery);
 - 3) Crowd control in public places (sporting arena, theater, shopping mall, transportation center); and
 - 4) Non-fire emergency voice-systems covered by the Life Safety Code, NFPA 101.
- c) Underwater speakers in accordance with Article 680 of NFPA 70. An underwater speaker is not to be used in a fire alarm system or as an emergency (non-fire) voice-warning system.

1.2 These requirements do not cover the following:

- a) Speakers intended for use in hazardous locations as defined in the National Electrical Code, NFPA 70; this includes speakers tested with the requirements in the Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment For Use In Hazardous (Classified) Locations, UL 1203;
- b) Speakers intended for personal or private consumer use; this includes speakers for household/domestic use covered by the requirements in the Standard for Audio-Video Products and Accessories, UL 1492 and the Standard for Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use, UL 6500;
- c) Speakers which are intended for commercial or professional audio applications and which employ integral active electronics; these products are covered in the Standard for Commercial Audio Equipment, UL 813; the Standard for Professional Video and Audio Equipment, UL 1419; and the commercial audio amplifier applications covered in UL 6500; and
- d) Speakers intended for security applications; these products are covered in the Standard for Local Burglar Alarm Units and Systems, UL 609; and the Standard for Household Burglar-Alarm System Units, UL 1023.

1.3 Speakers intended for use with fire alarm systems are covered by Standard for Speakers for Fire Alarm and Signaling Systems, Including Accessories, UL 1480. Speakers with integral amplifiers must comply with the requirements in UL 1480 and the Standard for Amplifiers for Fire Protective Signaling Systems, UL 1711.

1.4 Speakers intended for use with emergency and non-emergency systems and having integral amplifiers must comply with this standard in addition to the requirements in the Standard for General-Purpose Signaling Devices and Systems, UL 2017.

1.5 Speakers intended for use in air-handling spaces in accordance with Installation of Air Conditioning and Ventilating Systems, NFPA 90A, shall comply with the requirements in this standard and the requirements in the Standard for Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces, UL 2043.

2 General

2.1 Components

2.1.1 Except as indicated in 2.1.2, 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.

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

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

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

2.1.4 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.

2.2 Units of measurement

2.2.1 Unless otherwise indicated, all voltage and current values mentioned in this standard are rms.

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

2.3 Undated references

2.3.1 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.

3 Glossary

3.1 For the purpose of this standard, the following definitions apply.

3.2 AUDIO CIRCUITS (HIGH-VOLTAGE) – Commercial or professional speakers for connection in accordance with Article 640 of the National Electrical Code, ANSI/NFPA 70, that are used for music or voice communication and are rated more than 120 volts.

3.3 AUDIO CIRCUITS (LOW-VOLTAGE) – Commercial or professional speakers for connection in accordance with Article 640 of the National Electrical Code, ANSI/NFPA 70, that are used for music or voice communication and are rated 120 volts or less.

3.4 BI-AMPLIFIED SYSTEMS – Systems that employ two or more speakers that are cross-overed before the amplifier with separate amplifiers powering the low and high frequency transducers.

3.5 CHEESECLOTH INDICATORS – Cheesecloth used for tests shall be untreated cotton cloth running 14 – 15 square yards per pound (26 – 28 square meters per kilogram) and having what is known in the trade as a "count of 32 by 28".

3.6 CRITICAL COMPONENT – With regard to the risk of fire and electric shock, a critical component is a part that:

- a) Encloses a high-voltage part(s);
- b) Is capable of coming into contact with a source of ignition;
- c) Supports a live part; or
- d) Is capable of coming into contact with a live part.

3.7 DISTRIBUTED AUDIO SYSTEMS – Distributed audio systems, also referred to as constant voltage systems, provide a constant voltage from the amplifier to the speaker and usually have long wire runs between the amplifier and the speakers. Typical distributed audio voltages are 25, 70, or 100 volts.

3.8 ELECTRICAL CIRCUIT (HIGH-VOLTAGE) – A circuit other than audio involving a potential of not more than 300 volts and having circuit characteristics in excess of those of a low-voltage circuit.

3.9 ELECTRICAL CIRCUIT (LIVE PART) – A conductive part of a circuit carrying (or having the potential to carry) voltage, power, or current of sufficient magnitude to present a risk of fire or electric shock.

3.10 ELECTRICAL CIRCUIT (LOW-VOLTAGE) – A circuit other than audio involving a potential of not more than 30 volts alternating-current (AC) rms, 42.4 volts direct-current (DC) or AC peak.

3.11 FIELD-WIRING LEADS – Leads to which electrical connections are made in the field.

3.12 FIELD-WIRING TERMINALS – Terminals to which electrical connections are made in the field.

3.13 INSTALLATION LOCATIONS:

a) Dry – A location with a controlled ambient that is not subject to dampness or wetness.

b) Damp – A location protected from sun, rain, and water, but subject to moisture (such as basements, barns, cold-storage warehouses, greenhouses, indoor swimming facilities, and similar locations); may also include partially protected locations under canopies, marquees, roofed open porches, and similar spaces.

c) Wet – A location subject to rain and the spray of non-corrosive and non-flammable liquids that may become saturated with water or that is unprotected from the weather.

d) Underwater – A location such as a swimming pool or diving tank.

3.14 NON-DISTRIBUTED AUDIO (LOW IMPEDANCE) SYSTEMS – Non-distributed audio systems are low impedance systems with short wire runs between the amplifier and the speaker. Typical impedance for these systems are 4, 8, or 16 ohms.

3.15 PINK NOISE – Broadband noise whose energy content is inversely proportional to frequency.

3.16 PRODUCT – Any type of speaker covered by the Scope of these requirements.

3.17 RISK OF ELECTRIC SHOCK – A risk of electric shock is considered to exist within a circuit unless that circuit meets one of the following criteria:

a) The circuit is supplied by an isolating source, such that the maximum open-circuit voltage potential available to the circuit is 30 V AC rms, 42.4 V DC, or 42.4 V peak or less;

b) The circuit is supplied by an isolating source such that the current available through a 1500-ohm resistor connected across any potential in the circuit (including to ground) is 5 milliamperes or less; or

c) The circuit is supplied by a low-voltage source such as the audio circuit described in 3.3.

3.18 RISK OF FIRE – A risk of fire is considered to exist within a circuit that meets both of the following criteria:

a) The circuit is supplied by a power source such that the maximum open-circuit voltage potential available to the circuit is 30V AC or 42.4 V peak or more and

b) The power available to the circuit is 15 watts or greater.

3.19 SPEAKER ASSEMBLY – Includes one or more speaker transducers, a mounting frame or enclosure, a means for field connection, and any electrical components.

3.20 SPEAKER TRANSDUCER – The component within in a speaker assembly which converts the electrical signal into an acoustical signal.

3.21 TISSUE PAPER – Used as a flame indicator. Undyed, lightweight tissue paper weighing between 12 and 30 g/m².

3.22 UNDERWATER SPEAKERS:

a) Dry-niche – A dry-niche underwater speaker as covered by these requirements is one intended to be permanently mounted and sealed in the wall of the swimming pool or diving tank. It is equipped with provisions for conduit connection, and is designed to be serviced from the rear in a passageway or tunnel behind the wall of the pool or tank.

b) No-niche – A no-niche underwater speaker as covered by these requirements is intended to be securely held or suspended within the pool or diving tank. It is to be provided with a flexible cord of a sufficient length to permit the underwater speaker to be removed and lifted to the deck of the pool or tank for servicing.

c) Wet-niche – A wet-niche underwater speaker as covered by these requirements is one intended for installation in or on the wall of a swimming pool or diving tank where the underwater speaker will be surrounded by water. The underwater speaker is supplied by a flexible cord of sufficient length to permit the underwater speaker to be removed from the niche and lifted to the deck of the pool or tank for servicing.

3.23 VANDAL-RESISTANT – A speaker enclosure constructed so that the sounder cannot be compromised. See 6.2.6.

4 Instructions and Drawings

4.1 Each product shall be provided with installation instructions and drawings that shall include the following information:

a) Typical representative installation wiring diagram for the product indicating recommended wiring methods. The recommended methods shall be in accordance with the applicable section of the National Electrical Code, ANSI/NFPA 70, as applicable. The wiring method and compartment shall be such as not to interfere with the operation of the speaker.

b) Identification of replacement parts (such as fuses) by a part number, manufacturer's model number, ratings, or the equivalent if intended to be replaced.

4.2 The instructions are not prohibited from being incorporated on a visible interior or exterior surface of the product, on a separate sheet, or as part of a manual. When not included directly on the product, the instructions or manual shall be referenced in the marking information on the product, which shall include an issue date, number, or the equivalent.

CONSTRUCTION

ASSEMBLY

5 General

5.1 The construction of a speaker shall comply with the construction requirements contained in Sections 5 – 20 unless, where permitted by test, the construction is determined to be equivalent. A means of determining construction equivalence shall comply with the requirements in Recommended Loudspeaker Safety Practices, CEA-CEB19.

5.2 Unless specifically indicated otherwise, the construction requirements specified for a product also apply to any remote accessories with which it is to be employed.

5.3 If provision is made for testing the operability of a product, the means provided shall not involve a risk of electric shock or injury to persons.

5.4 A test means shall be constructed and located so as to reduce the risk of tampering by unauthorized personnel.

6 Enclosures

6.1 General

6.1.1 The frame and enclosure of a product shall have the strength and rigidity to resist total or partial collapse with attendant reduction of spacings, loosening or displacement of parts, and development of other conditions that could impair operation of the product and result in a risk of fire, electric shock, or injury to persons.

6.1.2 Uninsulated high-voltage electrical parts or hazardous moving parts of a product shall be located or enclosed to provide protection from unintentional contact by persons.

6.1.3 The mounting means of an enclosure shall be accessible without disassembly of any operating part of the product. Removal of a completely assembled panel to mount the enclosure is not considered to be disassembly of an operating part.

6.1.4 An attachment point provided for mounting of the speaker system shall be of sufficient strength for mounting as outlined in the installation instructions. See the mounting/handle securement test in Mechanical Strength Tests, Section 24.

6.1.5 An enclosure intended for outdoor use, or for use in wet locations, shall be provided with external means for mounting.

Exception: Internal means for mounting are not prohibited from being used when constructed to prevent water from entering the enclosure.

6.1.6 When knockouts or unthreaded holes are provided for use with conduit, there shall be provision for drainage of the enclosure when the hole is located above the lowest terminal lug or live part within the enclosure, unless:

a) The installation instructions specify the use of watertight cable, conduit, or EMT fittings for installation in outdoor or wet locations and

b) The unused knockouts and/or unthreaded holes are sealed to resist the entrance of water.

6.1.7 A gasket used as an environmental seal shall consist of material that is suitable for its application (see Gasket Testing, Section 32). A gasket that will be disturbed during routine servicing as described in the installation instructions shall be cemented, pinned, or otherwise secured to one of the contacting surfaces.

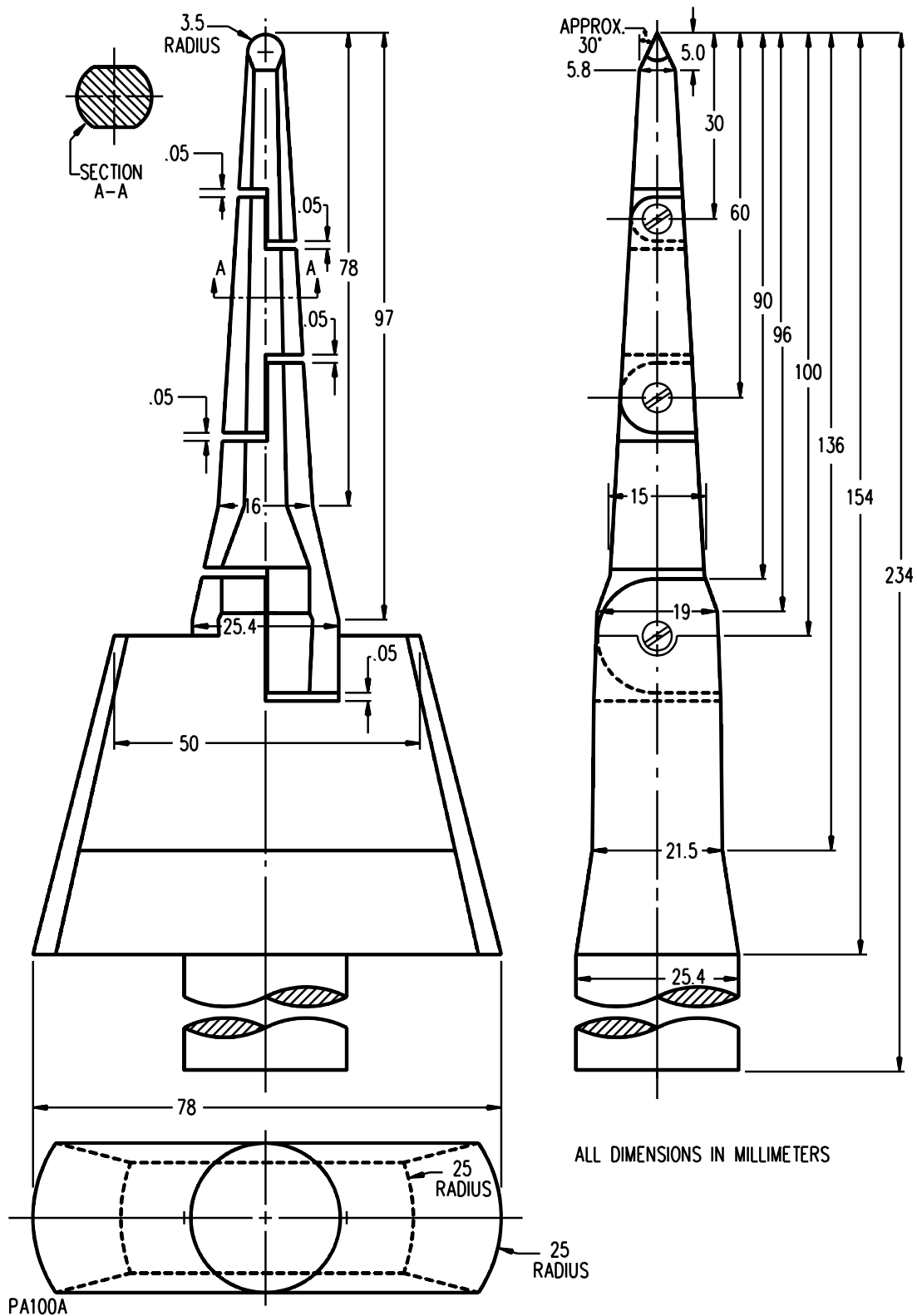
6.1.8 An underwater speaker shall be mounted in a metal forming shell. The shell shall have a metal screen or grill that is electrically bonded to the forming shell by a positive locking device that requires a tool for removal.

6.2 Openings

6.2.1 Openings in enclosures intended for outdoor use, or for use in damp or wet environments, are only permitted when the internal components are protected from the accumulation of moisture that may degrade the integrity or protection of the enclosure.

6.2.2 An opening in the top of the enclosure shall be constructed and sized to reduce the risk of entry of a foreign object and contact by persons with uninsulated high-voltage live or moving parts. An opening directly over an uninsulated live part shall be less than 0.187 inches (4.75 mm) in any dimension unless the configuration of the opening prevents direct entry to uninsulated high-voltage live parts. To determine accessibility of parts, the probe illustrated in Figure 6.1 shall be used. See Figure 6.2 for examples of acceptable top cover openings.

Figure 6.1
Articulate probe with web stop

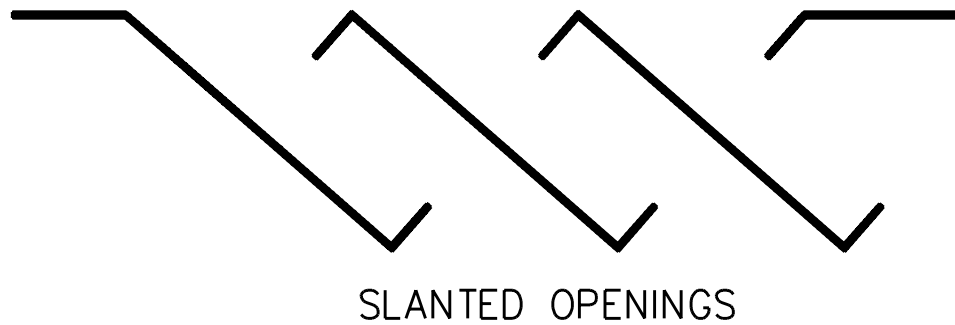


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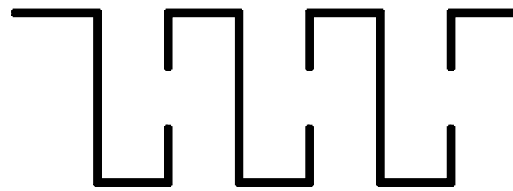


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Figure 6.2
Cross-sections of top cover openings



EC500



VERTICAL OPENINGS

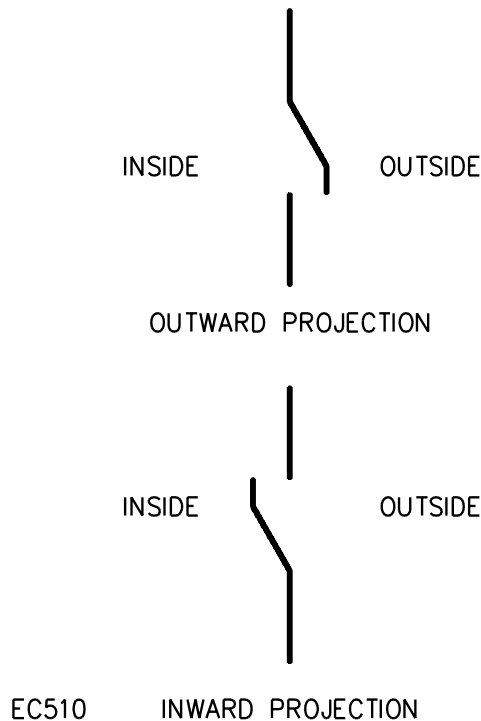
6.2.3 An opening in the side of the enclosure shall be located and sized to reduce the risk of entry of a foreign object and contact by persons with internal parts. A louver is not prohibited from being used when shaped to deflect external falling objects outward. See Figure 6.3 for examples of acceptable louver constructions.

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Figure 6.3
Cross-sections of side louvers



6.2.4 An opening in the enclosure of a fire or emergency warning speaker shall prevent access to a relay, terminal, control, or related component that is capable of affecting the performance or safety of the product.

6.2.5 A speaker assembly intended for mounting through a wall surface into a concealed space of a building structure such as a hollow space in the wall shall have no openings that vent into the concealed space when the product is mounted as intended. The speaker assembly is permitted to be mounted in an enclosure to prevent venting into the concealed space. The front panel mounting surface is required to be gasketed to insure that venting has been prevented only when the front panel mounting surface is irregular.

Exception: This requirement does not apply to the following:

- a) Openings which must be used for product mounting or for manufacturing operations (such as paint drainage or bend relief);*
- b) Openings which are effectively sealed unless used (such as knock-outs and flashed-over molded holes in plastic assemblies); and*
- c) Openings which may be used for product mounting or other purposes (such as cable entry) which do not exceed the area limitations of Table 6.1.*

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Table 6.1
Speaker assembly or enclosure openings

Maximum linear dimension of enclosure,		Area of largest surface of enclosure,		Maximum number of openings	Maximum total area of openings,	
inches	(cm)	square inches	(cm ²)		square inches	(cm ²)
7	17.8	32	206	4	1.2	7.7
18	45.7	135	870	6	1.2	7.7
40	102.0	1000	2540	6	1.5	9.7
Over 40	102.0+	Over 1000	2540+	8	2.0	12.9

6.2.6 A vandal resistant speaker shall restrict direct access to the sound producing element by a rigid rod 0.8 mm (0.031 inch) in diameter. The grill covering the acoustical opening shall withstand the force indicated in the speaker grill test, 24.4. All exterior exposed covers and grills shall be secured with tamper resistant hardware that prevents removal by common tools such as a screwdriver, pliers, or an Allen wrench.

6.3 Cast metal

6.3.1 The thickness of cast metal for an enclosure shall be at least the applicable value specified in Table 6.2.

Table 6.2
Cast-metal electrical enclosures

Use, or dimensions of area involved ^a	Minimum thickness			
	Die-cast metal,		Cast metal of other than the die-cast type,	
	inch	(mm)	inch	(mm)
Area of 24 square inches (155 cm ²) or less and having no dimension greater than 6 inches (152 mm)	1/16	1.6	1/8	3.2
Area greater than 24 square inches or having any dimension greater than 6 inches	3/32	2.4	1/8	3.2
At a threaded conduit hole	1/4	6.4	1/4	6.4
At an unthreaded conduit hole	1/8	3.2	1/8	3.2
^a The area limitation for metal 1/16 inch (1.6 mm) in thickness may be obtained by the provision of reinforcing ribs subdividing a larger area.				

6.3.2 When threads for the connection of conduit are tapped all the way through a hole in an enclosure wall, there shall be not less than 3-1/2 nor more than five threads in the metal, and the construction shall permit a standard conduit bushing to be attached as intended.

6.3.3 When threads for the connection of conduit are tapped only part of the way through a hole in an enclosure wall, there shall be not less than 3-1/2 full threads in the metal, and there shall be a smooth, rounded inlet hole that affords protection to the conductors equivalent to that provided by a standard conduit bushing.