



UL 1795

STANDARD FOR SAFETY

Hydromassage Bathtubs

UL Standard for Safety for Hydromassage Bathtubs, UL 1795

Sixth Edition, Dated February 27, 2025

Summary of Topics

This new Sixth Edition of ANSI/UL 1795 dated February 27, 2025 is being issued to reflect the ANSI approval of the standard and includes the following changes:

- Revisions for Button/Coin Cell Batteries Based on Latest Version of UL 4200A: [8.4](#);***
- Removal of the reference to UL 6059, Outline for Particular Requirements for Switches for Tools: [38.1.13](#);***
- Addition of a List of Referenced Standards: Section [3](#);***
- Updates to Annexes [A](#) and [B](#); and***
- Editorial updates throughout the standard***

The requirements are substantially in accordance with Proposal(s) on this subject dated November 22, 2024.

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FEBRUARY 27, 2025



ANSI/UL 1795-2025

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UL 1795

Standard for Hydromassage Bathtubs

First Edition – February, 1988
Second Edition – November, 1993
Third Edition – March, 1999
Fourth Edition – August, 2009
Fifth Edition – September, 2016

Sixth Edition

February 27, 2025

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

The most recent designation of ANSI/UL 1795 as an American National Standard (ANSI) occurred on February 27, 2025. 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 ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

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INTRODUCTION

1 Scope

1.1 These requirements cover indoor hydromassage bathtubs, rated 250 volts or less, for household and commercial use, for permanent connection to the plumbing of the building. They are intended for either permanent connection to the electrical supply or are factory-provided with a cord terminating in an attachment plug, and are intended for installation and use in accordance with the National Electrical Code, NFPA 70.

1.2 These requirements do not cover portable cord-connected hydromassage equipment, which is covered by the Standard for Personal Hygiene and Health Care Appliances, UL 1431, or hydrotherapy tubs, which are covered by the Standard for Medical Electrical Equipment, Part 1: General Requirements for Safety, UL 60601-1.

1.3 The majority of the requirements in this Standard address complete hydromassage bathtubs, including field-installed accessories. The following sections specify requirements for field-installed accessory heaters evaluated and certified for the hydromassage bathtub manufacturer.

- a) Hydromassage Bathtubs Configured for Field-Installed Heaters, (CONSTRUCTION) Section [26](#), and
- b) Field-Installed Heaters, Section [27](#).
- c) Test for Field-Installed Heaters, (PERFORMANCE) Section [67](#).
- d) Hydromassage Bathtubs Configured for Field-Installed Heaters, (MARKINGS) Section [73](#), and
- e) Field-Installed Heaters, Section [74](#).

2 Units of Measurement

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

2.2 Unless otherwise indicated, all voltage and current values mentioned in this Standard are root-mean-square (rms).

3 Referenced Publications

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.

3.2 The following publications are referenced in this Standard:

ANSI/APSP-16, *American National Standard for Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs*

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*

ASTM E230/E230M, *Standard Specification for Temperature-Electromotive Force (Emf) Tables for Standardized Thermocouples*

ASTM A653/A653M, *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*

ASTM B209/B209M, *Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate*

ASTM E28, *Standard Test Methods for Softening Point of Resins Derived from Pine Chemicals and Hydrocarbons, by Ring-and-Ball Apparatus*

CSA C22.2 No. 0.5, *Threaded Conduit Entries*

IEC 60127-1, *Miniature Fuses – Part 1: Definitions for Miniature Fuses and General Requirements for Miniature Fuse-Links*

IEC 60335-1, *Household and similar electrical appliances – Safety – Part 1: General requirements*

IEC 60417, *Graphical symbols for use on equipment*

IEC 60479-2, *Effects of current on human beings and livestock – Part 2: Special aspects*

IEC 60738-1, *Thermistors – Directly Heated Positive Temperature Coefficient – Part 1: Generic Specification*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and Measurement Techniques – Electrostatic Discharge Immunity Test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and Measurement Techniques – Radiated, Radio-Frequency, Electromagnetic Field Immunity Test*

IEC 61000-4-4, *Electromagnetic Compatibility (EMC) – Part 4-4: Testing and Measurement Techniques – Electrical Fast Transient/Burst Immunity Test*

IEC 61000-4-5, *Electromagnetic Compatibility (EMC) – Part 4-5: Testing and Measurement Techniques – Surge Immunity Test*

IEC 61000-4-6, *Electromagnetic Compatibility (EMC) – Part 4-6: Testing and Measurement Techniques – Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields*

IEC 61000-4-11, *Electromagnetic Compatibility (EMC) – Part 4-11: Testing and Measurement Techniques – Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests for equipment with input current up to 16 A per phase.*

IEC 61000-4-13, *Electromagnetic Compatibility (EMC) – Part 4-13: Testing and Measurement Techniques – Harmonics and Interharmonics Including Mains Signaling at a.c. Power Port, Low Frequency Immunity Tests*

IEC 61558-1, *Safety of transformers, reactors, power supply units and combinations thereof – Part 1: General requirements and tests*

NFPA 70, *National Electrical Code*

NMX-H-146-1996-SCFI, *Unified Screw Threads – Specifications*

UL 20, *General-Use Snap Switches*

UL 44, *Thermoset-Insulated Wires and Cables*

UL 62, *Flexible Cords and Cables*

UL 66, *Fixture Wire*

UL 67, *Panelboards*

UL 83, *Thermoplastic-Insulated Wires and Cables*

UL 94, *Tests for Flammability of Plastic Materials for Parts in Devices and Appliances*

UL 157, *Gaskets and Seals*

UL 248-1, *Low-Voltage Fuses – Part 1: General Requirements*

UL 248-2, *Low-Voltage Fuses – Part 2: Class C Fuses*

UL 248-3, *Low-Voltage Fuses – Part 3: Class CA and CB Fuses*

UL 248-4, *Low-Voltage Fuses – Part 4: Class CC Fuses*

UL 248-5, *Low-Voltage Fuses – Part 5: Class G Fuses*

UL 248-6, *Low-Voltage Fuses – Part 6: Class H Non-Renewable Fuses*

UL 248-7, *Low-Voltage Fuses – Part 7: Class H Renewable Fuses*

UL 248-8, *Low-Voltage Fuses – Part 8: Class J Fuses*

UL 248-9, *Low-Voltage Fuses – Part 9: Class K Fuses*

UL 248-10, *Low-Voltage Fuses – Part 10: Class L Fuses*

UL 248-11, *Low-Voltage Fuses – Part 11: Plug Fuses*

UL 248-12, *Low-Voltage Fuses – Part 12: Class R Fuses*

UL 248-15, *Low-Voltage Fuses – Part 15: Class T Fuses*

UL 310, *Electrical Quick-Connect Terminals*

UL 486A-486B, *Wire Connectors*

UL 486E, *Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors*

UL 489, *Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures*

UL 496, *Lampholders*

UL 498, *Attachment Plugs and Receptacles*

UL 508, *Industrial Control Equipment*

UL 746C, *Polymeric Materials – Use in Electrical Equipment Evaluations*

UL 746D, *Polymeric Materials – Fabricated Parts*

UL 758, *Appliance Wiring Material*

UL 796, *Printed Wiring Boards*

UL 810, *Capacitors*

UL 817, *Cord Sets and Power-Supply Cords*

UL 840, *Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment*

UL 873, *Temperature-Indicating and -Regulating Equipment*

UL 969, *Marking and Labeling Systems*

UL 1004-1, *Rotating Electrical Machines – General Requirements*

UL 1004-2, *Impedance Protected Motors*

UL 1004-3, *Thermally Protected Motors*

UL 1004-7, *Electronically Protected Motors*

UL 1030, *Sheathed Heating Elements*

UL 1059, *Terminal Blocks*

UL 1097, *Double Insulation Systems for Use in Electrical Equipment*

UL 1310, *Class 2 Power Units*

UL 1332, *Organic Coatings for Steel Enclosures for Outdoor Use Electrical Equipment*

UL 1411, *Transformer and Motor Transformers for Use in Audio-, Radio-, and Television-Type Appliances*

UL 1412, *Fusing Resistors and Temperature-Limited Resistors for Radio- and Television-Type Appliances*

UL 1431, *Personal Hygiene and Health Care Appliances*

UL 1434, *Thermistor-Type Devices*

UL 1439, *Tests for Sharpness of Edges on Equipment*

UL 1446, *Systems of Insulating Materials – General*

UL 1557, *Electrically Isolated Semiconductor Devices*

UL 1577, *Optical Isolators*

UL 1977, *Component Connectors for Use in Data, Signal, Control and Power Applications*

UL 2097, *Double Insulation Systems for Use in Electronic Equipment*

UL 2353, *Single- and Multi-Layer Insulated Winding Wire*

UL 4200A, *Products Incorporating Button Batteries of Coin Cell Batteries*

UL 4248-1, *Fuseholders – Part 1: General Requirements*

UL 4248-4, *Fuseholders – Part 4: Class CC*

UL 4248-5, *Fuseholders – Part 5: Class G*

UL 4248-6, *Fuseholders – Part 6: Class H*

UL 4248-8, *Fuseholders – Part 8: Class J*

UL 4248-9, *Fuseholders – Part 9: Class K*

UL 4248-11, *Fuseholders – Part 11: Type C (Edison Base) and Type S Plug Fuse*

UL 4248-12, *Fuseholders – Part 12: Class R*

UL 4248-15, *Fuseholders – Part 15: Class T*

UL 5085-1, *Low Voltage Transformers – Part 1: General Requirements*

UL 5085-2, *Low Voltage Transformers – Part 2: General Purpose Transformers*

UL 5085-3, *Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers*

UL 60335-1, *Household and Similar Electrical Appliances, Part 1: General Requirements*

UL 60384-14, *Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains*

UL 60601-1, *Medical Electrical Equipment, Part 1: General Requirements for Safety*

UL 60691, *Thermal-Links – Requirements and Application Guide*

UL 60730-1, *Automatic Electrical Controls – Part 1: General Requirements*

UL 60730-2-6, *Automatic Electrical Controls – Part 2-6: Particular Requirements for Automatic Electrical Pressure Sensing Controls Including Mechanical Requirements*

UL 60730-2-9, *Automatic Electrical Controls – Part 2-9: Particular Requirements for Temperature Sensing Controls*

UL 60947-1, *Low-Voltage Switchgear and Controlgear – Part 1: General Rules*

UL 60947-7-1, *Low-Voltage Switchgear and Controlgear – Part 7-1: Ancillary Equipment – Terminal Blocks for Copper Conductors*

UL 60947-7-2, *Low-Voltage Switchgear and Controlgear – Part 7-2: Ancillary Equipment – Protective Conductor Terminal Blocks for Copper Conductors*

UL 60947-7-3, *Low-Voltage Switchgear and Controlgear – Part 7-3: Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks*

UL 61058-1, *Switches for Appliances – Part 1: General Requirements*

UL 61800-5-1, *Adjustable Speed Electrical Power Drive Systems – Part 5-1: Safety Requirements – Electrical, Thermal and Energy*

4 Glossary

4.1 For the purpose of this Standard the following definitions apply.

4.2 ACCESSIBLE PART – A part located so that it can be contacted by a person, either directly or by means of a tool during user servicing, or that is not recessed the required distance behind an opening.

4.3 ACCESSIBLE TO THE OCCUPANT – Any surface or component within a 5-foot (1.52-m) reach path of the bathtub occupant.

4.4 ACCESSORY – An optional electrical component that is intended to be attached to the main equipment in the field or that may be shipped separately from the main equipment.

4.5 CLASS 2 CIRCUIT – A secondary circuit with an open circuit potential of no more than 30 volts rms (42.4 volts peak) supplied by either an inherently limited Class 2 transformer or by a transformer and fixed impedance that together comply with all performance requirements for inherently limited Class 2 transformers in UL 5085-1, and UL 5085-3.

4.6 CONFORMAL COATING – An insulating coating that conforms to the configuration of the object that is coated. The coating is used as a covering to protect against environmental conditions.

4.7 CONTROLLED ENVIRONMENT – An environment that is relatively free from conductive contaminants, such as dust and carbon particles, and that is protected against humidity and the formation of condensation. A controlled environment may be provided by a hermetically sealed enclosure, encapsulation, or a conformal coating.

4.8 DEAD METAL – A metal part not connected to electrical circuitry and not intended to conduct current. Does not include an isolated metal name plate, cabinet trim, screws, or small metal hardware fastened to a nonconductive enclosure.

4.9 DOUBLE INSULATION – An insulation system comprised of 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, or the like) to the same degree.

4.10 DRY-FIRE PROTECTION – A device or circuit that de-energizes the heater whenever water circulation through the heater is interrupted.

4.11 ENCLOSURE – That part of a unit that:

- a) Renders inaccessible any part that may present a risk of electric shock;
- b) Prevents emission of flame or molten material; or
- c) Prevents unintentional contact with internal parts that may involve a risk of injury.

Some examples are tub materials, skirting materials, service access covers, electrical boxes, and barriers.

4.12 FIELD-WIRING TERMINAL – A terminal or terminals to which the electrical supply is to be connected during installation of the unit.

4.13 HYDROMASSAGE BATHTUB – A permanently installed bathtub equipped with a recirculating piping system, a pump, and associated plumbing constructed to accept, circulate, and discharge water upon each use. Optional equipment such as control switches, timers, blowers, heaters, temperature controls, air bubblers, and luminaires may be provided. A hydromassage bathtub may be provided with an air blower and no recirculating pump.

4.14 INTERLOCK – A device, system, or circuit used to de-energize electrical components or stop moving parts that become exposed when an enclosure is opened or when a cover is removed.

4.15 ISOLATING TRANSFORMER – A transformer with one or more output windings electrically separated from the input winding and all other output windings.

4.16 LEAKAGE CURRENT COLLECTOR – Conductive metal in the circulating water system of a hydromassage bathtub that provides a path for leakage current to ground.

4.17 LIVE PART – A part at some potential with respect to another part, or to earth ground.

4.18 MAXIMUM NORMAL LOAD – A load that closely approximates the most severe conditions of normal use.

4.19 PRIMARY CIRCUIT – An input circuit that supplies energy to a product.

4.20 RISK OF ELECTRIC SHOCK – A risk of electric shock is considered to exist whenever the available current exceeds the limits specified in [Table 4.1](#) when measured as described in the Available Current Test, Section [56](#). Other current waveforms than specified in [Table 4.1](#) are considered to comply with the intent of this requirement if the maximum available current to ground does not exceed the startle current threshold and the maximum point-to-point current, when unreliable control isolation layers are removed, does not exceed the let-go current threshold as specified in IEC TS 60479-2, Effects of current on human beings and livestock – Part 2: Special aspects.

Table 4.1
Risk of Electric Shock Limits

Location	Limit, milliamperes, 50 or 60 Hz AC	Limit, milliamperes, pure DC ^b
Current circulating in the water from two points immersed in the water	0.5	2.0
Bathtub water and ground	0.5	2.0
Any point accessible to the bathtub occupant and ground	0.5	2.0

Table 4.1 Continued on Next Page

Table 4.1 Continued

Location	Limit, milliamperes, 50 or 60 Hz AC	Limit, milliamperes, pure DC ^b
Any point on the bathtub control and ground ^a	0.5	2.0
Any two points on the bathtub control, or between two controls ^a	5.0	30.0
NOTE: The 0.5 and 2.0 mA limits specified correspond to the startle current threshold. The 5.0 and 30 mA limits specified correspond to the let-go current threshold.		
^a The outer layer of a membrane switch shall not be relied upon for mitigation of the risk of electric shock.		
^b DC current is considered to be pure dc only if it is confirmed through test that the peak-to-peak value of ripple in the current is not more than 10 % of the dc current.		

4.21 **RISK OF FIRE** – A risk of fire is considered to exist if the available power at any point exceeds Class 2 levels as defined in [4.5](#).

4.22 **SAFETY CRITICAL FUNCTION** – Control, protection and monitoring functions which are being relied upon to reduce the risk of fire, electric shock or casualty hazards.

4.23 **SECONDARY CIRCUIT** – A circuit derived from the secondary of an isolating transformer.

4.24 **TRIP-FREE TEMPERATURE-LIMITING CONTROL** – A control device constructed so that, regardless of the position of the actuating handle, button, or lever, the contacts cannot be held in the closed position when the water has attained a temperature hotter than specified.

4.25 **UNIT** – A term meaning a hydromassage bathtub.

4.26 **USER SERVICING** – Any form of servicing that may be performed by anyone other than qualified service personnel.

5 Accessories

5.1 An accessory for optional use shall comply with the applicable requirements of this Standard and shall be constructed such that it can be used without alteration of wiring, enclosure, or other features of the main equipment depended upon to reduce the risk of fire, electric shock, or injury to persons. If the main equipment has provisions for electrical or mechanical connections to field applied accessories, such accessories shall be investigated with the main equipment and accompanied by installation instructions. An accessory that is made available or recommended by the manufacturer shall be investigated with the unit.

5.2 Each accessory connector shall be marked to indicate that the accessory is to be connected as specified in [71.13](#).

CONSTRUCTION

6 General

6.1 A unit shall be formed and assembled so that it will have the strength and rigidity necessary to resist the abuses to which it is likely to be subjected without introducing 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.

6.2 A hydromassage bathtub is not prohibited from:

- a) Being provided as a completely enclosed unit;
- b) Having only one finished side for built-in installations; or
- c) Being without finished sides for custom installations.

6.3 A completely enclosed unit shall provide access for splice inspection and routine maintenance after final installation. A unit intended for built-in or custom installation shall include instructions that detail the access for splice inspection and routine maintenance after final installation. See [79.5](#).

7 Component Specifications

7.1 General

7.1.1 Except as indicated in [7.1.2](#), a component of a product covered by this Standard shall comply with the requirements for that component as indicated in this Section.

7.1.2 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; or
- c) Is separately investigated when forming part of another component, provided the component is used within its established ratings and limitations.

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

7.1.4 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.

7.1.5 Components shall be suitable for the intended use and installation environment. This suitability shall assume the following installation parameters.

- a) Pollution Degree III installations.

Exception: Components installed so they reside entirely in the user (bathroom) side of the tub installation.

- b) Overvoltage Category II as specified in UL 840.

7.1.6 Components not anticipated by the requirements of this Standard, not specifically covered by a component standard of Component Specifications, Section [7](#), and which pose a potential risk of electric shock, fire or casualty hazard shall be additionally investigated. Reference to other product standards is appropriate where those standards anticipate normal and abnormal use conditions consistent with the application of this Standard.

7.2 Quick-connect wire connectors

7.2.1 Quick-connect type wire connectors shall be suitable for the wire size, type (solid or stranded), conductor material (copper or aluminum) and the number of conductors terminated. If insulated, they shall

be rated for the voltage and temperature of the intended use. They shall be applied per the installation instructions of the wire connector manufacturer.

7.2.2 Quick-connect type wire connectors shall comply with UL 310.

7.3 Terminal blocks

7.3.1 Terminal blocks shall comply with:

- a) UL 1059;
- b) UL 60947-7-1;
- c) UL 60947-7-2; or
- d) UL 60947-7-3.

7.3.2 The UL 60947-7-x standards are used in conjunction with UL 60947-1.

7.3.3 Terminal blocks shall be suitable for the number of conductors per termination, wire size, type (solid or stranded), conductor material (copper or aluminum), voltage and current of the intended use.

7.4 Wire connectors

7.4.1 Wire connectors shall be suitable for the wire size, type (solid or stranded), conductor material (copper or aluminum) and the number of conductors terminated. If insulated they shall be suitable for the voltage and current of the intended use. They shall be applied per the installation instructions of the wire connector manufacturer.

7.4.2 Wire connectors shall comply with UL 486A-486B or UL 486E.

8 Frame and Enclosure

8.1 General

8.1.1 An enclosure shall be provided to house all parts that may cause a risk of fire, electric shock, or injury to persons under any condition of operation.

8.1.2 The enclosure shall reduce the risk of molten metal, burning insulation, or flaming particles falling on combustible materials, including the surface upon which the unit is supported.

8.1.3 An enclosure containing an electrical component, other than a motor having a sealed housing, shall have provision for drainage if there is a knockout or unthreaded opening in the enclosure or if there is a risk of condensation accumulating.

8.1.4 The material of a part, such as an enclosure, a frame, or a guard, the breakage of which may result in a risk of injury to persons, shall have such properties as to meet the demand of expected loading conditions.

8.1.5 The requirement in [8.1.4](#) applies to those portions of a part adjacent to moving parts considered to involve a risk of injury to persons.

8.1.6 An enclosure shall be judged with respect to its size, shape, and thickness, considering the intended use. Sheet steel shall be not less than 0.026 inch (0.66 mm) thick if uncoated or 0.029 inch (0.74 mm) thick if galvanized. Nonferrous sheet metal shall be not less than 0.036 inch (0.91 mm) thick.

Exception: Any relatively small area or surface that is curved or otherwise reinforced may be thinner than specified if the construction results in equivalent strength and rigidity.

8.1.7 For unreinforced, flat surfaces in general, cast metal shall be no less than 1/8 inch (3.2 mm) thick, malleable iron shall be not less than 3/32 inch (2.4 mm) thick, and die-cast metal shall be not less than 5/64 inch (2.0 mm) thick.

Exception: Corresponding thicknesses of not less than 3/32, 1/16 (1.6 mm), and 3/64 inch (1.2 mm), respectively, are not prohibited from being used when the surface under consideration is curved, ribbed, or otherwise reinforced, or when the shape or size of the surface, or both, is such that the required physical strength is provided.

8.1.8 Among the factors taken into consideration when investigating a material used as an enclosure are its:

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

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

8.1.9 All electrical parts shall be located or enclosed so as to reduce the risk of unintentional contact with any uninsulated live part or internal wiring.

8.1.10 Live parts shall be located at least 1-1/2 inches (38.1 mm) above the intended mounting surface.

8.1.11 Polymeric materials shall comply with the applicable requirements in UL 746C.

Exception: A polymeric tub material of a hydromassage bathtub within which each electrical component is provided with a suitable electrical enclosure, as specified in Frame and Enclosure, Section [8](#), and Internal Wiring, Section [15](#), are not required to comply with the requirements in UL 746C.

8.1.12 The polymeric materials specified in [8.1.11](#), when molded or fabricated by a source other than the manufacturer, shall be identified according to the UL 746D.

8.2 Barriers

8.2.1 An opening in the bottom of the enclosure is not acceptable if the opening is located directly below field- or factory-made splices or overload or overcurrent protective devices.

8.2.2 A barrier of material that is resistant to combustion shall be provided:

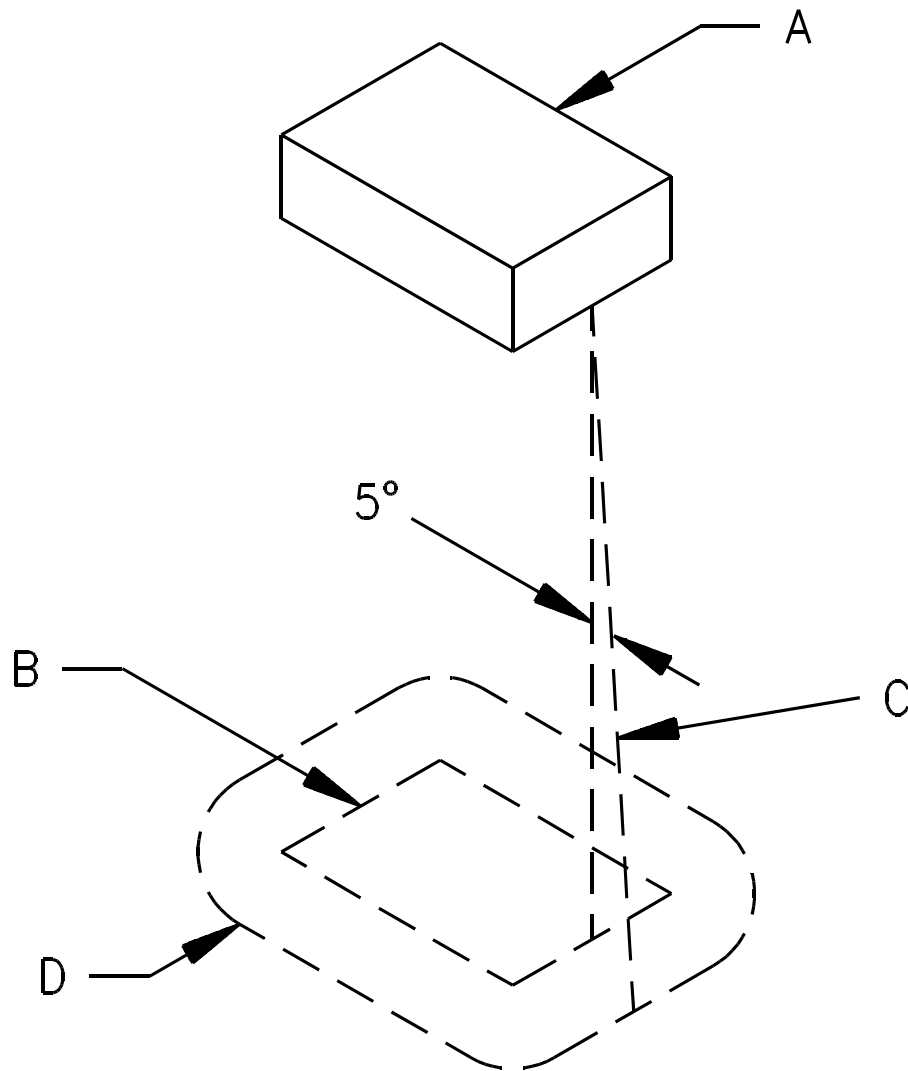
a) Under a motor unless:

- 1) The structural parts of the motor or of the overall unit provide the equivalent of such a barrier; or
- 2) The protection provided with the motor is such that no burning insulation or molten material falls to the surface that supports the unit when the motor is energized under each of the following four fault conditions, applied separately:
 - i) Main winding opened;
 - ii) Starting winding opened;
 - iii) Starting switch short circuited; and
 - iv) For a permanent split-capacitor motor, the capacitor short circuited (the short circuit is to be applied before the motor is energized, and the rotor is to be locked); or
- 3) The motor is provided with a thermal motor protector (a protective device that is sensitive to both temperature and current) that will prevent the temperature of the motor windings from becoming more than 125 °C (257 °F) under the maximum load under which the motor will run without causing the protector to cycle, and from becoming more than 150 °C (302 °F) with the rotor of the motor locked.

b) Under wiring unless it is of the flame retardant type. Neoprene- or thermoplastic-insulated wires are considered to be of this type.

8.2.3 The barrier specified in [8.2.2](#) shall be horizontal, located as indicated in [Figure 8.1](#), and shall have an area no less than that described in [Figure 8.1](#). Openings for drainage or ventilation may be provided in the barrier, provided that such openings will not permit molten metal or burning insulation to fall on combustible material.

Figure 8.1
Location and Extent of Barrier



EB120A

A – Region to be shielded by barrier. This shall consist of the entire component if it is not otherwise shielded, and shall 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) Oriented so that the area traced out on a horizontal plane is a 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.

8.2.4 A switch, transformer, relay, or solenoid is to be individually and completely enclosed other than at terminals, unless it can be shown that malfunction of the component will not result in a risk of fire, or unless there are no openings in the bottom of the enclosure.

8.2.5 The barrier specified in [8.2.2](#), if plastic, shall have a minimum rating of 5VA in accordance with UL 94.

8.3 Moving parts

8.3.1 The rotor of a motor, a pulley, a belt, a gear, or other moving part that could cause injury to persons shall be enclosed or guarded to reduce the likelihood of unintentional contact.

8.4 Button Batteries or Coin Cell Batteries

8.4.1 The battery compartment of an appliance or any accessory, such as a wireless control, incorporating one or more button batteries or coin cell batteries shall comply with UL 4200A, if the appliance or any accessory:

- a) Is intended for use with one or more single cell batteries having a diameter of 32 mm (1.25 inches) maximum with a diameter greater than its height; and
- b) The appliance is intended for consumer use.

9 Mechanical Assembly

9.1 General

9.1.1 A unit shall be assembled so that it will not be adversely affected by vibration. Motor brush caps shall be constructed so as not to loosen.

9.1.2 A unit shall be provided with an integral mounting means for the pump or air blower and shall be shipped from the factory with the pump or air blower mounted and plumbed in place.

Exception No. 1: The pump may be shipped with the bathtub but not secured or plumbed in place if the pump is provided:

- a) With provision to be plumbed to the bathtub with threaded unions and the pump and bathtub are factory assembled with all appropriate fittings; and*
- b) In the same shipping container as the bathtub.*

Exception No. 2: The bathtub is not required to be provided with a pump mounting platform if the pump is provided with an integral mounting base that can be secured with the use of screws.

Exception No. 3: The pump may be shipped separately from the bathtub if:

- a) The pump is provided with provision to be plumbed to the bathtub with threaded unions and the pump and bathtub are factory assembled with all appropriate fittings; and*
- b) The bathtub is marked with the following or the equivalent, "Pump shipped separately. Complete unit includes pump(s) ____, Model ____." The blanks shall be filled in with the name of the manufacturer and model number for the pump(s).*

Exception No. 4: Air blowers intended for field installation and that are part of optional kits may be mounted remote from the bathtub.

9.2 Adhesive used to secure parts

9.2.1 An adhesive that is relied upon to reduce a risk of fire, electric shock, or injury to persons shall comply with the requirements for adhesives in UL 746C.

9.2.2 The requirement in [9.2.1](#) applies to an adhesive used to secure a conductive part, including a nameplate, 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 values described in Spacings, Section [22](#);
- d) Short circuit live parts; or
- e) Bridge live parts to ground, to dead metal, or to a Class 2 or safety circuit.

9.2.3 All electrical components shall be mounted securely and shall be prevented from turning.

Exception No. 1: An electric switch is not required to be prevented from turning when:

- a) The switch is of 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 turn the switch during intended operation of the switch);*
- b) The means of mounting the switch make it unlikely that operation of the switch will loosen it;*
- c) Electrical spacings are not reduced below the minimum required values if the switch rotates;*
- d) Strain is not transmitted to internal wiring; and*
- e) Intended operation of the switch is to be by mechanical means rather than by direct contact by persons.*

Exception No. 2: A lampholder with a nonreplaceable lamp need not be prevented from turning if:

- a) Rotation cannot reduce electrical spacings below the minimum required values;*
- b) Strain is not transmitted to internal wiring; and*
- c) The rotation does not affect the integrity of a watertight enclosure.*

9.2.4 An uninsulated live part shall be secured to its base or mounting surface so that it will be prevented from turning or shifting in position if such motion may result in a reduction of spacings below the minimum required values.

9.2.5 Friction between surfaces shall not be used as the sole means to prevent shifting or turning of live parts or shifting or turning of a device having a single-hole mounting means. A lock washer installed as intended may be used.

9.2.6 A unit is not prohibited from being shipped from the factory unassembled, or disassembled to the degree necessary to facilitate shipment, when:

- a) All of the parts are furnished by the manufacturer;
- b) Adequate electrical continuity is provided between the field-assembled components;

- c) The equipment is constructed so that the field assembly can be accomplished without drilling, cutting, threading, or any other alteration other than the attachment of field-installed electrical conduit or raceway;
- d) Detailed, step-by-step installation instructions are provided with the unit; and
- e) All safety features are factory installed.

10 Accessibility of Uninsulated Live Parts, Film-Coated Wire, and Moving Parts

10.1 To reduce the risk of unintentional contact that may involve a risk of:

- a) Electric shock from an uninsulated live part or film-coated wire; or
- b) Injury to persons from a moving part, an opening in an enclosure shall comply with either (1) or (2).
 - 1) For an opening that has a minor dimension as described in [10.5](#) of less than 1 inch (25.4 mm), an uninsulated live part, a moving part, or film-coated wire shall not be contacted by the probe illustrated in [Figure 10.1](#).
 - 2) For an opening that has a minor dimension as described in [10.5](#) of 1 inch or more, an uninsulated part, a moving part, or film-coated wire shall be spaced from the opening as specified in [Table 10.1](#).

Exception: An opening in a motor is not required to comply with these requirements when it complies with the requirements in [10.2](#).

Figure 10.1
Accessibility Probe

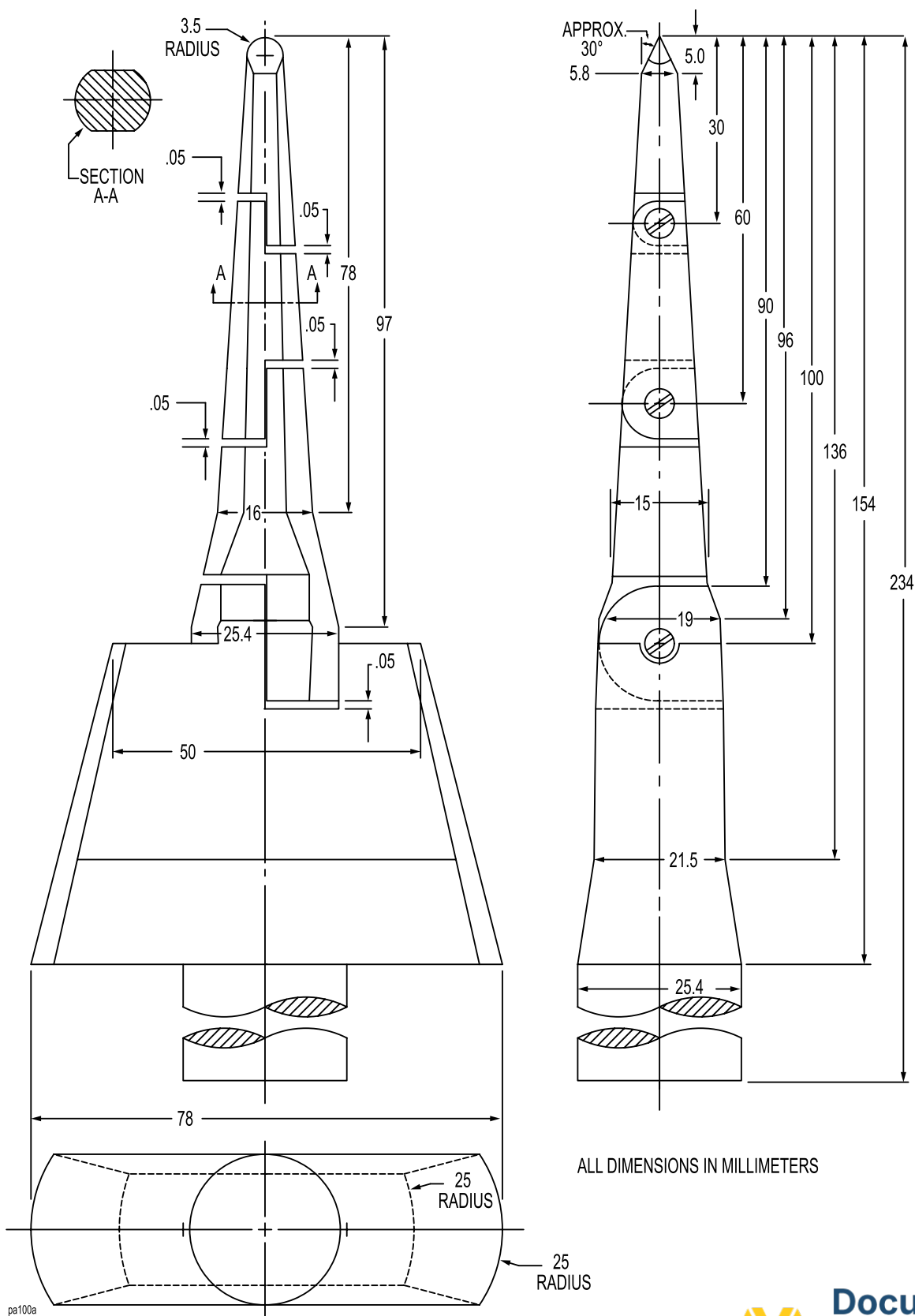


Table 10.1
Minimum Distance From an Opening to a Part That May Involve a Risk of Electric Shock or Injury to Persons

Minor dimension ^a of opening		Minimum distance from opening to part	
inches ^b	(mm) ^b	inches ^b	(mm) ^b
3/4 ^c	(19.1)	4-1/2	(114.0)
1 ^c	(25.4)	6-1/2	(165.0)
1-1/4	(31.8)	7-1/2	(191.0)
1-1/2	(38.1)	12-1/2	(318.0)
1-7/8	(47.6)	15-1/2	(394.0)
2-1/8	(54.0)	17-1/2	(445.0)
d	(d)	30	(762.0)

^a See [10.5](#) for a description of the minor dimension of an opening.

^b Between 3/4 inch and 2-1/8 inches, interpolation is to be used to determine a value between values specified in the table.

^c Any dimension less than 1 inch applies to a motor only.

^d More than 2-1/8 inches, but not more than 6 inches (152 mm).

10.2 With regard to a moving part or film-coated wire within the enclosure of a motor as specified in the Exception to [10.1](#):

a) An opening that has a minor dimension, as described in [10.5](#), of less than 3/4 inch (19.1 mm) is not prohibited when:

- 1) In an indirectly accessible motor, an uninsulated live part or a moving part cannot be contacted by the probe illustrated in [Figure 10.2](#);
- 2) Film-coated wire cannot be contacted by the probe illustrated in [Figure 10.3](#); and
- 3) In a directly accessible motor, an uninsulated live part or a moving part cannot be contacted by the probe illustrated in [Figure 10.4](#).

b) An opening that has a minor dimension of 3/4 inch or more is acceptable if an uninsulated live part, a moving part, or film-coated wire is spaced from the opening as specified in [Table 10.1](#).

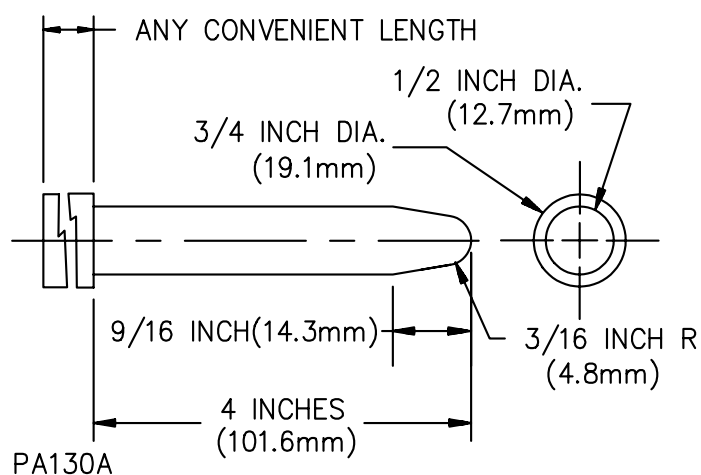
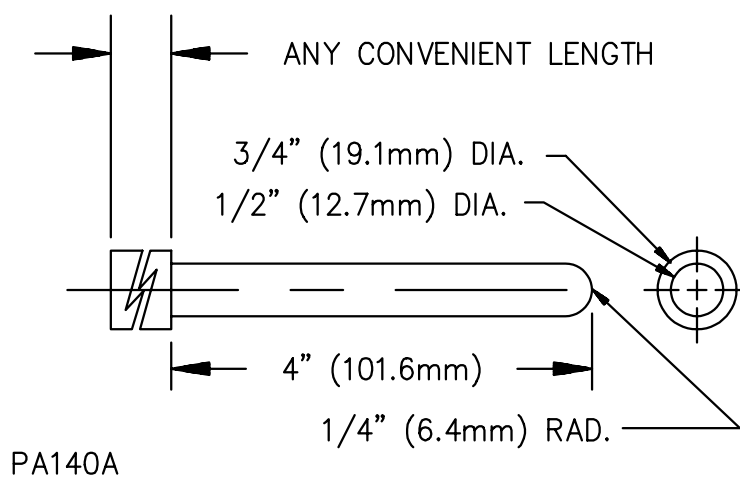
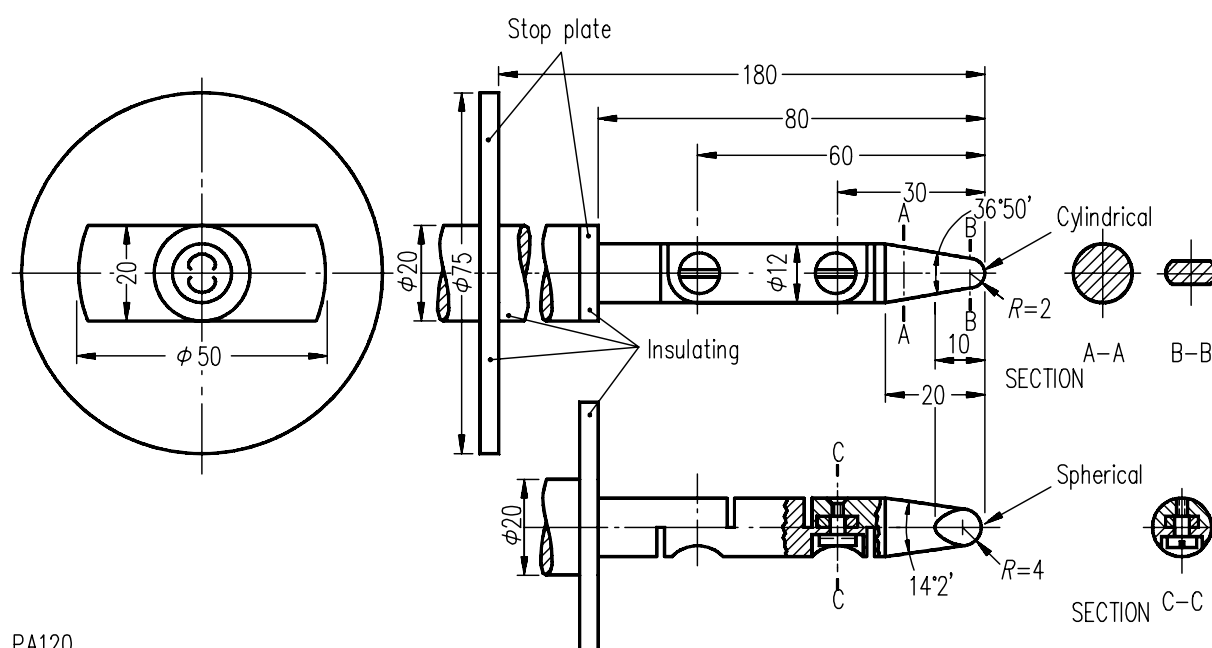
Figure 10.2**Probe for Moving Parts and Uninsulated Live Parts****Figure 10.3****Probe for Film-Coated Wire**

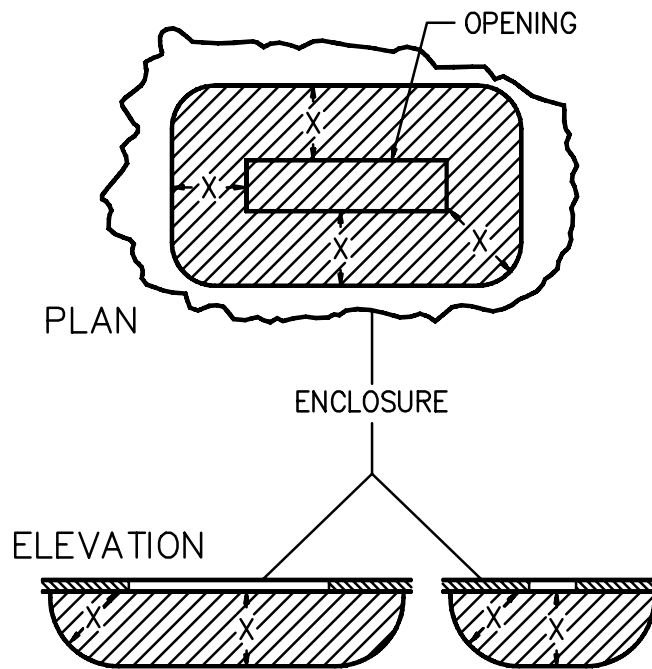
Figure 10.4
Articulate Probe



Inches:	5/64	5/32	25/64	15/32	25/32	1-5/64	1-61/64	2-23/64	2-61/64	3-9/64	7-3/32
(mm):	(2)	(4)	(10)	(12)	(20)	(30)	(50)	(60)	(75)	(80)	(180)

10.3 The probes specified in [10.1](#) and [10.2](#) and illustrated in [Figure 10.1](#) – [Figure 10.4](#) shall be applied to any depth that the opening illustrated in [Figure 10.5](#) 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 [Figure 10.1](#) and [Figure 10.4](#) shall be applied in any possible configuration; and, if necessary, the configuration shall be changed after insertion through the opening.

Figure 10.5
Opening in Enclosure



SB0610

10.4 The probes illustrated in [Figure 10.1](#) – [Figure 10.4](#) 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.

10.5 With reference to the requirements in [10.1](#) and [10.2](#), 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.

10.6 During the examination of a unit to determine whether it complies with the requirements in [10.1](#) or [10.2](#), 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.

10.7 A directly accessible motor is a motor that may be contacted without opening or removing any part and that is located so as to be accessible to contact. An indirectly accessible motor is a motor that is accessible only by opening or removing a part of the outer enclosure, such as a panel or service door that can be removed without the use of tools, or a motor that is located in such a position or is otherwise guarded or enclosed so that it is unlikely to be contacted.

11 Provisions for Servicing

11.1 A hydromassage bathtub shall incorporate means for servicing internal components after installation as specified in [6.3](#).

11.2 An enclosure door or cover intended to give the user access to a fuseholder, a switch, or a circuit breaker shall be hinged, captive to the enclosure, and provided with a closing device. The door or cover shall be constructed such that no live part is accessible when the door is closed.

12 Resistance to Corrosion

12.1 An iron or steel part shall be made resistant to corrosion by enameling, galvanizing, plating, or other equivalent means when the corrosion of such a part is capable of resulting in a risk of fire, electric shock, or injury to persons.

Exception: Bearings, laminations, or minor parts of iron or steel, such as washers and screws, are not required to be corrosion resistant.

12.2 Aluminum, stainless steel, and copper or copper alloy with zinc content not in excess of 15 % may be used without additional resistance to corrosion.

12.3 When, during use, aluminum comes into contact with water in the unit, it shall be an alloy of the 5000 series as given in ASTM B209/B209M. Cast aluminum shall be one of the alloys shown in [Table 12.1](#) or shall be an alloy that has been found to have equivalent resistance to corrosion.

Table 12.1
Aluminum Alloys

Sand-cast	Permanent-mold cast	Die cast	Machined bar and rod stock
G4A	GM70B	G8A	5052
G10A	GS42A	S5C	5056
GM70B	S5A	S12A	5456
GS42A	S5B	S12B	6061
S5A	SG70A	SG100A	6063
S5B	SG70B	GS100B	
SG70A			
ZG61B			

12.4 Metals shall not be used in combinations to cause galvanic action.

12.5 A sheet steel enclosure and other parts of a unit, including hinges and other attachments, shall be made resistant to corrosion as specified in [12.1](#).

12.6 An enclosure that is entirely within the outer enclosure of a unit and that contains any live part other than a motor shall be made resistant to corrosion as described in [12.7\(c\)\(1\)](#) and [12.7\(c\)\(2\)](#) with or without the added epoxy, paint coating, or other means described in [12.7](#) and [12.8](#).

12.7 Sheet steel shall be made resistant to corrosion by one of the following:

a) Hot-dipped, mill-galvanized sheet steel designated G90 in ASTM A653/A653M.

b) A zinc coating, other than that provided on hot-dipped, mill-galvanized sheet steel, uniformly applied to an average thickness of not less than 0.00061 inch (0.015 mm) on each side, with a minimum thickness of 0.00054 inch (0.014 mm). The thickness of the coating shall be determined by the Metallic Coating Thickness Test, Section [64](#). An annealed coating shall also comply with [12.8](#).