UL 1795

STANDARD FOR SAFETY

Hydromassage Bathtubs

UL Standard for Safety for Hydromassage Bathtubs, UL 1795

Fifth Edition, Dated September 2, 2016

Summary of Topics

This revision of UL 1795 is being issued to revise control requirements.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated October 20, 2017.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

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UL 1795

Standard for Hydromassage Bathtubs

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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 https://csds.ul.com.

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INTRODUCTION

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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 Undated References

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.

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 the Standard for Low Voltage Transformers – Part 1: General Requirements, UL 5085-1, and the Standard for Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers, 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
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 percent 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 the Standard for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment, 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 the Standard for Electrical Quick-Connect Terminals, UL 310.

7.3 Terminal blocks

7.3.1 Terminal blocks shall comply with:

a) The Standard for Terminal Blocks, UL 1059;

b) The Standard for Low-Voltage Switchgear and Controlgear – Part 7-1: Ancillary Equipment – Terminal Blocks for Copper Conductors, UL 60947-7-1;

c) The Standard for Low-Voltage Switchgear and Controlgear – Part 7-2: Ancillary Equipment – Protective Conductor Terminal Blocks for Copper Conductors, UL 60947-7-2; or

d) The Standard for Low-Voltage Switchgear and Controlgear – Part 7-3: Ancillary Equipment – Safety Requirements for Fuse Terminal Blocks, UL 60947-7-3.

7.3.2 The UL 60947-7-x standards are used in conjunction with the Standard for Low-Voltage Switchgear and Controlgear – Part 1: General Rules, 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 the Standard for Wire Connectors, UL 486A-486B, or the Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors, UL 486E.

7.5 Button or coin cell batteries of lithium technologies

Deleted August 25, 2017

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

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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 the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, 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 Standard for Polymeric Materials – Fabricated Parts, 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

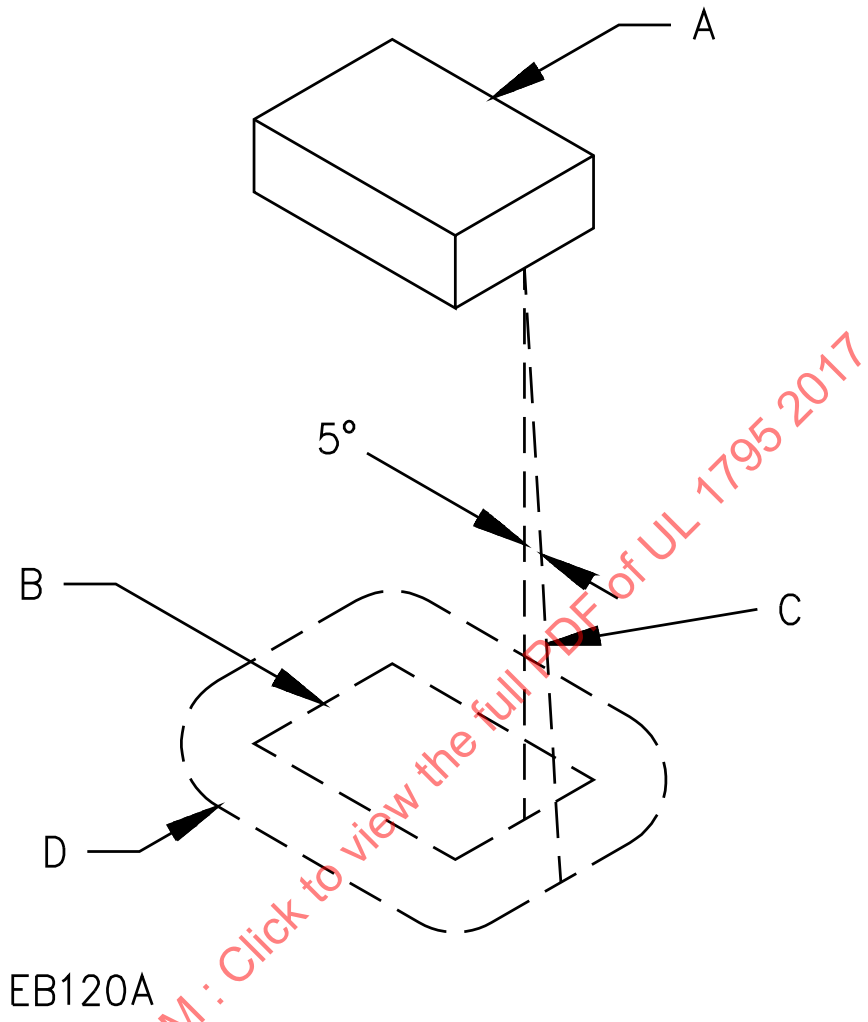
iv) For a permanent split-capacitor motor, the capacitor short circuited (the short circuit is to be applied before the motor is energized, and the rotor is to be locked); or

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



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 the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, 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 or coin cell batteries of lithium technologies

8.4.1 The battery compartment of an appliance or any accessory, such as a wireless control, incorporating one or more coin cell batteries of lithium technologies shall comply with the Standard for Products Incorporating Button or Coin Cell Batteries of Lithium Technologies, 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 in) maximum with a diameter greater than its height; and

b) The appliance is intended for household 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).