UL 1563

STANDARD FOR SAFETY

Electric Spas, Equipment Assemblies, and Associated Equipment

UL Standard for Safety for Electric Spas, Equipment Assemblies, and Associated Equipment, UL 1563

Seventh Edition, Dated January 13, 2025

Summary of Topics

This new Seventh edition of ANSI/UL 1563 dated January 13, 2025 incorporates editorial changes including renumbering and reformatting to align with current style, as well as the following changes in requirements:

– Proposed Requirements to Align with ANSI/APSP/ICC-6 2013 (R2023); 1.1, 4.42 – 4.44, 7.3, 8.5, 40.10, 41, 76.16 – 76.18, 77.3.1

– Proposed Requirements for Cold Tubs and Ice Baths; 4.41, 4.7, 4.27, 4.28, 8.6, Section 39, 40.11, 53.11, 53.12, 54.1(d), Figure 74.1, Figure 75.1, 76.9, 76.11, Figure 76.1, 77.3.1(g)

– Removal of the Reference to UL 6059, Outline for Particular Requirements for Switches for Tools; 33.4

– Revisions for Button/Coin Cell Batteries Based on Latest Version of UL 4200A; 40.9

– Updates to Section 4, and Revisions of Some Referenced Publications; 3.2, 4.15, 14.4, 16.1.6, 30.1.5, 37.5.2, 38.3, 40.4.1, 40.7.2, Annex B note

The new requirements are substantially in accordance with Proposal(s) on this subject dated July 5, 2024 and December 6, 2024.

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UL 1563

Standard for Electric Spas, Equipment Assemblies, and Associated Equipment

First Edition – October, 1981
Second Edition – May, 1986
Third Edition – November, 1992
Fourth Edition – July, 1996
Fifth Edition – March, 2004
Sixth Edition – July, 2009

Seventh Edition

January 13, 2025

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

The most recent designation of ANSI/UL 1563 as an American National Standard (ANSI) occurred on January 13, 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 ULSE's Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements apply to self-contained spas. They also apply to field-installed equipment assemblies, blowers, and controls for use with field-installed hot tubs, swimming pools, non-self-contained spas, and exercise spas. These products are for household or commercial use, indoors, outdoors, or both. All equipment is intended for installation and use in accordance with Article 680 of the National Electrical Code, NFPA 70.

1.2 These requirements do not apply to products covered by the following UL Standards:

a) Underwater Luminaires and Submersible Junction Boxes, UL 676;

b) Swimming Pool Pumps, Filters, and Chlorinators, UL 1081;

c) Electric Water Heaters for Pools and Tubs, UL 1261;

d) Personal Hygiene and Health Care Appliances, UL 1431 (professional hydrotherapy equipment – whirlpool bathtubs); and

e) Hydromassage Bathtubs, UL 1795.

2 Units of Measurement

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

2.2 Unless indicated otherwise, 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:

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

APSP/ICC-6 2013, *Standard for Residential Portable Spas and Swim Spas*

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

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

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

ASTM A653/653M, *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*

ASTM A90/A90M, *Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings*

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, *Standard for 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 61000-4-11, *Standard for 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 61000-4-13:2002+AMD1:2009+AMD2:2015)*

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 60417, *Graphical symbols for use on equipment*

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

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 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 244A, *Solid-State Controls for Appliances*

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

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UL 353, *Limit Controls*

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UL 467, *Grounding and Bonding Equipment*

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 514C, *Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers*

UL 676, *Underwater Luminaires and Submersible Junction Boxes*

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

UL 746D, *Polymeric Materials – Fabricated Parts*

UL 758, *Appliance Wiring Material*

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UL 810, *Capacitors*

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UL 1030, *Sheathed Heating Elements*

UL 1059, *Terminal Blocks*

UL 1081, *Swimming Pool Pumps, Filters, and Chlorinators*

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

UL 1241, *Junction Boxes for Swimming Pool Luminaires*

UL 1261, *Electric Water Heaters for Pools and Tubs*

UL 1310, *Class 2 Power Units*

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

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

UL 1431, *Personal Hygiene and Health Care Appliance*

UL 1434, *Thermistor-Type Devices*

UL 1446, *Systems of Insulating Materials – General*

UL 1449, *Surge Protective Devices*

UL 1557, *Electrically Isolated Semiconductor Devices*

UL 1577, *Optical Isolators*

UL 1795, *Hydromassage Bathtubs*

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

UL 1998, *Software in Programmable Components*

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

UL 2111, *Overheating Protection for Motors*

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

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

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UL 60065, *Audio, Video and Similar Electronic Apparatus – Safety Requirements*

UL 60335-1, *Safety of 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 60691, *Thermal-Links – Requirements and Application Guide*

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

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UL 60730-2-9, *Automatic Electrical Controls for Household and Similar Use; Part 2-9: Particular Requirements for Temperature Sensing Controls*

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.

4.3 ACCESSIBLE TO THE OCCUPANT – Any surface or component within 5 feet (1.52 m) of the tub water, measured by any convenient method such as a measuring tape or a 5-foot flexible wire, cord, or string. The distance shall be measured with the service door closed and shall be the shortest path without piercing a permanent barrier such as the tub or skirt of a spa or the service door.

4.4 ACTUATION – Movement of the actuating member of the control by the user, by hand, by foot, or by any other human activity.

4.5 BONDING TERMINAL – A pressure wire connector secured to the enclosure in which the power supply conductors are terminated, for the connection of a bonding conductor.

4.6 CLASS 2 CIRCUIT – A secondary circuit with an open circuit potential of not more than 30 volts rms (42.4 volts peak) supplied by a Class 2 transformer, or by a transformer and fixed impedance that together comply with all performance requirements for Class 2 transformers in UL 5085-1 and UL 5085-3.

4.7 COLD TUB/COLD SPA/ICE BATH – A spa that provides for cold water only, or for cooled and heated water. May have high flow water jets and pump(s) or may have low flow water recirculation/filtration only. When used in the body of the standard, COLD TUB is used to represent COLD SPA, or ICE BATH.

4.8 COMMON BONDING GRID – A common bonding grid may be a copper grounding loop, metal reinforcing rods in a concrete or tile supporting pad, or a network of other local groundable metal that local inspection authorities evaluate to be in compliance with Section 680-26(B) of NFPA 70.

4.9 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.

4.10 CONTROL, AUTOMATIC ACTION – A device in which the transmission and operation of at least one function is produced by initiation which is not the result of manual actuation.

4.11 CONTROL, AUXILIARY – A device that provides a functional utility but is not relied on as an operational or protective control. The failure of an auxiliary control generally does not cause the operation of a protective control. An example of an auxiliary is one that controls the "on/off" state of spa lighting.

4.12 CONTROL, MANUAL – A device that requires direct human interaction to activate or test the control.

4.13 CONTROL, OPERATING – A device that starts or regulates the operation of an appliance during normal operation. The failure of an operational control generally causes the operation of a protective control. An example of an operating control is a temperature regulating control – a control that maintains the temperature of the spa water to a user-determined level.

4.14 CONTROL, PROTECTIVE – A device, the operation of which is intended to reduce the risk of electric shock, fire, or injury to persons during normal or abnormal operation of the appliance. During the evaluation of the protective control / circuit, the protective functions are verified under normal and single-fault conditions of the control.

4.15 CONTROL, TYPE 2 ACTION – The actuation of an automatic control (see 4.10) for which the manufacturing deviation and the drift of its operating value, operating time, or operating sequence have been declared and tested under UL 60730-1.

4.16 CONTROL, TYPE 2.D.H ACTION – This action is applicable to manual controls (see 4.12). The automatic action (i.e. tripping of the control) is independent of the manipulation or position of the manual reset/adjustment mechanism. The manipulation of the manual adjustment means will not allow for the reverse operation (resetting of a "tripped" control), even momentarily, while the excess or fault condition persists. This action is also referred to as trip-free action. The action of the control is such that the reverse operation (resetting) is possible if the manual reset mechanism is held in the reset position – i.e. the control will function as an automatic control if the reset button is held in the reset position. The control shall not reset automatically at any temperature above -35 °C (-31 °F) with the reset mechanism in the normal position.

4.17 CONTROL, TYPE 2.D.J ACTION – This action is applicable to manual controls (see 4.12). The automatic action (i.e. tripping of the control) is independent of the manipulation or position of the manual reset/adjustment mechanism. The manipulation of the manual adjustment means will not allow for the reverse operation (resetting of the control), even momentarily, while the excess or fault condition persists. This action is also referred to as trip-free action.

4.18 CONTROLLED ENVIRONMENT – An environment that is relatively free from conductive contaminants, such as dust and carbon particles, and that is protected against humidity and condensation.

A controlled environment may be provided by a hermetically sealed enclosure, encapsulation, or a conformal coating.

4.19 CONVERTIBLE UNIT – A spa or equipment assembly that is shipped from the factory with a power supply cord and that is intended for optional field conversion to a permanently-wired configuration.

4.20 DISCONNECTING MEANS – A suitably rated switch or circuit breaker that opens all ungrounded circuit conductors and that is readily accessible to the user of the unit.

4.21 DRY-FIRE – Fire resulting from dry operation of heating element intended to be continuously immersed.

4.22 ENCLOSURE – That part of a unit that renders inaccessible any part that may present a risk of electric shock, prevents emission of flame or molten material, or prevents unintentional contact with internal parts that may involve a risk of injury. Some examples are tub materials, skirting materials, electrical boxes, and barriers.

4.23 EQUIPMENT ASSEMBLY – A factory-assembled grouping of electrical components used to provide heating, filtering, aeration, or both filtering and aeration of water circulated in a field-supplied tub. An assembly can be either permanently connected or cord-and-plug connected.

4.24 GROUNDING TERMINAL – A designated pressure wire connector located within the field wiring compartment to terminate the equipment grounding conductor of the supply circuit.

4.25 HEATING ELEMENT – An unbroken length of resistance material used to electrically generate heat.

4.26 HOT TUB – See SPA, 4.41.

4.27 HYPERTHERMIA – A condition that occurs when the body absorbs or generates more heat than it can release, which may cause abnormally high body temperature. Hyperthermia can occur when the body temperature rises above 104 °F (40 °C).

4.28 HYPOTHERMIA – A condition that occurs when the body loses heat faster than it can produce, which may cause abnormally low body temperature. Hypothermia can occur when the body temperature falls below 95 °F (35 °C).

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

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

4.31 LEAKAGE CURRENT COLLECTOR – Metal in the water-circulating system intended to provide a low-impedance path for leakage currents to ground.

4.32 OPEN MOTOR – A motor having ventilating openings that permit passage of external cooling air over and around the windings of the motor.

4.33 OPERATING TEMPERATURE VALUE – Value of temperature at which the temperature sensing control operates on a rise or fall of the temperature.

4.34 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 47. 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.

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
Spa water and ground	0.5	2.0
Any point accessible to the spa occupant and ground	0.5	2.0
Any point on the spa control and ground[a]	0.5	2.0
Any two points on the spa 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.		

4.35 RISK OF FIRE – A risk of fire is considered to exist when the power limitations of a Class 2 circuit as defined in UL 5085-3, are exceeded.

4.36 SAFETY CIRCUIT – A circuit that is relied upon to reduce the risk of fire, electric shock, unintentional contact with moving parts, or other casualty hazard (such as hyperthermia). Examples include, but are not limited to:

a) An interlock circuit used to prevent the risk of electric shock and/or injury to persons;

b) A circuit which limits current to accessible parts;

c) A circuit which limits the wattage to a limited-energy circuit;

d) A temperature-limiting control;

e) A temperature-regulating control; and

f) A dry-fire control.

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

4.38 SECONDARY CIRCUIT – A circuit supplied from an output winding of an isolating transformer.

4.39 SELF-CONTAINED SPA – A portable spa in which all control, water-heating, and water-circulating equipment is an integral part of the product. Self-contained spas may be permanently wired or cord connected. See Figure 4.1 for an example of a self-contained spa.

4.40 SKIMMER – A suction opening intended to remove floating debris from the water surface and to be installed where part of the water intake opening is open to atmospheric pressure.

4.41 SPA – A product intended for the immersion of persons in heated water or cooled water or both, circulated in a closed system, and not intended to be drained and filled with each use. A spa usually includes a filter, a heater (electric, solar, electric heat pump, or gas) and/or chiller (i.e. electric heat pump or cooler), a pump or pumps, and a control, and may also include other equipment such as lights, blowers, and water sanitizing equipment.

4.42 SPA, EXERCISE (ALSO KNOWN AS A SWIM SPA) – Variant of a Portable Spa in which the design and construction includes specific features and equipment to produce a water flow intended to allow physical activity including, but not limited to, swimming in place. Exercise spas may include peripheral jetted seats intended for water therapy, heater, circulation and filtration system, or may be a separate distinct portion of a combination spa/exercise spa and may have separate controls. These aquatic vessels are of a design and size such that it has an unobstructed volume of water large enough to allow the 99th Percentile Man, as specified in the latest published revision of APSP-16, to swim or exercise in place.[a]

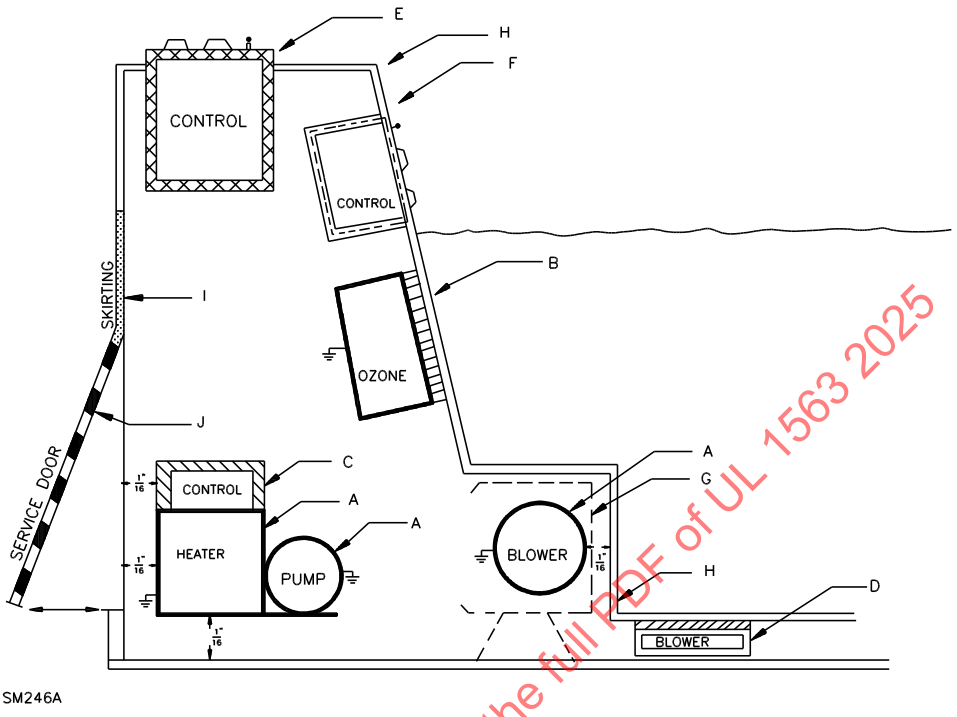
[a] APSP/ICC-6 2013 (R2023), portions of APSP/ICC-6 2013 (R2023) reproduced with permission from PHTA (Pool Hot Tub Alliance).

4.43 SPA, NON-SELF-CONTAINED – A spa in which the water heating and circulating equipment is not an integral part of the product. Non-self-contained spas may employ separate components such as an individual filter, pump, heater, and controls, or they may employ assembled combinations of various components that are to be installed in accordance with manufacturer's specifications.

4.44 SPA, SELF-CONTAINED – A portable spa in which all control, water-heating, and water-circulating equipment is an integral part of the product. Self-contained spas may be permanently wired or cord connected. See Figure 4.1 for an example of a self-contained spa.

Figure 4.1

Example of Self-Contained Spa



A – Grounded metal with spacings to material accessible to the occupant (see 13.4).

B – Grounded metal with insulation in lieu of spacings to material accessible to the occupant (see 13.4).

C – Nonmetallic enclosure of live parts[a] with spacings to material accessible to the occupant (see 9.3.3 and 13.5).

D – Nonmetallic enclosure of live parts[a] with insulation in lieu of spacings to material accessible to the occupant (see 9.3.3 and 13.5).

E – Nonmetallic enclosure of live parts[a] accessible to the occupant (see 9.3.3 and 13.6).

F – Nonmetallic enclosure of live parts[b] accessible to the occupant (see 9.3.3 and 13.7).

G – Alcove/shroud used to support components (see 9.3.6).

H – Tub material (see 9.3.5).

I – Skirting (see 9.3.1, 9.3.2, and 9.3.5).

J – Service door (see 9.1.5, 9.3.1, 9.3.2, and 9.3.5).

[a] Live parts that present a risk of electric shock (see 4.34).

[b] Live parts that do not present a risk of electric shock.

4.45 TEMPERATURE SETTING BY THE USER – Any selection of an operating temperature value by actuation performed by the user.

4.46 TOTALLY ENCLOSED MOTOR – A motor that is enclosed to prevent the free exchange of air between the inside and outside of the enclosure but not necessarily sufficiently enclosed to be airtight.

4.47 UNIT – A collective term used to designate all products covered by this Standard; such as a self-contained spa, equipment assembly, blower, and control.

5 Accessories

5.1 An accessory intended for field installation shall comply with the applicable requirements in this Standard and shall be constructed so that it can be installed and used without the need for altering wiring, enclosure, or other features of the basic unit that are relied upon to reduce the risk of fire, electric shock, or injury to persons.

6 Safety Critical Functions

6.1 Any function involved in the control, protection, and monitoring of safety-related attributes of a pump whereby a loss/malfunction of its functionality would represent an unacceptable risk of fire, electric shock, or casualty hazards would be considered a Safety Critical Function.

6.2 Electronic circuits that manage a Safety Critical Function shall be:

a) Reliable as defined as being able to maintain the Safety Critical Function in the event of single defined component faults and

b) Not susceptible to electromagnetic environmental stresses encountered in the anticipated environments of the appliance.

6.3 Electronic circuits managing Safety Critical Functions shall comply with:

a) Annex B; or

b) UL 60730-1 and it's Part 2's as specified in this Standard. The function shall be considered Class B. When utilizing UL 60730-1, surge protective devices are defeated for the EMC immunity testing unless they are provided with spark gaps (gas tube surge suppressors); or

c) The requirements in Annex C for circuits providing the Safety Critical heater functions relating to the risk of hyperthermia, scalding and loss of water flow (dry-fire protection).

6.4 Functions specified in Table 6.1 represent the common safety critical circuit functions of spas. It is not intended to represent all possible Safety Critical Functions.

Table 6.1
Safety Critical Functions

Function[a]	Hazard	Location of parameters and tests
Motor running overload protection	Risk of fire or electric shock	Clause 30.2
Motor locked rotor protection	Risk of fire or electric shock	Clause 30.2
Motor short circuit protection	Risk of fire or electric shock	Clause 30.2

Table 6.1 Continued on Next Page

Table 6.1 Continued

Function[a]	Hazard	Location of parameters and tests
Temperature regulating control	Hyperthermia	Section 37
Temperature limiting control	Scalding	Section 38
Water-Flow Controls (dry-fire protection)	Risk of fire, electric shock, or scalding	Clause 40.4

[a] Functions specified in the table represent the common safety critical circuit functions of spas. It is not intended to represent all possible safety critical functions. Any function involved in the control, protection, and monitoring of safety-related attributes of a product whereby a loss/malfunction of its functionality would represent an unacceptable risk of fire, electric shock, or casualty hazards would be considered a Safety Critical Function.

CONSTRUCTION

7 General

7.1 A unit shall be evaluated for both indoor and outdoor use unless marked "For Indoor Use Only" or "For Outdoor Use Only."

7.2 A unit that uses a gas heater shall be marked "For Outdoor Use Only" unless an investigation shows that the unit vents heat and exhaust in a manner that complies with the applicable building code.

7.3 Shape: This Standard is not intended to regulate the shape of the spa or swim spa. It is the designer's responsibility to take into account the effect a given shape will have on the safety of the occupants and that the minimum required level of circulation (See 40.10.2) will be maintained to ensure sanitation.

8 Component Specifications

8.1 General

8.1.1 Except as indicated in 8.1.2, a component of a product covered by this Standard shall comply with the requirements for that component as indicated in this Section.

8.1.2 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.

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

8.1.4 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.

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

a) Outdoor, Pollution Degree III installations.

b) Overvoltage Category II as specified in UL 840.

8.1.6 Components not anticipated by the requirements of this Standard, not specifically covered by a component standard of Component Specifications, Section 8, 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.

8.2 Quick-connect wire connectors

8.2.1 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.

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

8.3 Terminal blocks

8.3.1 Terminal blocks shall comply with:

a) UL 1059, or

b) UL 60947-7-1, or

c) UL 60947-7-2, or

d) UL 60947-7-3.

8.3.2 The UL 60947-7-x Standards are used in conjunction with UL 60947-1.

8.3.3 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.

8.4 Wire connectors

8.4.1 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.

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

8.5 Heaters

8.5.1 Heaters shall comply to the latest published editions of ANSI-Z21.56 for natural gas application, or UL 1261. Heat pumps shall comply with the latest published edition of UL 1995 or UL 60335-2-40, as it pertains to heat pumps and be evaluated for the application and listed by a laboratory that has been accredited to the latest published edition of the ISO 17025/IEC 17025 standard.

8.6 Heat pump

8.6.1 A heat pump or water chiller for providing cooled water (may also provide heated water), shall comply with UL 60335-2-40 4th edition, or UL 1995 5th edition.

8.6.2 A heat pump using refrigerant to cool the spa water, shall have double wall piping to reduce risk of spa water entering into refrigerant, and of refrigerant entering into spa water, or shall comply with Section 22, Construction, of UL 60335-2-40, or Clause 26.11 of Section 26, Switches and Controllers, of UL 1995.

8.6.3 Any controls that are part of a heat pump, that are intended for installation where accessible to the occupant of the Cold Spa, shall comply with Section 47, Available Current Test.

8.6.4 A heat pump or chiller that relies on a water flow sensing device to reduce the risk of fire, shall comply with the applicable requirements in 40.4.

8.6.5 A heat pump or chiller that uses flammable or Low Global Warming Potential (GWP) refrigerants is not covered by these requirements.

9 Frame and Enclosure

9.1 General

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

9.1.2 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 increasing the risk of fire, electric shock, or injury to persons due to total or partial collapse with resulting reduction of spacings, loosening or displacement of parts, or other serious defects.

9.1.3 Unless marked "For Indoor Use Only," a unit shall be subjected to the simulated rain test described in 57.4.1. A switch, circuit breaker, fuseholder, or similar device and any opening associated with an operating handle shall be shielded from rain.

9.1.4 The shielding specified in 9.1.3 shall be formed of material intended for use as an enclosure, as described in 9.2.1 – 9.3.1, and shall not be detachable from the enclosure without the use of tools.

9.1.5 A service door in a spa shall be held in the closed position by a positive means, such as:

a) A hinged door that is held closed by a magnetic or mechanical latch;

b) A sliding type door; or

c) A non-hinged or non-sliding door that is held in place by a magnetic or mechanical latch or screws complying with 10.6. Also see 42.8.

Exception: This requirement does not apply to a service door providing access only to nonelectrical equipment or to controls that comply with the requirement in 13.6 or 13.8.

9.2 Metal enclosures

9.2.1 The outer enclosure of a unit intended for outdoor use, if of sheet metal, shall not be less than 0.032 inch (0.81 mm) thick if uncoated steel, not less than 0.034 inch (0.86 mm) thick if galvanized steel, and not less than 0.045 inch (1.14 mm) thick if nonferrous. The enclosure shall also comply with Resistance to Corrosion, Section 14.

9.2.2 An enclosure of sheet metal, other than that covered in 9.2.1, shall be evaluated with regard to its size, shape, and thickness, considering the intended use of the complete unit. Sheet steel shall have a

thickness of not less than 0.026 inch (0.66 mm) if uncoated when measured, or 0.029 inch (0.74 mm) if galvanized. Nonferrous sheet metal shall have a thickness of not less than 0.036 inch (0.91 mm).

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.

9.2.3 Cast metal portions of an enclosure shall be no thinner than indicated in Table 9.1.

Table 9.1
Minimum Thicknesses of Enclosure Metal

Metal	At small, flat unreinforced surfaces and at surfaces that are reinforced by curving, ribbing, or the like (or are otherwise of a shape or size or both) to provide physical strength,		At relatively large unreinforced flat surfaces,	
	inch	(mm)	inch	(mm)
Die-cast	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)

9.3 Nonmetallic enclosures

9.3.1 Among the factors taken into consideration when evaluating the acceptability of a nonmetallic material, other than a polymeric material, when used to enclose grounded metal or live parts are:

a) Mechanical strength;

b) Resistance to impact;

c) Moisture absorptive properties;

d) Combustibility; and

e) Resistance to distortion at temperatures to which the material may be subjected under conditions of normal or abnormal use.

9.3.2 Wooden skirting material used as a barrier to grounded metal shall be minimum 1/4 inch (6.4 mm) thick.

Exception: Wood that is less than 1/4 inch thick may be used as a barrier to grounded metal if the material complies with the impact test described in 59.1. The test may also be used whenever referee tests for the integrity of a material are necessary.

9.3.3 A polymeric material used as the enclosure of live parts, or as a barrier in lieu of spacings shall comply with the applicable requirements in UL 746C, based on the application and, if intended to be exposed to sunlight, it shall also be investigated for resistance to the ultraviolet light exposure requirements as specified in UL 746C, except flammability after conditioning is not considered.

9.3.4 The polymeric housing of a component is not considered to be an appliance enclosure unless this part is the sole insulation (excluding air) between a live part and an external surface of the appliance.

9.3.5 A polymeric material used as a barrier to grounded metal (such as the tub and skirting material) shall: