



**Summary of Substantive Changes
between the updates dated March 27, 2015 and October 20, 2017 of
UL 1563 “Electric Spas, Equipment Assemblies, and Associated Equipment”
(6th edition, dated July 16, 2009)**

Presented to the IAPMO Standards Review Committee on October 15, 2018

General: The changes to this standard may have an impact on currently listed products. The significant changes are:

- Added new requirements for electronic circuits monitoring safety critical functions (see Sections 5.24, 6A, 29.2, 35.5, 36.3, 37.4 and Table 37.1)
- Added requirements for clearance and creep distances (see Section 25.6)
- Updated the referenced standards for the requirements for switches and controllers from UL 1054 to UL 61058-1 (see Section 32.1.1)
- Added requirements for button or coin cell batteries of lithium technologies (see Section 37.9)
- Added requirements specifying the instructions that must be printed and those that may be provided in electronic media format (see Section 73.1)
- Added a new Supplement for the evaluation of electronic circuits (see Supplement SB)

Section 5, Glossary: Added a definition for Safety Critical Function as follows:

5.24 Safety Circuit – A circuit that ...

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

Section 6A, Safety Critical Functions: Added new requirements for electronic circuits monitoring safety critical functions as follows:

6A Safety Critical Functions

6A.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.

6A.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.*

6A.3 Electronic circuits managing Safety Critical Functions shall comply with:

- a) Supplement SB; or*
- b) the Standard for Automatic Electrical Controls – Part 1: General Requirements, UL 60730-1 and its 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 Appendix B for circuits providing the Safety Critical heater functions relating to the risk of hyperthermia, scalding and loss of water flow (dry-fire protection).*



6A.4 Functions specified in Table 6A.1 represent the common safety critical circuit functions of spas. It is not intended to represent all possible Safety Critical Functions.

Table 6A.1
Safety Critical Functions

<u>Function^a</u>	<u>Hazard</u>	<u>Location of parameters and tests</u>
<u>Motor running overload protection</u>	<u>Risk of fire or electric shock</u>	<u>Section 29.2</u>
<u>Motor locked rotor protection</u>	<u>Risk of fire or electric shock</u>	<u>Section 29.2</u>
<u>Motor short circuit protection</u>	<u>Risk of fire or electric shock</u>	<u>Section 29.2</u>
<u>Temperature regulating control</u>	<u>Hyperthermia</u>	<u>Section 35</u>
<u>Temperature limiting control</u>	<u>Scalding</u>	<u>Section 36</u>
<u>Water-Flow Controls (dry-fire protection)</u>	<u>Risk of fire, electric shock, or scalding</u>	<u>37.4</u>
<p>^a<u>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.</u></p>		

Section 25.6, Clearance and Creepage Distances: Added new requirements for fixed minimum clearance and creep to distances to be evaluated in accordance with UL 840 as follows:

25.6 Clearance and Creepage Distances

25.6.1 As an alternative approach to the spacing requirements specified in Spacings, Section 18, and other than as noted in 25.6.2 and 25.6.3, clearances and creepage distances may be evaluated in accordance with the requirements in the Standard for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment, UL 840, as described in 25.6.4.

25.6.2 Clearances between an uninsulated live part and the walls of a metal enclosure, including fittings for conduit or armored cable, shall be as noted in 25.3.1. The clearances shall be determined by physical measurement.

25.6.3 The clearance and creepage distance at field wiring terminals shall be in accordance with 25.2.

25.6.4 In conducting evaluations in accordance with the requirements in the Standard for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment, UL 840, the following guidelines shall be used:

a) For evaluating clearances:

- 1) The installation shall be considered Overvoltage Category II;
- 2) The Phase-to-Ground Rated System Voltage used in the determination of clearances shall be the equipment rated supply voltage rounded to the next higher value.
- 3 To determine equivalence with current through air spacings requirements an impulse test potential having a value as determined in UL 840 is to be applied.



b) For evaluation of creepages:

- 1) The installation environment shall be considered to be Pollution Degree III except for those product intended for indoor use only. Installations in a garage or the like would also be considered Pollution Degree III.
- 2) Any printed wiring board which complies with the requirements for Direct Support in the Standard for Printed-Wiring Boards, UL 796, provides a Comparative Tracking Index (CTI) of 100;
- 3) Printed wiring boards are evaluated as Pollution Degree 2 when adjacent conductive material is covered by any coating, such as a solder mask, which provides an uninterrupted covering over at least one side and the complete distance up to the other side of conductive material;
- 4) Printed-wiring boards shall be evaluated as Pollution Degree 1 under one of the following conditions:
 - i) A coating which complies with the requirements for Conformal Coatings in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C, or
 - ii) At a specific printed wiring board location by application of at least a 1/32 inch (0.79 mm) thick layer of silicone rubber or through potting, without air bubbles, in epoxy or potting material.

Section 29.2, Motor circuit overload protection: Added new requirements for the electronic protection of motor circuit overload as follows:

29.2.1 A unit employing a motor shall incorporate thermal or overcurrent protection that consists of one of the following:

- a) Thermal protection complying with the applicable requirements in the Standard for Overheating Protection for Motors, UL 2111; the Standard for Impedance Protected Motors, UL 1004-2; or the Standard for Thermally Protected Motors, UL 1004-3.

Exception No. 1: For a motor that includes a control that limits the length of time the motor can be operated, such as a timer, the duration of the temperature test and the endurance test (both under locked rotor conditions) may be less than that specified but shall be no less than the period of operation permitted by the control.

Exception No. 2: When the time required to operate a manually reset protective device through 10 cycles of operation is longer than the time that the motor is likely to be operated during each use, the number of operations of the device for the temperature test under locked-rotor conditions may be less than 10 cycles but no less than 4 cycles.

Exception No. 3: A motor intended to move air only, by means of an air-moving fan that is integrally attached, keyed, or otherwise fixed to the motor, is not required to have running-overload protection.

~~b) Impedance protection complying with the applicable requirements in UL 2111, UL 1004-2, or UL 1004-3, when the motor is tested as used in the product.~~

~~c) Other protection that is shown by test to be equivalent to the protection mentioned in (a).~~

d) Electronic protection that complies with the requirements of the Standard for Electronically Protected Motors, UL 1004-7;

e) Electronic overcurrent protection provided as part of a motor-drive complying with the Standard for Power Conversion Equipment, UL 508C. The combination of the motor and the motor drive shall comply with the running overcurrent and locked rotor protection requirements specified in the Standard for Electronically Protected Motors, UL 1004-7;

f) Electronic protection complying with Standard for Automatic Electrical Controls – Part 1: General Requirements, UL 60730-1 and the tests of the Standard for Thermally Protected Motors, UL 1004-3;



- g) Electronic circuits complying with Supplement SB and the tests of the Standard for Thermally Protected Motors, UL 1004-3;
- h) Impedance protection complying with the applicable requirements in the Standard for Overheating Protection for Motors, UL 2111, the Standard for Impedance Protected Motors, UL 1004-2, or the Standard for Thermally Protected Motors, UL 1004-3, when the motor is tested as used in the product; or,
- i) Other protection that is shown by test to be equivalent to the protection mentioned in (a).

Section 32, Switches and Controllers: Updated the requirements for switches to remove the withdrawn standard UL 1054 and include it's replacement UL 61058-1 and the necessary parameters for the evaluation to UL 61058-1 as follows:

32.1.1 Switches shall comply with the Standard for General-Use Snap Switches, UL 20, ~~the Standard for Special-Use Switches, UL 1054~~, the Standard for Switches for Appliances – Part 1: General Requirements, UL 61058-1, or the Standard for Clock Operated Switches, UL 917.

32.1.1.1 Switches that comply with the Standard for Switches for Appliances – Part 1: General Requirements, UL 61058-1, shall be rated as specified in 32.1.1.2 – 32.1.1.4.

32.1.1.2 Power switches shall be rated as follows:

- a) For a voltage not less than the rated voltage of the appliance;
- b) For a current not less than the rated current of the appliance;
- c) For Continuous Duty;
- d) With respect to load:
 - 1) Switches for motor-operated appliances: for resistance and motor load in accordance with the Standard for Switches for Appliances – Part 1: General Requirements, UL 61058-1, or Outline for Particular Requirements for Switches for Tools, UL 6059, if the switch would encounter this load in normal use; or
 - 2) Switches may be regarded as switches for a declared specific load in accordance with UL 61058-1, or UL 6059, and may be classified based upon the load conditions encountered in the appliance under normal load.
- e) For ac if the appliance is rated for ac;
- f) For dc if the appliance is rated for dc.

32.1.1.3 Ratings and load classifications for switches other than power switches shall be based on the conditions encountered in the appliance under normal load.

32.1.1.4 Switches shall also be rated with respect to endurance as follows:

- a) Power switches: 6000 cycles;
- b) Power switches provided with series electronics shall be subject to an additional 1000 cycles of operation with the electronics bypassed;
- c) Switches other than power switches, such as speed selector switches, that may be switched under electrical load: 1000 cycles;
- d) The following non-power switches are not required to be rated for endurance:
 - 1) Switches not intended for operation without electrical load, and which can be operated only with the aid of a tool or are interlocked so that they cannot be operated under electrical load; or
 - 2) Switches for 20 mA load as classified in Clause 7.1.2.6 of Standard for Switches for Appliances – Part 1: General Requirements, UL 61058-1.



32.1.2 Electronic motor drives shall be suitable for the pump voltage and current rating and shall comply with the Standard for Power Conversion Equipment, UL 508C, and shall comply with one of the following:

- a) The Standard for Power Conversion Equipment, UL 508C; or
- b) The Standard for Automatic Electrical Controls – Part 1: General Requirements, UL 60730-1;
- or
- c) The circuit requirements in Supplement SB.

32.1.2.1 Electronic motor drives that additionally provide motor overload protection shall comply with 29.2.1.

Section 35.5, Construction: Included reference to the new supplement SB for evaluation of electronic circuits as follows:

Note: The reference to the new supplement SB was also added to Sections 36.3 and 37.4 for Temperature-Limiting Controls, and Heater Protection

35.5.1 A water temperature-regulating control shall have a tolerance at the maximum setting of not more than $\pm 3^{\circ}\text{C}$ ($\pm 5^{\circ}\text{F}$).

35.5.2 A water temperature-regulating control shall comply with either the requirements in a ~~or~~ b or c:

- a) The water heater control requirements in the Standard for Temperature-Indicating and -Regulating Equipment, UL 873. In addition, the control shall have a maximum tolerance of $\pm 3^{\circ}\text{C}$ ($\pm 5^{\circ}\text{F}$) and shall comply with the calibration verification and 100,000-cycle endurance requirements in UL 873. If part or all of the control is electronic, it shall comply with 37.6, 37.7 and Appendix B.
- b) The Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1, and the Standard for Automatic Electrical Controls for Household and Similar Use, Part 2: Particular Requirements for Temperature Sensing Controls, UL 60730-2-9, with the parameters as specified in Table 35.1.
- c) The circuit requirements in Supplement SB.

Section 37.4, Heater protection:

37.4.1 Water-flow sensing circuitry or devices designed to sense the lack of water when heaters are energized (sometimes called dry-fire protection) shall be investigated for reliability. These devices shall comply with either a, b, c, ~~d~~ or e below:

- a) The Standard for Limit Controls, UL 353.
- b)

...

e) The circuit requirements in Supplement SB.

~~37.4.1.1 Switches and relays controlled by such circuitry or devices shall have an electrical rating no less than the electrical load controlled and shall be capable of interrupting the load for 100,000 cycles of operation.~~

~~37.4.2 Water flow sensing circuitry or devices as specified in 37.4.1 shall comply with the low water tests described in 58.1.1–58.1.3.~~

~~37.4.3 A water flow sensing device as specified in 37.4.1 shall be installed such that the risk of contamination due to dirt or debris is minimized, such as by installation downstream of the water filter ~~or~~~~

~~by positioning the device at the top rather than the bottom of a water circulating pipe.~~



Section 37.9, Button or coin cell batteries of lithium technologies: Added requirements for lithium batteries as follows:

~~7A.5~~ 37.9 *Button or coin cell batteries of lithium technologies*

37.9.1 *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.

Exception: UL 4200A is not applicable to appliances and accessories under the scope of UL 1563 that meet the following:

a) The battery is not intended to be replaced.

b) The battery is not referenced in the instructions or markings.

c) A battery access door or cover is not provided.

d) The appliance or accessory is not intended to be handheld during normal operation.

Section 73, General: Added a new requirements for printed versus electronic media instructions as follows:

73.1 Each unit shall be provided with installation instructions, operating instructions, user-maintenance instructions, and important safety instructions. The installation instructions shall include information on supply wiring, proper connection to the supply circuit, and bonding. When the unit is rated for use with more than one supply voltage or with multiple supply circuits, appropriate instructions shall be provided for each application.

73.1.1 *The following instructions shall be provided as printed material:*

a) The instructions pertaining to a risk of fire, electric shock, or injury to persons as required by 73.6 – 73.7 and Section 74; and

b) A minimum set of installation and operating instructions, such as a quick start guide, that includes the instructions required by 73.1 – 73.4.

73.1.2 *All other instructions may be provided in electronic read-only media format only, such as a DVD, website, flash drive or CD-ROM. If any electronic media instructions are provided, the instructions and warning statements required by Section 74 shall also be included within the electronic media instructions.*

73.1.3 *The printed instructions shall contain detailed instructions of how to obtain a printed copy of the material contained in electronic format.*

Table 37.1, Water-flow control parameters (Dry-fire protection): This table was updated to reflect changes in the standard:



The following new supplement was added:

SUPPLEMENT SB – REQUIREMENTS FOR THE EVALUATION OF ELECTRONIC CIRCUITS

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INTRODUCTION

SB1 Scope

SB1.1 Throughout this Supplement, when reference is made to requirements in “this Standard,” the reference is to requirements in the main body of the Standard and not to other requirements of the Supplement.

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SB14.3 The tests of SB14.1 are carried out after the protective electronic circuit has operated during the relevant Abnormal Operation Test of this standard. However, appliances that are attended during use are not subjected to the tests for electromagnetic phenomena.