UL 60335-2-1000

STANDARD FOR SAFETY

Household and Similar Electrical Appliances: Particular Requirements for Electrically Powered Pool Lifts

UL Standard for Safety for Household and Similar Electrical Appliances: Particular Requirements for Electrically Powered Pool Lifts, UL 60335-2-1000

First Edition, Dated September 29, 2017

Summary of Topics

This First Edition of ANSI/UL 60335-2-1000, the Standard for Safety for Household and Similar Electrical Appliances: Particular Requirements for Electrically Powered Pool Lifts was issued which includes requirements for the safety of electrically powered pool lifts intended for persons requiring assistance for safe entry into and out of a pool.

The new requirements are substantially in accordance with Proposal(s) on this subject dated June 16, 2017 and August 18, 2017.

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Standard for Household and Similar Electrical Appliances: Particular Requirements for Electrically Powered Pool Lifts

First Edition

September 29, 2017

This ANSI/UL Standard for Safety consists of the First Edition including revisions through September 29, 2017.

The most recent designation of ANSI/UL 60335-2-1000 as an American National Standard (ANSI) occurred on September 29, 2017. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page. Any other portions of this ANSI/UL standard that were not processed in accordance with ANSI/UL requirements are noted at the beginning of the impacted sections.

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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FOREWORD

The Standard for Safety for Household and Similar Electrical Appliances: Particular Requirements for Electrically Powered Pool Lifts, UL 60335-2-1000 is to be used in conjunction with the sixth edition of the Standard for Safety of Household and Similar Electrical Appliances, Part 1: General Requirements, UL 60335-1.

NOTE 1: When "Part 1" is mentioned in this standard, it refers to UL 60335-1.

When a particular subclause of Part 1 is not mentioned in this Part 2, that subclause applies as far as is reasonable. When this standard states "addition", "modification" or "replacement", the relevant text of Part 1 is to be adapted accordingly.

NOTE 2: The following numbering system is used:

– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;

– unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;

– additional Annexes are lettered AA, BB, etc.

NOTE 3: in this standard, the following print types are used:

– requirements: in roman type;

– test specifications in: italic type;

– notes: in smaller roman bold type.

Words in SMALL ROMAN CAPS in the text are defined in clause 3.

Preface

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

This standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

NOTE: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

This UL Standard is to be used in conjunction with the Standard for Safety of household or Similar Electrical Appliances, Part 1: General Requirements, UL 60335-1.

Household and Similar Electrical Appliances: Particular Requirements for Electrically Powered Pool Lifts

1 Scope

This clause of Part 1 is replaced by the following.

This Standard deals with the safety of electrically powered pool lifts intended for persons requiring assistance for safe entry into and out of a pool, their RATED VOLTAGE being not more than 150 V between supply phases or one phase and neutral or ground, and intended for installation in accordance with the US National Electrical Code, (NFPA 70) Article 680, Part VIII.

NOTE 101: Examples of appliances that are within the scope of this standard are:

– portable and stationary lifts of the chair type

– stationary lifts of the single wheelchair platform type.

As far as is practicable, this standard deals with the common hazards presented by these appliances. However, in general, it does not take into account

a) the use of appliances by young children or infirm persons without supervision;

b) playing with the appliance by young children.

NOTE 102: Attention is drawn to the fact that:

– Authorities Having Jurisdiction should be consulted on additional installation regulations and requirements for lifts with respect to accessibility, performance and the like.

NOTE 103: This standard does not apply to:

– platform type lifts intended for multiple wheelchairs

– pool lifts for use in medical facilities

2 Normative References

This clause of Part 1 is applicable except as follows.

Addition:

ANSI/NEMA WD 6, *Standard for Dimensions of Attachment Plugs and Receptacles*

IEC 62133-2, *Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications - Part 2: Lithium systems*

ISO 3864-1:2011, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings.*

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

UL 943, *Ground-Fault Circuit-Interrupters*

UL 1703, *Flat-Plate Photovoltaic Modules and Panels*

UL 1741, *Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources*

UL 62133, *Secondary Cells and Batteries Containing Alkaline or Other Non-Acid Electrolytes – Safety Requirements for Portable Sealed Secondary Cells, and for Batteries Made From Them, for Use in Portable Applications*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1.9
Replacement:
NORMAL OPERATION
operation of the appliance under the following conditions:

– A lift is installed in accordance with the manufacturer's installation instructions with the maximum recommended weight placed on the seat.

– A lift is operated through a cycle beginning at- rest on a flat surface simulating a pool perimeter deck to the fully extended position with its seat immersed to its maximum depth in water and then back to the at-rest position.

3.1.11
Addition:
NOTE to entry: "ghost lift" is not considered a dangerous malfunction.

3.4.3
Replacement:
SAFETY ISOLATING TRANSFORMER
transformer, the input winding of which is electrically separated from the output winding by an insulation at least equivalent to double insulation or reinforced insulation.

NOTE 1 to entry: The definition describes a transformer that complies with NFPA 70 680.23(A)(2).

3.101
ELECTRICALLY POWERED POOL LIFT
an electrically powered lift that provides accessibility to and from a pool or spa for people with disabilities.

NOTE 1 to entry: LIFT and ELECTRICALLY POWERED LIFT are used interchangeably in this standard.

3.102
LOW VOLTAGE CONTACT LIMIT
a voltage not exceeding the following values:

a) 15 volts (RMS) for sinusoidal ac

b) 21.2 volts peak for non-sinusoidal ac

c) 30 volts for continuous dc

d) 12.4 volts peak for dc that is interrupted at a rate of 10 to 200 Hz

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Modification:*

LIFTS where the battery is removed for charging at another location and the battery is rated less than or equal to the LOW VOLTAGE CONTACT LIMIT are not classified.

Solar-operated or solar-recharged LIFTS where the solar panel is attached to the LIFT and the battery is rated less than or equal to 24 volts are not classified.

LIFTS supplied from a source not exceeding the LOW-VOLTAGE CONTACT LIMIT and supplied by transformers or power supplies that comply with NFPA 70 680.23(A)(2) are not classified.

STATIONARY LIFTS shall be CLASS I or CLASS III.

NOTE: It is assumed that there will be no fixed-wiring LIFT installations due to requirements for electrical outlets in the vicinity of pools.

6.2 *Addition:*

ELECTRICALLY POWERED POOL LIFTS shall be at least IPX5.

Unless supplied via a SAFETY ISOLATING TRANSFORMER not exceeding the LOW-VOLTAGE CONTACT LIMIT, parts of ELECTRICALLY POWERED POOL LIFTS that may be installed below the finished plane surface of the pool perimeter or that may be immersed in the pool, shall be at least IPX7.

7 Marking and instruction

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

– weight capacity. The minimum rating shall be 300 lbs.

7.6 *Addition:*

⚠ [symbol ISO 7000-0434]

7.12 *Addition:*

The instructions shall provide details for fixing the LIFT and include parameters of the pool surround (deck) construction.

The instructions shall state

IMPORTANT SAFETY INSTRUCTIONS

When installing and using this electrical appliance, basic precautions should always be followed, including the following:

READ ALL INSTRUCTIONS BEFORE USING

WARNING – To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.

A wire connector is provided on this unit to connect a minimum 8 AWG (8.4 mm^2) solid copper conductor between this unit and the means for local equipotential bonding.

Check the unit periodically for signs of deterioration

– Keep all nuts, bolts and screws tight to be sure the lift is in safe working condition.

The instructions for Class I LIFTS shall state the substance of the following:

GROUND FAULT CIRCUIT INTERRUPTER PROTECTION

This lift is provided with a ground-fault circuit-interrupter (GFCI) built into the plug or the power-supply cord. This device provides additional protection from the risk of electric shock. Should replacement of the ground-fault circuit-interrupter or cord become necessary, use only identical replacement parts.

This lift is provided with a ground-fault circuit-interrupter (GFCI). To test the GFCI, push the test button. The GFCI should interrupt power. Push the reset button. Power should be restored. If the GFCI fails to operate in this manner, the GFCI is defective. If the GFCI interrupts power to the lift without the test button being pushed, a ground current is flowing, indicating the possibility of an electric shock. Do not use this lift. Disconnect the lift and have the problem corrected by a qualified service representative before using.

SAVE THESE INSTRUCTIONS

NOTE 101: Other important safety instruction items required by the manufacturer may be included.

Each LIFT shall be provided with a safety sign that is legible, durable and suitable for outdoor use. The sign shall be headed by symbol ISO 7000-0434 with a black triangle and orange exclamation point, adjacent to WARNING in black uppercase letters having a height no less than 9.5 mm on an orange background. Immediately thereafter it shall state:

“REDUCE THE RISK OF DROWNING” in uppercase letters having a height no less than 4.8 mm and the following in letters having a height no less than 3.2 mm:

– Supervise children at all times

– No jumping or diving from the lift

– Seat may be hot. Use caution when entering

– Keep covered when not in use. Inspect and clean before use

Instructions shall be provided for attaching the sign to the LIFT where it would be visible during use. Information on how to obtain additional or replacement safety signs shall also be provided.

8 Protection Against Access to Live Parts

This clause of Part 1 is applicable.

9 Starting of Motor-Operated Appliances

This clause of Part 1 is applicable.

10 Power Input and Current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.7 *Replacement:*

The LIFT is operated for a total of 5 cycles with 30 seconds between each cycle.

Table 3 *Addition:*

Table 3 – Maximum normal temperature rises

Materials and components	°C
Power-switching semiconductor (triac, SCR, or the like)	[a]

[a] *The maximum temperature rise on the case is the maximum case temperature recommended by the semiconductor manufacturer minus an assumed ambient of 25°C (77°F) for open devices.*

12 Void

13 Leakage Current and Electric Strength at Operating Temperature

13.1 *Addition:*

The requirement and tests are only applicable to mains-operated LIFTS.

14 Transient Overvoltages

This clause of Part 1 is applicable.

15 Moisture Resistance

This clause of Part 1 is applicable except as follows.

15.1 *Addition:*

For LIFTS *having a* HAND-HELD *user control or one integral with the seating with an* ACCESSIBLE *membrane, the test of 15.101 is also applicable. A nominal 25 mm incision is made in any* ACCESSIBLE *membrane on a user control.*

Traces of water on insulation or components operating at or below the LOW VOLTAGE CONTACT LIMIT *are ignored.*

15.101 A HAND-HELD *user control with an* ACCESSIBLE *membrane is fully immersed in a non-conductive tank filled with water having a resistivity of 300 ohm-cm. After a period of 1 h, the* LIFT *shall withstand the electric strength test of 16.101 and inspection shall show that there is no trace of water on insulation that could result in a reduction of clearances or creepage distances below the values specified in Clause 29.*

16 Leakage Current and Electric Strength

This clause of Part 1 is applicable except as follows.

16.1 *Modification:*

The requirement and tests are only applicable to mains-operated LIFTS. *The test of 16.101 is also applicable to a mains-operated* LIFT *having* HAND-HELD *user control(s) or one integral with the seating with an* ACCESSIBLE *membrane.*

16.101 The current measured between any two points of a user control with an ACCESSIBLE *membrane shall not exceed 5 mA 50-60 Hz a.c. or 30 ma d.c.*

The leakage current is measured through a 500 ohm non-inductive resistor via a low impedance ammeter responding to the rated frequency of the LIFT *between any pole of the supply and metal foil that conforms to the user control surface under test not exceeding 20 cm by 10 cm. If its area is smaller than the surface under test, it is moved to test all parts of the surface.*

The leakage current is measured through a 500 ohm non-inductive resistor via a low impedance ammeter responding to the rated frequency of the appliance between any pole of the supply and

– metal foil that conforms to the user control surface under test not exceeding 20 cm by 10 cm. If its area is smaller than the surface under test, it is moved to test all parts of the surface, or

NOTE: The heat dissipation of the LIFT is not to be affected by the metal foil.

– for a user control that can be immersed, a copper electrode plate having dimensions approximately 5 cm by 5 cm (2 in by 2 in) immersed in the tank water.

17 Overload Protection of Transformers and Associated Circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is applicable.

19 Abnormal Operation

This clause of Part 1 is applicable.

20 Stability and Mechanical Hazards

This clause of Part 1 is applicable except as follows.

20.1 *Modification:*

A portable LIFT shall be set in the most adverse position and placed on a 3 o inclined surface with the maximum rated load.

NOTE: The test on the horizontal support may be necessary for appliances provided with rollers, castors or feet. In this case, castors or wheels may be blocked to prevent the appliance from rolling.

20.102 The operator's manual shall provide warnings as to potential pinch points from the moving parts of the lift. Permanent caution labels shall be provided at the corresponding points on the lift. The labels shall consist of the symbol ISO 7000-0434A.

21 Mechanical Strength

This clause of Part 1 is applicable except as follows.

21.1 *Addition:*

A portable LIFT shall be set in the most adverse position and placed on a 3 o inclined surface and secured against tipping but not against deformation. The LIFT shall then be loaded with 1.25 x rated weight capacity for a period of 5 minutes. The LIFT shall then be placed in the most adverse position on a horizontal surface. The LIFT shall then be loaded with 1.5 x the rated weight capacity for 20 minutes.

The test is repeated on a horizontal surface when loaded with 1.5 x rated weight capacity for 20 minutes.

A fixed LIFT shall be installed in accordance with the installation instructions. It shall be set in the most adverse position and then loaded with 1.5 x the rated weight capacity. It shall be maintained in this position for 20 minutes.

After the tests there shall be no deformation or wear that would affect the function of the LIFT.

22 Construction

This clause of Part 1 is applicable except as follows.

22.18 Replacement for the note:

NOTE 101: The following materials are considered to have adequate resistance to corrosion:

- *– Stainless steel*
- *– Copper or copper alloy with zinc content not in excess of 15 percent*
- *– Aluminum*

22.57 *Addition:*

The properties of non-metallic materials used in a seat, seatback and footrests shall not degrade from exposure to sunlight such that they no longer comply with this standard. This requirement does not apply to glass, ceramics or similar materials.

Compliance is checked by inspection.

22.101 Fixed LIFTS shall be constructed so that they can be fixed securely to a pool perimeter surface. Brackets, bolts and other fastening hardware shall be of metal that shall not be liable to creep or deform.

Compliance is checked by inspection.

NOTE: Keyhole slots, hooks and similar means, without any further means to prevent the LIFT from being inadvertently lifted off the support, are not considered to be adequate means for fixing the LIFT securely.

22.102 LIFTS shall be provided with a rigid seat and seat back. The seat shall be at least 405 mm (16 in) wide.

Except for LIFTS provided in spas, footrests shall be provided and shall move with the seat.

If provided, an armrest positioned between a seated person and the pool edge shall be removable, or shall fold clear of the seat when the seat is in the raised (load) position.

Compliance is checked by inspection.

22.103 LIFTS intended for unassisted operation shall be provided with a user control that is operable from both the pool perimeter and in-water levels. The user control shall be operable with one hand and shall not require tight grasping or pinching, or twisting of the wrist. The force required to actuate operable parts shall not exceed 22.2 N (5 lbf).

Controls and operating mechanisms shall be accessible and unobstructed when the lift is in use and they shall enable the lift to be called to the position opposite to the current position.

Compliance is checked by inspection.

22.104 For constructions other than those of CLASS III, the LIFT mechanism, seating and any other part of the LIFT located within 1.5 m (5 ft) of the inside walls of a pool shall not become live in the event of a failure of BASIC INSULATION. If these parts are of metal , they shall be adequately covered by insulating material or their ACCESSIBLE PARTS shall be separated from earthed metal parts or fixings by SUPPLEMENTARY INSULATION.

Compliance is checked by inspection and if necessary by the relevant tests.

Insulating material is adequately covered if the construction withstands the electric strength test specified for SUPPLEMENTARY INSULATION.

23 Internal Wiring

This clause of Part 1 is applicable.

24 Components

24.1 *Modification:*

Power electronic converter circuits are not required to comply with IEC 62477-1. They are tested as part of the appliance according to this standard. A charge controller, inverter, converter or other components intended for use as part of the photovoltaic system that comply with the Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources, UL 1741 fulfill the relevant requirements of this standard.

24.1.101 The relevant standard for ground-fault circuit-interrupters for personnel is the Standard for Ground-Fault Circuit-Interrupters, UL 943.

25 Supply Connection and External Flexible Cords

This clause is applicable except as follows.

25.1 *Replacement:*

STATIONARY LIFTS shall not incorporate an appliance inlet. They shall be provided with a supply cord fitted with a plug, the current rating and voltage rating of the plug being not less than the corresponding ratings of the LIFT, and the plug configuration not being one that can be found in Standard for Dimensions of Attachment Plugs and Receptacles, ANSI/NEMA WD 6.

A CLASS I LIFT shall be provided with a ground-fault circuit-interrupter (GFCI) as an integral part of the power-supply cord attachment plug; or power-supply cord within 300 mm of the attachment plug face. The GFCI shall be marked “Rainproof” or “Suitable for Wet Locations.”

The maximum length of the supply cord shall be 900 mm (3 ft.). This length does not apply to the supply cord of battery chargers of battery-operated lifts where the battery is removed from the lift for charging at another location.

Compliance is checked by inspection.

25.5 *Addition:*

TYPE X ATTACHMENTS shall not be used for LIFTS.

25.7 *Addition:*

SUPPLY CORD for CLASS III LIFTS supplied from a photovoltaic panel shall be one of the following types:

– Photovoltaic Wire,

– Type SW, STW, STOW, or SOW, or

– PLTC Cable marked ″Sunlight Resistant″ or ″SUN RES

NOTE: Flexible cord suitable for use with photovoltaic systems is described in NFPA 70, 690.31(E).

SUPPLY CORDS of CLASS I LIFTS shall be at least junior-hard service type suitable for outdoor use.

26 Terminals for External Conductors

This clause of part 1 is applicable.

27 Provision for Earthing

This clause of Part 1 is applicable.

27.2 *Addition:*

Fixed LIFTS shall be provided with an external bonding wire connector of copper, copper alloy or stainless steel for connection to an equipotential bonding grid. It shall be able to accommodate an 8 AWG (8.4 mm^2) solid copper conductor.

Modification by revising Clause 27.7DV.1.1 and Table 27DV.2 of the Part 1:

Protective earthing conductors shall be a minimum 12 AWG (3,31 mm^2)

Replace the first three rows under the headings of Table 27DV.2 with the following

Table 27DV.2 - Minimum size of protective conductors

Up to and including 10	12 (3,31)	20 (0,52)
Over 10 up to and including 13	12 (3,31)	18 (0,82)
Over 13 up to and including 18	12 (3,31)	16 (1,31)

28 Screws and Connections

This clause of Part 1 is applicable.

29 Clearances, Creepage Distances and Solid Insulation

This clause of Part 1 is applicable.

30 Resistance to Heat and Fire

This clause of Part 1 is applicable except as follows.

30.2 *Modification:*

Clause 30.2.3 is not applicable.

31 Resistance to Rusting

This clause of Part 1 is applicable.

31 *Addition:*

31.101 An iron or steel part, except bearings, laminations or minor parts such as washers and screws, shall be resistant to corrosion by enameling, galvanizing, plating, or equivalent means, if the corrosion of such a part would impact compliance with this standard.

NOTE 102: In certain instances where the oxidation of iron or steel due to the exposure of the metal to air and moisture is not likely to be appreciable – thickness of metal and temperature also being factors – surfaces of sheet steel and cast iron parts within an enclosure may not be required to be corrosion resistant.

Compliance is checked by inspection and, for an outer sheet steel enclosure, the salt mist test of IEC 60068-2-52, severity 2 being applicable.

Before the test, coatings are scratched by means of a hardened steel pin, the end of which has the form of a cone with an angle of 40°. Its tip is rounded with a radius of 0,25 mm ± 0,02 mm. The pin is loaded so that the force exerted along its axis is 10 N ± 0,5 N. The scratches are made by drawing the pin along the surface of the coating at a speed of approximately 20 mm/s. Five scratches are made at least 5 mm apart and at least 5 mm from the edges.

After the test, the LIFT shall not have deteriorated to such an extent that compliance with this standard, in particular with Clauses 8 and 27, is impaired. The coating shall not be broken and shall not have loosened from the metal surface.

31.102 Sheet and plate aluminum likely to come into contact with pool water shall be of an alloy of the 5000 series as given in the Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate, ANSI/ASTM B209. Cast aluminum shall be one of the alloys shown in Table 101 or an alloy that has been found to have equivalent resistance to corrosion.

Table 101 – 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	6063Z
S5B	SG70B	SG100B	
SG70A			
ZG61B			

31.103 Metal shall not be used in combinations to cause galvanic action.

Compliance is checked by inspection.

31.104 An external and internal sheet steel enclosure of LIVE parts, and other sheet steel parts, including hinges and other attachments, shall be resistant to corrosion and shall not have deteriorated to such an extent that compliance with this standard, in particular with Clauses 8 and 27, is impaired. Any coating shall not be broken and shall not have loosened from the metal surface.

Compliance is checked by the salt mist test of IEC 60068-2-52, severity 2 being applicable.

Before the test, any coatings are scratched by means of a hardened steel pin, the end of which has the form of a cone with an angle of 40°. Its tip is rounded with a radius of 0,25 mm ± 0,02 mm. The pin is loaded so that the force exerted along its axis is 10 N ± 0,5 N. The scratches are made by drawing the pin along the surface of the coating at a speed of approximately 20 mm/s. Five scratches are made at least 5 mm apart and at least 5 mm from the edges.

31.105 An annealed coating on sheet steel that is bent or similarly formed or extruded, or rolled at edges of holes after annealing, shall be additionally painted in the affected areas if the process damages the zinc coating. Sheared or cut edges and punched holes are not required to be additionally treated.

Compliance is checked by inspection for visible, at 25 power magnification, flaking or cracking of the zinc coating at the outside radius of a bent or formed section.

32 Radiation, Toxicity and Similar Hazards

This clause of part 1 is applicable.

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Annexes

The annexes of the Standard for Safety of Household and Similar Electrical Appliances, Part 1: General Requirements, UL 60335-1, are applicable except as follows:

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