



UL 1576

STANDARD FOR SAFETY Flashlights and Lanterns

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UL Standard for Safety for Flashlights and Lanterns, UL 1576

First Edition, Dated February 23, 2018

Summary of Topics

Adoption Of The First Edition Of UI 1576 With First Time Accreditation As An American National Standard

The new requirements are substantially in accordance with Proposal(s) on this subject dated October 25, 2017 and December 29, 2017.

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FEBRUARY 23, 2018

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ANSI/UL 1576-2018

UL 1576

Standard for Flashlights and Lanterns

First Edition

February 23, 2018

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

The most recent designation of ANSI/UL 1576 as a Reaffirmed American National Standard (ANS) occurred on February 23, 2018. 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 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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PART I – REQUIREMENTS SPECIFIC TO BATTERY- POWERED FLASHLIGHTS AND LANTERNS

INTRODUCTION

1 Scope

1.1 These requirements cover battery-powered flashlights and lanterns powered by secondary (rechargeable) batteries and general purpose primary (non-rechargeable) batteries intended for non-hazardous locations in accordance with ANSI/NFPA 70.

1.2 Flashlights and lanterns are collectively categorized as products within the context of this standard.

1.3 These requirements also cover automatic flashlights and lanterns which are normally connected to a line voltage supply and, upon loss of the line voltage supply, will turn on the lamp.

1.4 These requirements do not cover:

- a) Stand-alone battery chargers;
- b) Cord and plug connected work lights and hand lights without batteries that are within the scope of UL 153;
- c) Cord and plug connected portable luminaires other than work lights and hand lights, with or without batteries, that are within the scope of UL 153;
- d) Aquarium lighting that is within the scope of UL 1018; and
- e) Emergency lighting that is within the scope of UL 924.

1.5 Permanently installed lighting that is capable of being battery powered is not fully specified in the requirements in this standard. The requirements are specified by UL 1598.

1.6 A flashlight or lantern which may also be powered by supply voltage and intended to be employed as nightlights shall also comply with UL 1786.

1.7 A product that generates ultraviolet (UV) radiation is intended for use in accordance with the Federal Radiation Control for Health and Safety Act of 1968, the Federal Food, Drug and Cosmetic Act, and the Code of Federal Regulations, Part 1040, 21 CFR, Chapter 1, Subchapter J, Radiological Health.

1.8 Most requirements for battery operation and charging are incorporated by reference to UL 2595 and are subject to the limitations of voltage in that standard. Products operating at voltages in excess of those specified in UL 2595 may require additional considerations.

1.9 General requirements for all battery operated flashlights and lanterns are specified in Part 1. Additional requirements for battery operated flashlights and lanterns that may also be connected to line-voltage supply for any purpose are specified in Part 2.

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 specified in this standard are rms.

3 References

3.1 Any undated reference to a code or standard appearing in the requirements in this standard shall be interpreted as referring to the latest edition of that code or standard.

ASTM Standards

ASTM E230/E23-0M

Standard Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples

IEC Standards

IEC 60417

Graphical Symbols for Use on Equipment

IEC 62471

Photobiological Safety of Lamps and Lamp Systems

IEC/TR 62471-2

Photobiological Safety of Lamps and Lamp Systems – Part 2: Guidance on Manufacturing Requirements Relating to Non-Laser Optical Radiation Safety

ISO Standards

ISO 7010

Graphical Symbols – Safety Colours And Safety Signs – Registered Safety Signs

NFPA Standards

NFPA 70

National Electrical Code

UL Standards

UL 20

General Use Snap Switches

UL 44

Thermoset-Insulated Wires and Cables

UL 66

Fixture Wire

UL 73

Motor-Operated Appliances

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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 224

Extruded Insulating Tubing

UL 244A

Solid-State Controls for Appliances

UL 248-1

Low-Voltage Fuses – Part 1: General Requirements

UL 248-5

Low-Voltage Fuses – Part 5: Class G Fuses

UL 248-14

Low-Voltage Fuses – Part 14: Supplemental Fuses

UL 153

Portable Electric Luminaires

UL 310

Electrical Quick-Connect Terminals

UL 355

Cord Reels

UL 486A-486B

Wire Connectors

UL 486C

Splicing Wire Connectors

UL 486E

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

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Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape

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UL 514A
Metallic Outlet Boxes

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

UL 514D
Cover Plates for Flush-Mounted Wiring Devices

UL 635
Insulating Bushings

UL 696
Electric Toys

UL 733A
Nonindustrial Photoelectric Switches for Lighting Control

UL 746C
Polymeric Materials – Use in Electrical Equipment Evaluations

UL 758
Appliance Wiring Material

UL 796
Printed-Wiring Boards

UL 810
Capacitors

UL 817
Cord Sets and Power-Supply Cords

UL 840
Clearances and Creepage Distances for Electrical Equipment

UL 917
Clock-Operated Switches

UL 924
Emergency Lighting and Power Equipment

UL 935
Fluorescent-Lamp Ballasts

UL 943
Ground-Fault Circuit-Interrupters

UL 969
Marking and Labeling Systems

UL 1018
Aquarium Equipment

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UL 1029

High-Intensity Discharge Lamp Ballasts

UL 1053

Ground-Fault Sensing and Relaying Equipment

UL 1059

Terminal Blocks

UL 1077

Supplementary Protectors for Use in Electrical Equipment

UL 1097

Accessibility of Uninsulated Live Parts and Film-Coated Wire

UL 1283

Electromagnetic Interference Filters

UL 1310

Class 2 Power Units

UL 1412

Fusing Resistors and Temperature-Limited Resistors for Radio- and Television- Type Appliances

UL 1441

Coated Electrical Sleeving

UL 1446

Systems of Insulating Materials – General

UL 1557

Electrically Isolated Semiconductor Devices

UL 1565

Positioning Devices

UL 1699

Arc-Fault Circuit-Interrupters

UL 1703

Flat Plate Photovoltaic Modules and Panels

UL 1786

Nightlights

UL 2459

Multi-Pole Splicing Wire Connectors

UL 2595

General Requirements for Battery-Powered Appliances

UL 4200A

Products Incorporating Button or Coin Cell Batteries of Lithium Technologies

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UL 4248-1

Fuseholders – Part 1: General Requirements

UL 4248-9

Fuseholders – Part 9: Class K

UL 5085-1

Low Voltage Transformers: General Requirements

UL 5085-2

Low Voltage Transformers: General Purpose Transformers

UL 5085-3

Low Voltage Transformers, Class 2 and Class 3 Transformers

UL 61010-1

Electrical Equipment for Measurement, Control, and Laboratory Use; 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 (Thermal Cutoffs) for Use in Electrical Appliances and Components

UL 60730-1

Automatic Electrical Controls for Household and Similar Electrical Controls for Household and Similar Use; Part 1: General

UL 60730-2-7

Automatic Electrical Controls for Household and Similar Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Timers and Time Switches

UL 61058-1

Switches for Appliances – Part 1: General Requirements

4 Glossary

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

4.2 **APPLIANCE COUPLER** – A single-outlet, female contact device for attachment to a flexible cord as part of a detachable power-supply cord to be connected to an appliance inlet (motor attachment plug).

4.3 **APPLIANCE INLET (MOTOR ATTACHMENT PLUG)** – A male contact device mounted on an end product appliance to provide an integral blade configuration for the connection of an appliance coupler or cord connector.

4.4 **AUTOMATICALLY CONTROLLED PRODUCT** – A product is considered to be automatically controlled if the repeated starting of the product, beyond one complete predetermined cycle of operation to the point where some form of limit switch opens the circuit, is independent of any manual control.

4.5 **AUTOMATIC FLASHLIGHT OR LANTERN** – A flashlight or lantern incorporating a switching device which, when the unit is connected to a line voltage supply, will maintain an open circuit between the battery and lamp and, upon loss of the line voltage supply, will close the circuit between the battery and the lamp.

4.6 **BATTERY, PRIMARY** – A battery which can only be discharged once. It is not designed to be rechargeable and must be protected from a charging current.

4.7 **BATTERY, SECONDARY** – A battery intended to be discharged and recharged many times.

4.8 **CHILD-APPEALING FEATURE** – A feature that provides visual appeal and attraction to children in the form of shape, decoration, bright colors, or unusual illuminations.

4.9 **LOW-VOLTAGE CIRCUIT** – A circuit involving a peak open-circuit potential of not more than 42.4 V a.c. or 60 V d.c. supplied by a primary battery, by a Class 2 transformer or power unit, or by a combination of a transformer and a fixed impedance that as a unit, complies with all performance requirements for a Class 2 transformer or power unit. A circuit derived from a line-voltage circuit by connecting a resistance in series with the supply circuit as a means of limiting the voltage and current, is not considered to be a low voltage circuit.

4.10 **PORTABLE PRODUCT** – A product that is easily carried or moved from one place to another in normal use.

4.11 **REMOTELY CONTROLLED PRODUCT** – A product that is out of sight of the operator who is at the starting device.

CONSTRUCTION

5 Components

5.1 General

5.1.1 Components shall comply with the safety requirements specified in the relevant UL standards as far as they reasonably apply, and to the extent that:

- a) The proper functioning of the component is required for the safety of the end-product; and
- b) The component itself does not increase the risk of fire or electric shock or personal injury when operated under either normal use conditions or under the abnormal conditions described in this standard.

5.1.2 Components that are generally required to comply with the safety requirements in the component standards in their entirety are specified in Specific Component Requirements, Section 5.2; others are referenced throughout this end-product standard.

5.1.3 A component that is required by this standard to comply with a particular referenced component standard shall:

- a) Be described within the scope of that standard;
- b) Be employed in the end product in a manner consistent with the intended use described in the component standard;
- c) Be used in accordance within its rating(s) established for the intended conditions of use or its established Conditions of Acceptability; and
- d) Additionally comply with the applicable requirements in this end product standard.

Exception: A component of a product specified in this standard is not required to comply with a specific component requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product;*
- 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.*

5.1.4 For products where various battery packs are recommended for use in the instruction manual, the most unfavorable configuration shall be selected for each test or evaluation unless otherwise specified.

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5.2 Specific component requirements

5.2.1 Internal wiring

5.2.1.1 Internal wiring composed of insulated conductors subjected to hazardous voltages as defined in UL 2595 shall comply with UL 758.

Exception No. 1: Insulated conductors are not requirement to comply with UL 758 if they comply with UL 44, UL 83, UL 66, or the applicable UL standard(s) for other insulated conductor types specified in Wiring Methods and Materials, Chapter 3 of ANSI/NFPA 70.

Exception No. 2: Insulated conductors for specialty applications (e.g. data processing or communications) and located in a low-voltage circuit not involving the risk of fire or personal injury is not required to comply with UL 758.

5.2.2 Gaskets and seals

5.2.2.1 Gaskets and seals that comply with UL 157, are considered to comply with the requirements in 10.2.

Exception: Rubber or neoprene compounds relied upon for protection from rain are only required to comply with the Accelerated Aging Test, Section 26.

5.2.3 Marking and labeling systems

5.2.3.1 A marking and labeling system shall comply with UL 969, under the specified environmental conditions.

Exception: A marking or labeling system that complies with Permanence of Marking Test, Section 20 of this standard is considered to comply with the requirement.

5.2.4 Printed wiring boards

5.2.4.1 Printed wiring boards, including the coatings, shall comply with UL 796. The printed-wiring board shall have a flammability rating of V-1 or better as determined by an evaluation to UL 94.

Exception: A printed-wiring board in a circuit other than hazardous voltage as defined in UL 2595 is not required to comply with the bonding requirements in UL 796 if the board is separated from parts of other circuits such that loosening of the bond between the foil conductor and the base material will not result in the foil conductors or components coming in contact with parts of other circuits of the control or of the end-use product.

5.2.5 Semiconductors and small electronic components

5.2.5.1 The insulation of a power switching semiconductor device that isolates live parts from the mounting surfaces shall have an isolation voltage rating not less than the electric strength test potential required in the Dielectric-Voltage Withstand Test, Section 66.

5.2.5.2 Optical isolators (optocouplers), used as a means of achieving electrical isolation shall have an isolation voltage rating not less than the electric strength test potential required in Dielectric-Voltage Withstand Test, Section 66.

5.2.5.3 Except as otherwise specified in this Standard, component requirements are not specified for small electronic components on printed wiring boards, including diodes, transistors, resistors, inductors, integrated circuits, and capacitors not directly connected to the supply source.

5.2.6 Lithium button or coin cell batteries

5.2.6.1 A product that incorporates or may use a lithium button or coin cell battery, shall comply with UL 4200A.

5.2.7 Photovoltaic sources

5.2.7.1 Photovoltaic sources of supply shall comply with UL 1703. Each photovoltaic module shall be operated within its maximum electrical parameters. However, the possibility of overcharging of lithium-ion cells shall not be dependent on photovoltaic sources operating within their limits of current and voltage.

Exception: Compliance with UL 1703 is not required if:

- a) The maximum output voltage is less than 30 V rms (42.4 V peak);*
- b) The maximum output power is less than 100 VA;*
- c) The supply is provided with backfeed protection; and*
- d) The panel is not intended to be mounted on or in a building structure.*

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6 Frame And Enclosure

6.1 A product shall be so formed and assembled so that it will have the strength and rigidity necessary to resist the abuses that it is likely to be subjected to, without increasing the likelihood 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 All electrical parts, except a supply cord or interconnecting cord, that may involve a risk of fire, electric shock, or injury to persons under any condition of use, shall be enclosed in an acceptable enclosure. The material requirements for polymeric enclosures are specified in Polymeric Materials and Enclosures, Section 44.

6.3 A polymeric enclosure, frame or cover of a product which generate ultraviolet (UV) radiation shall be suitable for UV exposure as determined by the applicable test of UL 746C under the conditions of exposure or shall be suitably shielded if degradation would result in non-compliance with other requirements in this Standard.

6.4 A door or a cover of an enclosure that provides access to any overload protective device intended to be reset or renewed by the user shall be hinged or otherwise attached in an equivalent manner.

6.5 Means shall be provided for holding the door or cover over a fuseholder in a closed position, and the door or cover shall be tight-fitting.

6.6 An enclosure of a product capable of being charged by solar power and comprised of a polymeric material shall comply with the Ultraviolet Light Exposure Test, UL 746C.

7 Child-Appealing Features

7.1 In addition to complying with the requirements in this standard, a product with child-appealing features shall also comply with the applicable requirements in UL 696.

7.2 Removable parts of a product with child-appealing features shall not present a risk of injury to persons from a sharp edge after being subjected to the drop or impact test requirements in accordance with 15.2. Removable parts shall be tested both attached to the product and separated from the product. The samples are permitted to break as a result of the impact but shall not produce any edges or points that are sharp to the touch under casual handling conditions.

8 Adhesives Used To Secure Parts

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

8.2 The requirement in 8.1 also applies to an adhesive used to secure a conductive part, that may, if loosened or dislodged:

- a) Energize an accessible dead metal part;
- b) Make a live part accessible;
- c) Reduce spacings below the minimum acceptable values; or
- d) Short-circuit live parts.

8.3 Whether the conditions specified in 8.2(a) – (d) can occur is to be considered with respect to both:

- a) A part inside the device; and
- b) A part on the outside of the device that may affect equipment in which the device is to be installed.

9 Mechanical Assembly

9.1 Parts, including switches, shall be securely mounted and shall be prevented from turning, if such repositioning results in noncompliance with this standard.

9.2 A movable joint, such as a swivel joint or telescoping arm, containing conductors shall be constructed so that movement of the joint will not result in damage to the insulation of conductors. Rotation shall be limited to 370 degrees, or the movable joint shall comply with the movable joint endurance test in Moveable Joint Rotation Test, Section 21.

9.3 A movable joint containing conductors shall comply with the movable joint torsion and pull tests in Moveable Joint Torsion and Pull Test, Section 22 and shall remain intact and operable.

9.4 A wall-hung product shall comply with the Mounting Means Strength Test, Section 23.

9.5 A handle used to support or carry a product shall comply with the Strength of Handles Test, Section 24.

9.6 A supporting device, such as chains, hooks, hanger holes, notches, magnets or the like used to support the product, shall comply with the requirements in Loading Test, Section 25.

10 Protection Against Corrosion

10.1 Iron and steel parts shall be protected against corrosion by enameling, galvanizing, plating, or other equivalent means, if corrosion of such unprotected parts would be likely to result in a risk of fire, electric shock, or injury to persons.

Exception No. 1: Surfaces of sheet-steel and cast-iron parts within an enclosure may not be required to be protected against corrosion if the oxidation of the metal due to the exposure to air and moisture is not likely to be appreciable. The thickness of metal and temperature are also to be considered.

Exception No. 2: This requirement does not apply to bearings, laminations, or minor parts of iron or steel, such as washers, screws, and the like.

10.2 If deterioration of a liquid container provided as a part of a product would result in a risk of fire or electric shock, the container shall be of a material that is resistant to corrosion by the liquid intended to be used therein.

11 Bushings For External Conductors

11.1 At a point where a supply cord or interconnecting cord, if damaged, may create a risk of fire, electric shock, or injury to persons, passes through an opening in a wall, barrier, or enclosing case, there shall be a bushing or the equivalent that shall be reliably secured in place, and shall have a smooth, rounded surface against which the cord may bear.

11.2 An insulating bushing shall be provided if:

- a) Type SP-2, SPE-2, SPT-2, or other cord lighter than Type SV or SVE is employed;
- b) The wall or barrier is of metal; or
- c) The construction is such that the cord may be subjected to strain or motion.

Exception: An insulated metal grommet having insulating material that is not less than 1/32 in (0.8 mm) thick and fills completely the space between the grommet and the metal in which it is mounted may be used instead of an insulating bushing.

11.3 A cord hole in wood, porcelain, phenolic composition, or other non-conducting material and having a smooth, rounded surface is considered to be equivalent to a bushing.

11.4 Ceramic materials and some molded compositions are generally acceptable for insulating bushings.

11.5 A separate bushing shall not be made of wood or of hot-molded shellac-and-tar compositions.

11.6 A vulcanized fiber bushing shall not be less than 3/64 in (1.2 mm) thick and formed and secured in place so that it will not be adversely affected by conditions of ordinary moisture.

11.7 A separate soft-rubber, neoprene, or polyvinyl chloride bushing shall not be employed in the product.

Exception: A bushing of any of the materials specified above may be employed at any point in a product if used in conjunction with a type of cord for which an insulating bushing is not required. If a bushing of one or these materials is used anywhere in the product, the edges of the hole in which the bushing is mounted shall be smooth and free from burrs, fins, and the like.

11.8 At any point in a product, a bushing of the same material as, and molded integrally with, the supply cord is acceptable on a Type SP-2 or harder-service cord if the built-up section is not less than 1/16 in (1.6 mm) thick at the point where the cord passes through the enclosure.

11.9 A flexible cord used for external interconnection shall comply with the requirements in Strain-Relief Test, Section 69, unless the construction is such that the cord will be protected from stress.

12 Current-Carrying Parts

12.1 Ordinary iron or steel shall not be used as a current-carrying part.

Exception: Ordinary iron or steel provided with a corrosion-resistant coating may be used for a current-carrying part if otherwise acceptable.

13 Internal Wiring

13.1 Mechanical protection

13.1.1 Wiring and connections between parts of a product shall be protected or enclosed.

Exception: A length of flexible cord may be employed for external connections if flexibility is essential. See Bushings for External Conductors, Section 11.

13.1.2 Wires within an enclosure, a compartment, a raceway, or the like shall be routed or otherwise protected so that damage to conductor insulation cannot result from contact with any rough or sharp part.

13.1.3 A hole through which insulated wires pass in a sheet-metal wall within the overall enclosure of a product shall be provided with a smooth, rounded bushing or shall have smooth, rounded surfaces upon which the wires may bear.

13.1.4 Insulated wires may be bunched and passed through a single opening in a metal wall within the enclosure of a product.

13.1.5 A conductor utilizing beads for insulation shall not be employed outside an enclosure.

13.1.6 Internal wiring shall consist of wires of a type or types that are acceptable for the application, when considered with respect to the temperature and voltage to which the wiring is likely to be subjected and with respect to its exposure to oil, grease, or other conditions of service to which it is likely to be subjected.