



UL 2438

STANDARD FOR SAFETY

Outdoor Seasonal-Use Cord-Connected Wiring Devices

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UL Standard for Safety for Outdoor Seasonal-Use Cord-Connected Wiring Devices, UL 2438

Second Edition, Dated November 14, 2014

Summary of Topics

This new edition of ANSI/UL 2438 is being issued to incorporate audio features, flasher controls, different number of receptacles, and a change in power supply cord length.

The new/revised requirements are substantially in accordance with Proposal(s) on this subject dated June 13, 2014.

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

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NOVEMBER 14, 2014

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ANSI/UL 2438-2014

UL 2438

Standard for Outdoor Seasonal-Use Cord-Connected Wiring Devices

First Edition – June, 2006

Second Edition

November 14, 2014

This ANSI/UL Standard for Safety consists of the Second edition.

The most recent designation of ANSI/UL 2438 as an American National Standard (ANSI) occurred on November 14, 2014. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or effective date information.

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 <http://csds.ul.com>.

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INTRODUCTION

1 Scope

1.1 The requirements of this Standard cover outdoor seasonal-use cord-connected wiring devices that are intended for temporary outdoor use – not to exceed 90 days – with outdoor equipment, Christmas-tree, and other seasonal decorative-lighting outfits. Some outdoor seasonal-use cord-connected wiring devices employ additional devices such as photoelectric sensors, fuses, supplementary protectors, timers, audio, flasher control or synchronized features. Products employing additional devices shall meet the intent and testing described in this Standard.

1.2 These requirements only cover devices of the 2-pole, 3-wire, 5-15 configuration as shown in Wiring Devices – Dimensional Specifications, ANSI/NEMA WD6.

1.3 These requirements cover devices with remote control features that comply with the Standard for Solid-State Controls for Appliances, UL 244A. See Devices Employing Remote Control Features, Section 11. Compliance with the Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1, and/or the applicable Part 2 standard from the UL 60730 series fulfills these requirements.

1.4 These requirements cover devices with audio features that comply with the Standard for Audio, Video, and Similar Electronic Apparatus – Safety Requirements, UL 60065, or the Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1. See Devices Employing Audio Features, Section 12.

1.5 These requirements are intended to be used with the Standard for Cord Sets and Power-Supply Cords, UL 817.

2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this Standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components generally used in the products covered by this standard.

2.2 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.

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

2.4 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.

3 Units of Measurement

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

4 Undated References

4.1 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.

CONSTRUCTION

5 General

5.1 An outdoor seasonal-use cord-connected wiring device shall have a minimum length of 1.5 feet (0.48 m) and a maximum length of 50 feet (15.2 m) when measured in accordance with the Standard for Cord Sets and Power-Supply Cords, UL 817.

5.2 Switches are permitted between or on the end fittings. When a switch is provided, it shall be either a general-use snap switch that complies with the Standard for General-Use Snap Switches, UL 20, or a special-use switch that complies with the Standard for Special-Use Switches, UL 1054, or the Standard for Switches for Appliances – Part 1: General Requirements, UL 61058-1. The switch shall have a voltage and current rating suitable for the application. When the switch is used to control a load fitting, it shall be AC tungsten rated and have voltage and current ratings not less than the load it is intended to control. These requirements apply to all switching mechanisms, including, but not limited to, supplementary protectors being used as, and having a reset button in a similar shape as a switch actuator, or containing symbols, words, or letters meaning "ON/OFF".

Note: UL 1054 will be withdrawn on June 23, 2015

5.3 The NEMA configurations of various attachment plug and receptacle combinations referenced in this standard are in accordance with Wiring Devices – Dimensional Specifications, ANSI/NEMA WD6.

5.4 A blade used in an attachment plug cap shall comply with the Standard for Attachment Plug Blades for Use in Cord Sets and Power-Supply Cords, UL 1659.

Exception No. 1: A blade which has crimp connections that are also soldered or welded need not comply with the performance requirements in the Standard for Attachment Plug Blades for Use in Cord Sets and Power-Supply Cords, UL 1659.

Exception No. 2: A blade which is welded or is made mechanically secure and soldered directly to the conductor connections need not comply with the performance requirements in the Standard for Attachment Plug Blades for Use in Cord Sets and Power-Supply Cords, UL 1659.

6 Flexible Cord

6.1 The flexible cord used in an outdoor seasonal-use cord-connected wiring device shall be of the size specified in Table 6.1. The cord shall comply with the Standard for Flexible Cords and Cables, UL 62, and shall have a minimum flame rating of VW-1 and minimum insulation temperature rating of 105°C (221°F). See 6.2 for cord types permitted.

6.2 The flexible cord used in an outdoor seasonal-use cord-connected wiring device shall be one of the following: SW, SOW, SOOW, STW, STOW, STOOW, SEW, SEOW, SJW, SJOW, SJOOW, SJTW, SJTOW, SJTOOW, SJEW, or SJEOW.

Table 6.1
Guide to construction and performance requirements for outdoor seasonal-use cord connected wiring devices

Device rating, A	Minimum power-supply cord size, AWG (mm ²)	Number of outlets	Overcurrent protection required?	Overcurrent protective device rating ^a , A	Temperature test load (A) ^d	Minimum internal wiring size ^b , AWG (mm ²)
15	12 (3.3)	Up to 6	No	15 ^c	15	12 (3.3)
15	14 (2.1)	≤4	No	15 ^c	15	14 (2.1)
15	14 (2.1)	Up to 6	Yes	15	15	14 (2.1)
13	16 (1.3)	Up to 6	Yes	13	13	16 (1.3)
Max 10	16 (1.3)	Up to 3	No	10 ^{c, e}	13 ^c	16 (1.3)

^a An overcurrent protective device shall not trip when it is operated at the marked current.
^b Smaller AWG is not prohibited from being used when an overcurrent protective device is provided and the results of the Fault Current Test, and the Component Temperature Test comply with the requirements of those tests using the smaller AWG wire.
^c When provided with an overcurrent protective device, the Temperature Test load shall be equal to the overcurrent protective device and its rating.
^d Test is capable of being conducted at the overcurrent protective device rating when provided.
^e The overcurrent protective device rating can be lower but shall be equal to the device rating.

7 Fittings

7.1 An attachment plug, cord connector, or current tap, provided on an outdoor seasonal-use cord-connected wiring device shall be rated 15 A, 125 V and of the 2-pole, 3-wire, 5-15 configuration. In addition, the line fitting of an outdoor seasonal-use cord-connected wiring device may additionally provide integral overcurrent protection in accordance with Table 6.1. When fusing is provided, or when overcurrent protection is required as specified in 6.1, it shall be located either in the line fitting or within 6 inches (152 mm) of the line fitting. (See also Fittings Intended to Accommodate Fuses or Overcurrent Protection, Section 10).

7.2 An outdoor seasonal-use cord-connected wiring device employing an outlet fitting (a cord connector connected between the end fittings) shall comply with all of the following:

- a) There shall not be more than a total of 6 outlets (including those provided at the end fittings); and
- b) The outlet fittings shall be factory-assembled to the flexible cord and shall not be field-rewireable.

7.3 The voltage and current ratings (configurations) of the line and load fittings shall be equal.

7.4 A load fitting shall be either of the molded- or assembled-body type. The load fitting is to be provided with means for mounting such as, but not limited to, a minimum of 3/8-inch (9.5-mm) diameter mounting hole or detachable type stake with a minimum length of 12 inches (305 mm) and maximum length of 32 inches (813 mm). After completion of installation, the connector shall be maintained a minimum of 6 inches (152 mm) above ground. The mounting means shall not require the use of tools to remove. Installation instructions shall be provided describing the intended use and mounting means.

7.5 All assembled-on (non molded-on) fittings of an outdoor seasonal-use cord-connected wiring device shall comply with the construction requirements in the Standard for Attachment Plugs and Receptacles, UL 498.

7.6 Load fittings shall be provided with self-closing outlet closures.

7.7 A polymeric material used for electrical insulation or enclosure of live parts shall have a flame class rating of V-1, V-0, VTM-1, or VTM-0 in accordance with the requirements of the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94. The flame class rating of the material shall be judged at the minimum thickness employed at the walls and barriers in the device which are critical to the functioning of the insulation or enclosure of the device.

7.8 A polymeric material used for electrical insulation or enclosure of live parts shall have a Comparative Tracking Index (CTI) rating of 175 V or greater or a performance level class of at least 3.

Exception No. 1: A polymeric material used for electrical insulation or enclosure of live parts is not required to comply with this requirement if it complies with the Comparative Tracking Index Test, Section 15.

Exception No. 2: A polymeric material used in an enclosure that is separated through air by more than 1/32 inches (0.8 mm) from uninsulated live parts and more than 1/2 inch (12.7 mm) from arcing parts is not required to comply with this requirement.

7.9 A polymeric material used for electrical insulation or enclosure of live parts shall have Hot Wire Ignition (HWI) and High-Current Arc Resistance to Ignition (HAI) ratings or performance level classes of at least those shown in Table 7.1 for the flame class rating determined in accordance with 7.7. For materials with other than VTM flammability classifications, the HWI and HAI ratings of the material shall be evaluated using the specimen thickness employed in the end product or nominal 1/8-inch (3.2-mm) thickness, whichever is greater.

Exception No. 1: A polymeric material used for electrical insulation or enclosure of live parts is not required to comply with the HWI requirements if it complies with the Glow Wire Test, Section 16.

Exception No. 2: A polymeric material used for electrical insulation or enclosure of live parts is not required to comply with the HAI requirements if it complies with the High-Current Arc Resistance to Ignition Test, Section 17.

Table 7.1
Electrical properties of insulating materials

Flammability classification ^a	HWI PLC ^b	HAI PLC ^c	CTI ^d
V-0, VTM-0	3	3	3
V-1, VTM-1	3	3	3
^a Flammability Classification – Described in the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94. ^b Hot Wire Resistance to Ignition Performance Level Category – Described in the Standard for Polymeric Materials – Short Term Property Evaluations, UL 746A. ^c High-Current Arc Resistance to Ignition Performance Level Category – Described in UL 746A. ^d Comparative Tracking Index – Described in UL 746A.			

7.10 A polymeric material having values 0, 1, 2 or 3 as specified in Table 7.1 are not required to be subjected to the tests described in 7.9. For materials whose electrical properties have not yet been determined, the tests described in Sections 15 – 17 shall be conducted.

7.11 A polymeric material used for electrical insulation or enclosure of live parts shall have the Relative Thermal Index (RTI) rating of 60°C as described in the Standard for Polymeric Materials – Long Term Property Evaluations, UL 746B.

7.12 All fittings shall be resistant to sunlight and mechanical abuse in accordance with the Standard for Polymeric Material – Use in Electrical Equipment Evaluations, UL 746C.

7.13 A solidly molded-on fitting shall exclude moisture by adhering tightly to the jacket of the cord at the point that the jacket or the cord enters the plug as determined by 7.14 and 7.15.

7.14 To determine the adhesion between the cord and the body of the fitting, the cord is to be bent sharply to an angle of 90 degrees with the plane of the cord entry and visually examined for openings that might permit the entry of moisture into the body.

7.15 If the visual examination called for in 7.14 is unable to verify that acceptable adhesion exists, but there is reason to suspect that an acceptable seal may exist between the cord and the plug at some concealed location within the plug, the representative power-supply cords may be cut apart for examination. The adhesion may be determined to be acceptable if the examination of the inner construction reveals a positive seal at all points around the periphery of the cord.

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8 Drain Openings

8.1 An enclosure body shall be constructed to prevent the accumulation of water on live parts, electrical components or conductors not identified for use in contact with water.

8.2 An enclosure body that permits water to enter the unit during the Rain and Sprinkler Test, Section 27, shall be provided with a drain hole.

8.3 Drain holes, if provided, shall be located in the surface likely to prevent the accumulation of water.

8.4 Drain holes shall permit the insertion of 0.125-inch (3.2-mm) diameter rod.

8.5 Drain holes shall have a barrier to prevent contact with live metal parts by an object that may be used to clear drain hole.

9 Gaskets

9.1 A gasket or bushing required to prevent water from entering the enclosure shall be secured to prevent its loosening by a clip, clamping ring, adhesion, or other mechanical means.

9.2 A gasket shall have a minimum temperature rating of 60°C (140°F).

9.3 The adhesive used to secure a gasket or bushing that is required to prevent water from entering the enclosure, and which is likely to be exposed or not compressed as intended during user maintenance, shall comply with the Gasket Adhesion Test, Section 29:

- a) For the gasket adhesive combination only; or
- b) With the gasket installed.

10 Fittings Intended to Accommodate Fuses or Overcurrent Protection

10.1 The enclosure of an overcurrent protective device (OCP) shall comply with the material requirements in 7.7.

10.2 Integral overcurrent protection (short circuit and overload protection), if provided, shall be rated in accordance with Table 6.1.

10.3 The integral overcurrent protective device shall also comply with the Standards for Low-Voltage Fuses – Part 1: General Requirements, UL 248-1, and Low-Voltage Fuses – Part 14: Supplemental Fuses, UL 248-14.

10.4 The overcurrent protective device, other than that required by 6.1, may be located in the attachment plug, in the outlet(s), or between the attachment plug and the outlet(s) and shall be connected to the ungrounded conductor. Supplementary overcurrent protection (short circuit and overload protection) is an acceptable method of providing the protection required by 6.1, however, thermal cutouts, thermal relays, and other devices not intended to open short circuits, shall not be used.

10.5 A fused attachment plug or load fitting shall be constructed so that there shall not be exposure of live parts during removal or replacement of the fuse, nor exposure of live parts with the fuse cover partially open while the plug or current tap is inserted 0.08 inch (2.03 mm) into a receptacle. Exposure of live parts shall be determined by contact with the accessibility probe illustrated in Figure 10.1.

10.6 The overcurrent protective device shall have a minimum short-circuit rating of 1000 A and shall be of the replaceable or manually resettable type. A replaceable fuse shall be of a readily available type to reduce the likelihood of the plug being replaced with one that is unfused. The overcurrent protective device shall not be of the automatic resetting type.

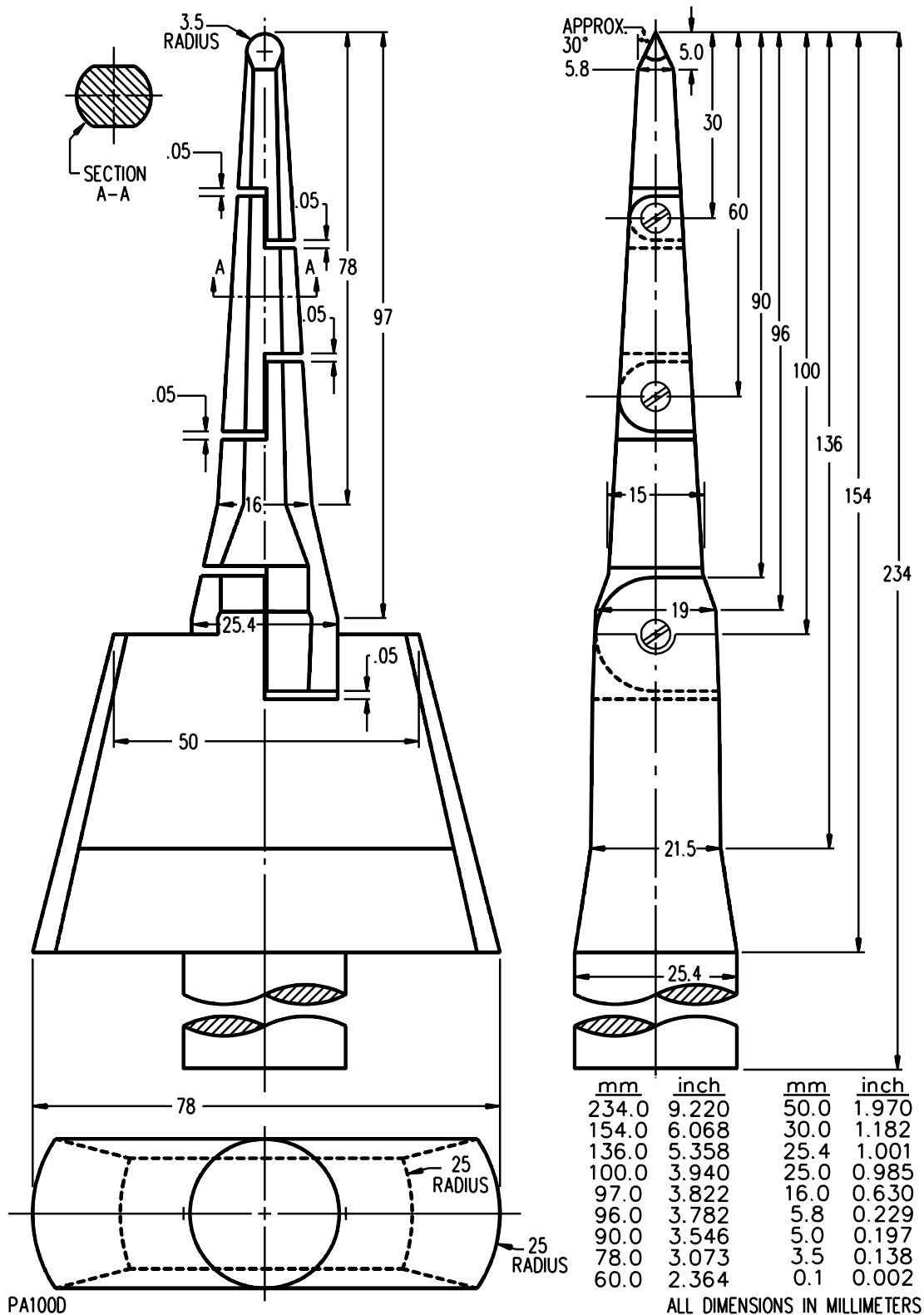
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Figure 10.1
Articulate probe with web stop



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11 Devices Employing Remote Control Features

11.1 In addition to the requirements of this standard, devices employing remote control features shall comply with the Standard for Solid-State Controls for Appliances, UL 244A. Compliance with the Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1, and/or the applicable Part 2 standard from the UL 60730 series fulfills these requirements.

11.2 The electrical tungsten rating shall be greater than or equal to the device rating.

11.3 The output shall not only be controlled by the remote controller. A separate individual switch/interface shall be provided on the main body as a secondary on/off control.

11.4 A device employing a remote control feature shall be marked in accordance with 45.4 and 45.5.

12 Devices Employing Audio Features

12.1 In addition to the requirements of this standard, devices employing audio features shall comply with the Standard for Audio, Video, and Similar Electronic Apparatus – Safety Requirements, UL 60065 or the Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1. See Devices Employing Audio Features, Section 12.

12.2 The current rating of the audio portion shall be considered in the overall rating of the device.

13 Devices Employing Synchronized Features

13.1 The electrical rating shall be greater than or equal to the rating of the device.

13.2 For a device that can be switched between sustaining output and synchronized output, an indicator shall be provided when the device operates at synchronized mode. The device shall be started up only at sustaining output mode.

13.3 A device employing synchronized features shall be marked in accordance with 45.6.

13.4 Synchronized outlets shall be marked as noted in 45.6 and each synchronized outlet shall be rated a minimum of 2.4 amps.