

Subject 8754

March 8, 2013

SUMMARY OF TOPICS

The following changes in requirements to the Standard for Holders, Bases, and Connectors for Solid-State (LED) Light Engines and Arrays, UL 8754/ULC-S8754, are being proposed:

1. The Proposed First Edition of the Joint UL/ULC Standard for Holders, Bases, and Connectors for Solid-State (LED) Light Engines and Arrays, UL 8754/ULC-S8754

STP BALLOTS AND COMMENTS DUE: April 22, 2013

For your convenience in review, proposed additions to existing requirements are shown underlined and proposed deletions are shown ~~lined-out~~.

1. The Proposed First Edition of the Joint UL/ULC Standard for Holders, Bases, and Connectors for Solid-State (LED) Light Engines and Arrays, UL 8754/ULC-S8754

RATIONALE

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This document contains the Proposed First Edition of the Joint UL/ULC Standard for Holders, Bases, and Connectors for Solid-State (LED) Light Engines and Arrays, UL 8754/ULC-S8754. The proposed standard specifies the requirements applicable to lampholders, lamp bases and connectors intended for solid-state (LED) light engines and arrays for installation in lighting equipment. These requirements only cover lampholders of a configuration not typically found on incandescent or fluorescent light sources.

These proposed requirements have been developed in parallel with requirements for field-replaceable light emitting diode (LED) light engines. Throughout, the document exceptions are provided to requirements that only apply to holders for field-replaceable light engines but are not suitable to certain devices due to restricted application or use condition. Examples include limited application devices and solid-state lighting assemblies as defined in the document.

The availability of a national standard that clearly addresses these products and this form of power distribution creates the basis for evaluation of these products that allows inspection authorities to approve product installations with confidence that Code compatibility has been established. Without such a standard, installers and inspection authorities will be compelled to individually adapt other existing regulations in their attempt to establish Code compliance, resulting in inconsistent regulations and market uncertainty.

There are national differences only where standards (U.S. vs. Canadian) are referenced. However, the body of the proposed standard is technically identical for Canada and the U.S.

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ANNEX A (NORMATIVE) – Reference Standards

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PROPOSAL

1 Scope

1.1 This standard specifies the requirements applicable to holders, bases and connectors intended for solid-state (LED) light engines and arrays for installation in lighting equipment, provided that they employ a configuration not typically found on incandescent or fluorescent light sources.

1.2 This standard does not cover lampholders with screw, bayonet or pin-type bases intended to be compatible with incandescent or fluorescent lamps. Such lampholders are covered under CSA C22.2 No. 43 / UL 496.

1.3 This standard does not cover wire connectors. Such connectors are covered under CAN/CSA-C22.2 No. 65 / UL 486A-486B or CSA C22.2 No. 2459 / UL 2459.

2 Definitions

2.1 For the purpose of this standard, the following definitions apply:

2.2 BASE – That part of a lampholder that is used for mounting of the device.

2.3 CURRENT-INTERRUPTING DEVICE – A component (such as a switch or breaker) intended to stop the flow of current in a lampholder circuit.

2.4 ENCLOSURE – That part or parts of a lampholder that:

a) Renders inaccessible all or any parts of the equipment that may otherwise present a risk of electric shock, or

b) Retards propagation of flame caused by electrical disturbances occurring within.

2.5 INSULATION, BASIC – The insulation necessary to provide basic protection against the risk of electric shock. This insulation may be in the form of vulcanized fiber, an inorganic or polymeric material, or an air gap.

2.6 INSULATION, DOUBLE – An insulation system comprised of both basic insulation and supplementary insulation.

2.7 INSULATION, REINFORCED – A single insulation system with such mechanical and electrical qualities that it, in itself, provides the same degree of protection against the risk of electric shock as does double insulation.

Note: The term “single insulation system” does not necessitate that the insulation must be in one homogeneous piece. The insulation system may comprise two or more layers that cannot be tested as supplementary or basic insulation.

2.8 INSULATION, SUPPLEMENTARY – An independent insulation provided in addition to the basic insulation to provide protection against the risk of electric shock in case of breakdown of the basic insulation.

2.9 LAMP BASE – The part of a lamp that engages the lampholder and makes contact with the electrical circuits of the lampholder.

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2.10 LAMP CONNECTOR – A type of lampholder that provides electrical connection to a lamp but does not provide mechanical support; sometimes known as a lamp-supported lampholder.

2.11 LAMPHOLDER – A wiring device intended for making connection to the electrical circuits of a lamp and, in some cases, providing support.

2.12 LAMPLOCK – A feature intended to keep a lamp from being removed except by a person having a key or special tool.

2.13 LED ARRAY (LED MODULE) – An assembly of one or more LED packages or dies on a printed circuit board or substrate, possibly with optical elements and additional thermal, mechanical, and electrical interfaces that are intended to connect to the load side of an LED driver.

2.14 LED LIGHT ENGINE (LIGHT ENGINE) – An integrated assembly comprised of an LED array (LED module), LED driver, and other optical, thermal, mechanical and electrical components. The device is intended to connect directly to the branch circuit through a custom or industry-standard lamp base. This lamp base shall be of a type not typically found on incandescent or fluorescent light sources.^a

^aWith permission from ANSI/IES RP-16, Nomenclature and Definitions for Illuminating Engineering, by the Illuminating Engineering Society of North America.

2.15 LIMITED APPLICATION DEVICE (LAD) – Lampholders that:

- a) Are only suitable for connection to low voltage, low energy circuits supplied from a Class 2 or LVLE source; or
- b) Are solely used to provide mechanical support to the light engine and its components, and provide no direct support of live parts.

Note: The following clauses contain requirements, exceptions or notes applicable to limited application devices: 4.2.3, 4.2.6, 4.5.2, 4.8.5.2, 4.9.10, 4.12.3, 5.1.1, 5.3.1, 5.3.3, 6.2, and 7.3.3.

2.16 LIVE PART – A metal or other conductive part that, during intended use, has an electrical potential difference with respect to earth ground or any other conductive part. By definition, the grounded (or neutral) mains supply conductor is considered to be a live part.

2.17 LOCATION, DAMP – An interior or exterior location that is normally or periodically subject to condensation of moisture, including partially protected locations. The interior of a luminaire or sign intended for wet locations is considered a damp location.

Note: Examples of damp locations include partially protected locations under canopies, marquees, roofed open porches, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold storage warehouses.

2.18 LOCATION, DRY – A location not normally subject to dampness. Dry locations include locations subject to temporary dampness, as in the case of a building under construction, provided ventilation is adequate to reduce the likelihood of accumulation of moisture.

2.19 LOCATION, WET – A location in which water or other liquid can drip, splash, or flow on or against a device.

Note: Examples include vehicle washing areas, showers, or unprotected locations exposed to weather.

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2.20 **RATED CURRENT** – The current declared by the manufacturer to indicate the highest current for which the device is rated.

2.21 **RATED VOLTAGE** – The voltage declared by the manufacturer to indicate the highest working voltage for which the device is rated.

2.22 **SEALING COMPOUND** – An insulating material that may be used to insulate live parts on the underside of a lampholder from the surface to which it is intended to be mounted or used to fill a void for the purpose of reducing clearances.

2.23 **SET SCREW** – A threaded device for securing a lampholder to its support or for securing leads within a terminal assembly.

2.24 **SOLID-STATE LIGHTING ASSEMBLY** – An LED light engine or array intended for factory installation into end-product lighting equipment in a manner not intended for servicing by end users (i.e., servicing performed by qualified personnel only).

2.25 **SOLID-STATE ASSEMBLY HOLDER** – A wiring device that couples a solid-state lighting assembly to the end-product lighting equipment in a manner not intended for servicing by end users (i.e., servicing performed by qualified personnel only). The coupling is either electrical or both electrical and mechanical.

2.26 **SYSTEM, DEFINED-FIT** – A group of modular components (e.g., lampholders, light engines, associated mounting and thermal control hardware) defined and evaluated as a unique lighting system for use in luminaires and similar equipment for use in luminaires and similar equipment (see 4.16).

2.27 **TERMINAL** – Provision for the connection of supply conductors.

2.28 **TERMINAL, INSULATION DISPLACEMENT (PIERCING)** – A terminal to which insulated conductors are secured by forcing them through an integral blade assembly, piercing through their insulation in the process.

2.29 **TERMINAL, PUSH-IN** – A terminal in which the stripped end of a conductor is pushed into the terminal and the clamping pressure is maintained by a spring mechanism without the use of screws.

2.30 **TERMINAL, SCREW** – A terminal in which the conductor is bent around the screw and clamped directly under the head of the screw when it is tightened.

2.31 **UPSET** – A process for peening, staking, cross threading, or rounding, for example, a screw's shaft end to prevent it from loosening or being backed out.

2.32 **VULCANIZED FIBER** – A material normally used as electrical insulation, made by combining layers of chemically jelled paper. "Fish paper" is a designation commonly used in the trade to refer to thin sheets of electrical grade vulcanized fiber.

2.33 **WORKING VOLTAGE** – The highest voltage to which an electrical component or insulating barrier could be subjected when the equipment is operating under any condition of normal use.

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3 General

3.1 Reference Publications

3.1.1 See Annex A for a list of publications referenced in this standard. Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

3.1.2 Where any clauses from other standards are referenced in this standard, this is to be interpreted as meaning that all requirements of the referenced clauses apply, except where it is clearly non-applicable to the product being evaluated, or superseded by requirements in this standard.

3.1.3 Throughout this standard, the CSA and ULC standard references apply to products intended for use in Canada, while the UL standard references apply to products intended for use in the United States. Combined references are commonly separated by a slash (" / ").

3.1.4 Throughout this standard, and in references to requirements in CSA C22.2 No. 43 / UL 496, the word "lamp" is understood to also comprise solid-state (LED) light engines and arrays.

3.2 Components

3.2.1 Except as indicated in 3.2.2, a component of a product covered by this standard shall comply with the requirements for that component. See Annex A for a list of standards covering components generally used in products covered by this standard. A component shall comply with the standard(s) appropriate for the country where the product is to be used.

3.2.2 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.

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

3.2.4 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.

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3.3 Units of Measurement

3.3.1 The values given in SI (metric) units shall be normative. Any other values given shall be for information only.

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

3.3.3 All values of voltage and current are root mean square (rms) values unless otherwise noted.

4 Construction

4.1 Enclosures

4.1.1 A lampholder enclosure shall have the necessary strength and rigidity to resist the abuses likely to be encountered during normal service. The degree of resistance inherent in the unit shall preclude breaking, warping, or cracking without the required spacings being reduced or parts becoming loosened or displaced.

4.1.2 A lampholder enclosure shall not warp, creep, crack, or distort under conditions of arcing, temperature, and mechanical stress that are likely to occur in service.

4.1.3 Polymeric enclosure materials shall comply with the requirements in 4.2.

4.1.4 An adhesive used to secure the enclosure shall comply with the adhesive support test in CAN/CSA-C22.2 No. 250.13 / UL 8750. Fusion techniques, such as solvent cementing, ultrasonic welding, electromagnetic induction, and thermal welding are not subject to this test.

4.1.5 Enclosures that are assembled using snap-together components shall comply with the Deflection Test in 5.8.

Exception: This test is not required for snap-together components additionally secured by adhesive or fusion techniques.

4.2 Insulating materials

4.2.1 All polymeric materials used in a lampholder shall comply with 4.2.2 – 4.2.6. When a material is used for more than one purpose, the most stringent requirements shall be applied.

4.2.2 Lampholders employing molded polymeric materials shall comply with the mold stress-relief distortion test specified in Clause 5.2.17 of CSA C22.2 No. 43 / UL 496 as specified for fluorescent lampholders.

4.2.3 A polymeric material used to enclose electrical parts or to provide direct or indirect support of live parts shall have a flame class rating of at least V-2, as determined by CAN/CSA-C22.2 No. 0.17 / UL 94.

Exception: Polymeric materials used in limited application devices may be classified HB.

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4.2.4 A polymeric insulating material used to enclose electrical parts, to provide direct or indirect support of live parts or to provide mechanical support shall possess a minimum electrical relative thermal index (RTI) of 90°C (194°F), as determined by CAN/CSA-C22.2 No. 0.17 / UL 746B.

4.2.5 The polymeric enclosure of a lampholder marked for wet location use shall comply with the ultraviolet light exposure test specified in CAN/CSA-C22.2 No. 0.17 / UL 746C.

4.2.6 Polymeric materials used for direct support of live parts, or as electrical insulation, shall have the following performance level classes (PLC), as determined by CAN/CSA-C22.2 No. 0.17 / UL 746A:

- a) A Hot Wire Ignition (HWI) in accordance with CAN/CSA-C22.2 No. 0.17 / UL 746C,
- b) A High-current Arc resistance to Ignition (HAI) in accordance with CAN/CSA-C22.2 No. 0.17 / UL 746C,
- c) A Comparative Tracking Index (CTI) of 2 or less for materials directly exposed to weather, and
- d) A Comparative Tracking Index (CTI) of 3 or less for all other materials.

Exception: Does not apply to limited application devices.

4.3 Sealing compound

4.3.1 The depth or thickness of sealing compound over a live nut, screw head, or rivet shall not be less than 1.6 mm (1/16 in). If the underside of the base is not recessed and if in some cases it will be in contact with the surface upon which the lampholder is mounted, the depth or thickness of the sealing compound shall not be less than 3.2 mm (1/8 in).

4.3.2 Sealing compound shall be insulating and shall not soften at a temperature of 15°C (27°F) above the relative thermal index (RTI) of the thermoplastic enclosure material in which it is imbedded, but not lower than 105°C (221°F). Compliance shall be determined by ASTM E28 or ASTM D36, as applicable to the material.

4.3.3 Sulfur shall not be acceptable as a sealant.

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4.4 Mounting

4.4.1 A mounting bracket shall be attached to the lampholder, or at least two securement points shall be employed, such that neither the lampholder nor any lampholder component can rotate during installation or removal of a lamp. A single rivet or screw shall not be considered to prevent rotation unless additional means such as projections, keys, or the like are provided to restrict movement.

4.4.2 A mounting hole tapped to receive a screw shall be acceptable if it contains no fewer than two threads for the screw if in metal, or no fewer than five threads if in insulating material. Spring clips, clamps, or other means that provide equivalent support and restriction of rotation may also be used.

4.4.3 Live screw heads or nuts on the underside of a base designed for surface mounting shall be countersunk not less than 3.2 mm (1/8 in) in the clear, and then covered with a waterproof, insulating, sealing compound that complies with 4.3.2.

Note: If such parts are staked, upset, or otherwise secured so they cannot loosen, they may be insulated from the mounting surface by material other than sealing compound or by 12.7 mm (1/2 in) or more air separation from the mounting surface.

4.5 Accessibility of live parts

4.5.1 Accessibility to uninsulated live parts of a lampholder shall be determined while the lampholder is completely assembled and mounted as intended:

- a) Without a lamp,
- b) With the appropriate lamp inserted, and
- c) During the insertion or removal of a lamp.

4.5.2 An uninsulated live part of a lampholder shall not be accessible, as determined by the probe test described in 4.5.3.

Exception No. 1: An uninsulated live part that is not energized when it is accessible need not comply with this requirement.

Note: A circuit-interrupting device used to disconnect uninsulated live parts from the ungrounded supply shall comply with 4.10.

Exception No. 2: Does not apply to limited application devices.

4.5.3 The rod probe illustrated in Figure 1 shall not contact live parts when inserted through any openings in an enclosure, with the probe in every possible position. The probe shall be used as measuring instruments to judge accessibility and not as instruments to judge the strength of the material. Where necessary, an electrical indicator may be used to determine whether contact is made with live parts.

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4.6 Corrosion protection

4.6.1 Iron and steel parts and other parts not inherently corrosion-resistant shall be protected against corrosion by painting, enameling, galvanizing, plating, or other equivalent means.

4.7 Current-carrying parts

4.7.1 Current-carrying parts shall be made of:

- a) Copper or copper alloy, with or without plating, or
- b) Stainless steel.

Aluminum and aluminum alloys shall not be used, either as a part or as plating.

Note: When used as lamp contacts, the suitability of these metals to resist damage due to arcing will be determined by the Abnormal Overload Test in 5.4.

4.7.2 All current carrying parts shall be sized to suitably carry rated current. Compliance shall be determined by the Temperature Rise Test in 5.5.

4.7.3 Zinc or cadmium plating shall not be used on terminal parts of a lampholder where the parts will come in contact with branch circuit conductors other than the grounding conductors.

4.7.4 A current-carrying part shall be secured such that it cannot be turned relative to the surface on which it is mounted.

4.7.5 Positive electrical contact shall be maintained at any point at which a connection is made between current-carrying parts.

4.8 Supply connections

4.8.1 General

4.8.1.1 A lampholder shall be capable of being readily wired as intended. If a lampholder is intended for the connection of conductors, wiring terminals or leads shall be provided.

4.8.1.2 A lampholder may employ solder terminals provided that such lampholders are marked in accordance with 7.1.5. The solder terminals may be in the form of a terminal plate with a hole, an eyelet connected to a lampholder contact, or other such termination.

4.8.1.3 Lampholders provided with wiring terminals shall accept wires at least as large as 18 AWG.

4.8.1.4 Lampholders that employ push-in terminals that can accept 14 AWG wires shall reject 12 AWG or larger wires. Compliance shall be determined by the Tests for Push-in Terminals in CSA C22.2 No. 43 / UL 496.

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