

## STANDARD INFORMATION

**Standard:** UL 8750

**Standard ID:** Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products [UL 8750:2015 Ed.2+R:23Sep2021]

**Previous Standard ID:**

Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products [UL 8750:2015 Ed.2+R:06Jul2021]

Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products [UL 8750:2015 Ed.2+R:05Jan2021]

Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products [UL 8750:2015 Ed.2+R:11Sep2020]

## EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

**Effective Date:** **April 5, 2024**

## IMPACT, OVERVIEW, AND ACTION REQUIRED

**Impact Statement:** Per our accreditation, Intertek is required to review reports against the standard revisions to confirm compliance. Once compliance is confirmed, the standard reference in the report is updated to show continued compliance to the technical requirements of the standard. Reports not updated to this version by the effective date above will be withdrawn.

All reports need to be certified to the September 23, 2021 revision prior to the effective date.

### Overview of Changes:

#### January 5, 2021

- Revisions to Supplement SD to include Special-Use LED packages
- Revisions to Supplement SJ to include direct references to in IEC 62471
- Additional requirements for LED controllers
- Revisions to the Leakage current test

#### July 6, 2021

- Revisions to potting compounds
- Revisions to feedthrough circuits and receptacles

#### September 23, 2021

- Add Exception for Transformers Utilizing a Thermoset Varnish
- Revisions to Supplement SB- Type HL LED Drivers

Specific details of new/revise requirements are found in table below.

***Current Listings Not Active? – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records. We will do this at no charge as long as Intertek is notified in writing prior to the review of your reports.***



## STANDARD INFORMATION

CLAUSE	VERDICT	COMMENT
<i>Additions to existing requirements are <u>underlined</u> and deletions are shown <del>lined-out</del> below.</i>		
<b>The following changes reflect the January 5, 2021 revision:</b>		
6	Info	<b>Mechanical Construction</b>
6.1	Info	<b>General</b>
<i><b>New clause added;</b></i>		
In addition to complying with the construction requirements specified in this standard, a LED controller that is intended to be installed in a wall-box (or provided with an enclosure for flush or surface mounting) shall comply with the following requirements in the Standard for Safety for Solid-State Dimming Controls, UL 1472 as applicable:		
6.1.6		a) Means for mounting, b) Current-carrying parts, c) Switches, d) Flush-device cover plates, and e) Touch dimmers.
Note: This requirement applies to LED controllers that are not covered within the scope of the Standard for Safety for Solid-State Dimming Controls, UL 1472. See 1.1.3(b).		
8	Info	<b>Performance Tests</b>
8.1	Info	<b>General</b>
<i><b>New clause added;</b></i>		
In addition to complying with the construction requirements specified in this standard, a LED controller that is intended to be installed in a wall-box (or provided with an enclosure for flush or surface mounting) shall comply with the following tests in the Standard for Safety for Solid-State Dimming Controls, UL 1472 as applicable:		
8.1.6		a) Temperature test, b) Security of lead test, c) Torque and pull-out tests, d) Limited short-circuit test, e) Leakage current test for touch dimmers, f) Leakage current test, and



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		<p>g) Field replaceable actuator assembly test.</p> <p>Note: This requirement applies to LED controllers that are not covered within the scope of the Standard for Safety for Solid-State Dimming Controls, UL 1472. See 1.1.3(b).</p>
8.9	Info	<p><b>Leakage current measurement test</b></p> <p>A unit connected to a branch circuit supply voltage shall be tested in accordance with this section. Leakage current shall not be more than:</p> <p>a) 0.5 MIU for units connected to a supply voltage of 150 volts or less to ground, b) 0.75 MIU for units connected to a supply voltage of greater than 150 volts to ground.</p> <p><del>Exception: This test can be waived for a remotely mounted unit connected and grounded via a fixed supply connection or if the unit is an integral part of an end-product luminaire with a fixed supply connection and the end-product standard for the luminaire does not require a leakage current measurement when the supply connection is fixed.</del></p> <p><u>Exception: To address end-product standards where a measurement is not required when the supply connection is fixed, this test can be waived when a unit is 1) intended to be connected and grounded only to a fixed supply connection based on manufacturer installation instructions and 2) marked in accordance with 9.3.7.</u></p>
8.9.4		<p>The measurement circuits for leakage current is illustrated in Figure 8.5. <u>During the test the grounding connection from the unit is left open and not connected to the grounding conductor of the branch circuit supply.</u></p> <p><b><i>New clause added;</i></b></p> <p>The meter input network is defined in Figure 8.6. The meter that is actually used for a measurement need only indicate the same numerical value for a particular measurement as would the defined instrument; it need not have all the attributes of the defined instrument. Over the frequency range 20 Hz to 1 MHz with sinusoidal currents, the performance of the instrument is to be as follows:</p>
8.9.4.1		<p>a) The measured ratio <math>V1/I1</math> with sinusoidal voltages is to be as close as feasible to the ratio <math>V1/I1</math> calculated with the resistance and capacitance values of the measurement instrument shown in Figure 8.6.</p> <p>b) The measured ratio <math>V3/I1</math> with sinusoidal voltages is to be as close as feasible to the ratio <math>V3/I1</math> calculated with the resistance and capacitance values of the measurement instrument shown in Figure 8.6. <math>V3</math> is to be measured by the meter M in the measuring instrument. The reading of meter M in RMS volts can be converted to MIU by dividing the reading by 500 ohm and then multiplying the quotient by 1,000. The mathematic equivalent is to simply multiply the RMS voltage reading by 2.</p>



CLAUSE	VERDICT	COMMENT
9	Info	<b>Markings</b>
9.3	Info	<b>Construction-related markings</b>
9.3.7		<i>New clause added;</i> When the Exception to 8.9.1 has been applied, the unit shall be marked "For use in permanently connected (fixed) equipment only" or the equivalent.
Supplement SD	Info	<b>REQUIREMENTS FOR LIGHT EMITTING DIODE (LED) PACKAGES</b>
SD2A	Info	<b>Ratings</b>
SD2A.1		<i>New clause added;</i>  Construction, performance and marking criteria in this Supplement are based on the following ratings as designated by the manufacturer:  a) Environmental (dry, damp, or wet location), b) Input supply (non-isolated, isolated, Class 2), c) Electrical and thermal (e.g. Maximum Forward Voltage, Junction Temperature), d) Suitability to form part of an enclosure, and e) Spectral Power Distribution Characteristics (as graph or data-set).  Exception: Item (e) is not required when the LED package operates in the visible light spectrum only.
SD8A		<i>New section added;</i>  <b>Photobiological Safety Assessment</b>
SD8A.1		The requirements in this section apply to Special-use LED packages with spectral power distribution characteristics outside of the visible light spectrum (400 – 700 nm).  Note: Evaluation per Section SD8A, may be performed for other LED package types based on manufacturer request.
SD8A.2		LED packages shall be investigated to determine their risk group classification in accordance with the requirements in IEC 62471. The assessment is to determine the level of optical radiation emitted, if any, within the following spectral bands. The measurement shall be performed with a stop aperture providing 1.7 mrad field of view (FOV) with a measurement distance of 200 mm as recommended in IEC 62471 for a non-GLS (general lighting services) light source.  a) Ultraviolet hazard – 200 nm to 400 nm; b) Retinal blue light hazard – 300 nm to 400 nm; c) Cornea/lens infrared hazard – 780 nm to 3000 nm; and d) Retinal thermal, weak visual stimulus hazard – 780 nm to 1400 nm.



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SD8A.3		The LED package is to be mounted by the manufacturer on a PWB assembly to represent the recommended mounting (heat dissipation) and solder methods. The PWB assembly shall include appropriate electrical connection means to the LED package (anode and cathode) so the supply test leads can be properly connected.
SD8A.4		The LED package shall be powered by a supply according to manufacturer recommendations for the rated forward current(s).
SD9	Info	<b>Markings</b>
		<b><i>New clause added;</i></b>
SD9.2		When the LED package is evaluated per Section SD8A, the specification sheet shall include the intended application as well as markings noted in SD9.3 – SD9.6 as applicable. This is to identify potential photobiological hazards that must be considered as part of integration of the LED package into end equipment.  Exception: The markings in SD9.3 – SD9.5 are not required for LED packages that are classified as both: a) Risk Group 1 or 0 for both Retinal Blue Light spectral bands; and b) Risk Group 0 for the remaining spectral bands. However, the manufacturer may optionally provide the marking described in SD9.5.
		<b><i>New clause added;</i></b>
SD9.3		Risk group and markings shall be consistent with the labeling and other information specified in IEC/TR 62471-2, Tables 1 and 2.
		<b><i>New clause added;</i></b>
SD9.4		The markings shall be presented in bold block print within a black-bordered two-section box on a yellow background, as follows. See Figure SD9.1 for a graphical example.  a) The risk group classification is to be identified in the upper box. When LED arrays exceed Risk Group 0 in more than one spectral band, the most severe risk group classification shall be used. b) The required labeling, information and guidance text is to be included in the lower box. When more than one hazard is noted, the text shall be printed in order of descending severity, each separated by a blank line.
		<b><i>New clause added;</i></b>
SD9.5		The following marking shall be provided verbatim:  “CAUTION – RISK OF PERSONAL INJURY. THIS LED PACKAGE IS NOT INTENDED FOR GENERAL ILLUMINATION AND MAY REQUIRE THE USE OF SPECIAL SAFEGUARDS. INSTALL AND USE ONLY IN STRICT ACCORDANCE WITH THE PRODUCT AND PACKAGING MARKINGS.”



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		<b><i>New clause added;</i></b>
SD9.6		When the apparent source size (of the LED package) is smaller than the FOV, the following marking or equivalent shall be included in the specification sheet.  “Integration of this LED package into LED light sources (arrays, lamps or luminaries) or addition of reflective or magnifying optics may change the expected photobiological safety characteristics of such devices. The assigned risk group classification of this LED package may not necessarily indicate the risk group classification of the LED light source.”
Supplement SJ	Info	<b>SPECIAL USE LED ARRAYS</b>
SJ6	Info	<b>Performance</b>
SJ6.1		LED arrays shall be investigated to determine their risk group classification in accordance with the <del>Photobiological Safety Assessment in UL 8800, the Outline of Investigation for Horticultural Lighting Equipment</del> requirements in IEC 62471. <u>The assessment is to determine the level of optical radiation emitted, if any, within the following spectral bands. The measurement distance from the light source to the measuring instrument shall be set at 200 mm as recommended in IEC 62471 for a non-GLS (general lighting services) light source.</u>  a) <u>Ultraviolet hazard – 200 nm to 400 nm;</u> b) <u>Retinal blue light hazard – 300 nm to 400 nm;</u> c) <u>Cornea/lens infrared hazard – 780 nm to 1400 nm; and</u> d) <u>Retinal thermal, weak visual stimulus hazard – 780 nm to 1400 nm.</u>
<b>The following changes reflect the July 6, 2021 changes:</b>		
6	Info	<b>Mechanical Construction</b>
		<b><i>New section added;</i></b>
6.7		<b>Polymeric potting compound</b>  Polymeric potting compound shall not leak, drip, or be released from a unit during any test conducted in accordance with this standard. See standard for details.
		<b><i>New section added;</i></b>
6.8		<b>Asphalt potting compound</b>  Asphalt potting compound shall not leak, drip, or be released from a unit during any test conducted in accordance with this standard. See standard for details.



CLAUSE	VERDICT	COMMENT
7	Info	<b>Electrical Construction</b>
7.4	Info	<b>Supply and load connections</b>
		<i>New section added;</i>
7.4.3		<b>Feedthrough receptacles</b>  Receptacles shall have suitable voltage and current load ratings and shall comply with one of the applicable requirements noted below. See standard for details.
9	Info	<b>Markings</b>
9.3	Info	<b>Construction-related markings</b>
		<i>New clause added;</i>
9.3.8		Direct plug-in and through-cord LED drivers with a feedthrough receptacle (or a supply cord terminating in a receptacle) shall be marked:  a) “Max ‘X’ model ‘Y’ units”, where the ‘X’ identifies the maximum permitted number of identical units from the same manufacturer, and ‘Y’ identifies the model number, and/or b) “Max ‘X’ amps” or “Max ‘X’ watts”, where ‘X’ identifies the maximum permitted electrical load.
		<i>New clause added;</i>
9.3.9		Installation instructions for a direct plug-in and through-cord LED driver with a feedthrough receptacle (or a supply cord terminating in a receptacle) shall include the manufacturer's recommendations for its proper use (e.g. intended use, output ratings and maximum electrical load (current, power), acceptable number of units that can be supplied from the same supply source, considerations for load distribution, cumulative leakage currents, etc.).
<b>The following changes reflect the September 23, 2021 changes:</b>		
6	Info	<b>Mechanical Construction</b>
6.7	Info	<b>Polymeric potting compound</b>
6.7.3		Polymeric potting compound that can touch any part of the insulation system of a transformer shall be tested in accordance with Supplement SA – Substitutions or Modification to an Electrical Insulation System in the Standard for Systems of Insulating Materials – General, UL 1446.  Exception No. 1: This test does not apply if the transformer is not used for the mitigation of the risk of electric shock or is not used to separate Class 2 circuits or LVLE circuits from hazardous circuits.



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		<p>Exception No. 2: This test does not apply if the transformer insulation system already includes the potting.</p> <p>Exception No. 3: This test does not apply if the insulation system is used up to the temperature permitted for class 105 (A) according to Table 8.1 of this standard.</p> <p><u>Exception No. 4: This test does not apply for thermosetting potting compounds where the insulation system of a transformer utilizes a thermoset varnish which completely encloses the coil windings-preventing the potting compound from making contact with the winding wire insulation.</u></p>
Supplement SB	Info	<b>REQUIREMENTS FOR TYPE HL LED DRIVERS</b>
SB1	Info	<b>Scope</b>
		<p>LED drivers which meet the requirements in this supplement are identified as Type HL. These requirements provide one option for evaluation of LED drivers that are intended for use in a Class I, Division 2 hazardous (Classified) location luminaires. The Standard for Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations, ANSI/ISA-12.12.01, has the full spectrum of requirements for electrical equipment for use in hazardous (Classified) locations.</p> <p><u>This Supplement has explosion protection by encapsulation requirements for LED drivers that are intended for use in a Class I, Division 2 hazardous (classified) location luminaires. LED drivers which meet the requirements in this supplement are identified as Type HL.</u></p> <p><u>Note: These requirements provide only one option for evaluation of LED drivers that are intended for use in hazardous (Classified) location luminaires. LED drivers that do not comply with the requirements of this Supplement can be evaluated for hazardous (classified) location applications per alternate requirements in the Standard for Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations, ANSI/ISA-12.12.01i. These alternate requirements provide options for compliance that cannot be addressed by this Supplement.</u></p>
		<b><i>New section added;</i></b>
		<b>Explosion Protection by Encapsulation Construction</b>
SB2A		<p>A Type HL LED driver provides a Class I, Division 2 means for explosion protection when all parts are fully encapsulated by being fully submerged in potting compound, unless otherwise permitted by this Supplement. Such fully potted constructions provide a seal for the potential sources of ignition from the flammable atmosphere.</p> <p>See standard for details.</p>