UL 8800 – Learn About The New UL Safety Standard For Horticultural Lighting Equipment

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Empowering Trust™

Introducing our Speaker

Ed Joseph

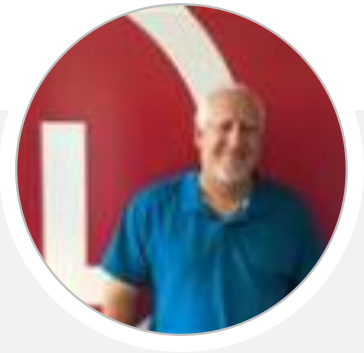
Principal Engineer - Lighting Safety

Background

Ed is a Principal Engineer for Lighting Safety at UL, having 40 years of product safety experience. He has performed equipment investigations and participated in codes and standards development for a wide range of commercial and consumer products including lighting equipment.

Ed represents UL on several Lighting Industry technical committees including the American National Standards Institute for Lighting (ANSLG), the American Lighting Association Engineering Committee (ALA), and is a member of the U.S. Technical Advisory Group TC34 for lighting.

Ed is responsible for developing and maintaining UL Lighting Standards for Track Lighting Equipment (UL1574), Stage and Studio Lighting Equipment (UL1573), and most recently is leading UL's safety program for Horticultural Lighting Equipment and is responsible for the development of UL 8800.



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Lighting Safety

Discussion Topics

- UL 8800 History of Development
- UL 8800 Scope and Definitions
- UL8800 Format and Approach
- Notable Difference between UL 8800 and Other Lighting Standards
- Discussion of Several Key Safety Requirements in UL 8800
- UL's Safety Certification Program Offerings for Horticultural lighting equipment
- UL 8800 Benefits

UL 8800 – History of Development

UL and the lighting industry Recognized need to have safety requirements specific to horticultural lighting equipment.

The first issue of the UL 8800 Outline of Investigation was published in May 2017.

The second issue of the UL 8800 Outline of Investigation was published in December 2018.

The First Edition of the UL 8800 Standard was published on August 30, 2019. Covers safety requirements for Horticultural Lighting Equipment and Systems intended for both the United States and Canada.

UL 8800 – Scope and Definitions

SCOPE, Section 1

1.1 The requirements contained in this Standard apply to lighting equipment intended for use in a horticultural environment and installed in accordance with the U.S. National Electrical Code (NEC), ANSI/NFPA 70 and the Canadian Electrical Code, Part I (CEC), CSA C22.1.

1.2 Equipment covered by this Standard is intended for horticultural lighting purposes and includes: horticultural luminaires, hardware, and horticultural systems intended for use in a plant growth environment.

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GLOSSARY , Section 5

5.3 HORTICULTURAL LUMINAIRE – A horticultural luminaire identified as such and intended to emit light at wavelengths that are intended for growing flowers, vegetables, and other plants.

5.4 HORTICULTURAL SYSTEM - A prefabricated chamber, cabinet, or open frame structure of which identified for the purpose outfitted with electrical infrastructure for the active optimization of plant growth. Systems may include lighting, shutters, controls, control panels, plumbing components (such as pump motors, solenoid valves, water reservoirs), cooling and heating components, as part of the plant growth management system.

UL 8800 – Format and Approach

Format

The First Edition of UL 8800 is organized in two parts:

PART I

HORTICULTURAL LUMINAIRES

PART II

HORTICULTURAL SYSTEMS

UL 8800 – Format and Approach

Approach

UL 8800 uses the approach of referencing applicable requirements in other existing UL and CSA standards and then adds amended requirements specifically for horticultural equipment.

Example:

9.	Electrical Construction
9.1.1.	A horticultural luminaire shall comply with the requirements in UL 1598 or CSA C22.2 No. 250.0, for Electrical construction, the supplementary requirements for flexible cords on luminaires, and, as applicable, the additional requirements in this section of the Standard.
9.5.	Flexible Cord
9.5.1.	Flexible cord may be used for the purpose of connecting a horticultural luminaire to the branch circuit, for the purpose of interconnecting horticultural luminaires, or for connecting a horticultural luminaire to a remote power source (e.g. LED driver, fluorescent ballast, or HID ballast).

UL 8800 – Format and Approach

Approach

For Part II, UL 8800 uses the approach of referencing applicable requirements in other existing UL and CSA standards for the applicable requirements for horticultural Systems

Another Example:

PART II – HORTICULTURAL SYSTEMS, Section 21 – General Requirements

21.1 A horticultural system shall comply with the relevant mechanical and electrical construction, performance, marking and installation instruction requirements in UL 1951 or CSA C22.2 No. 68.

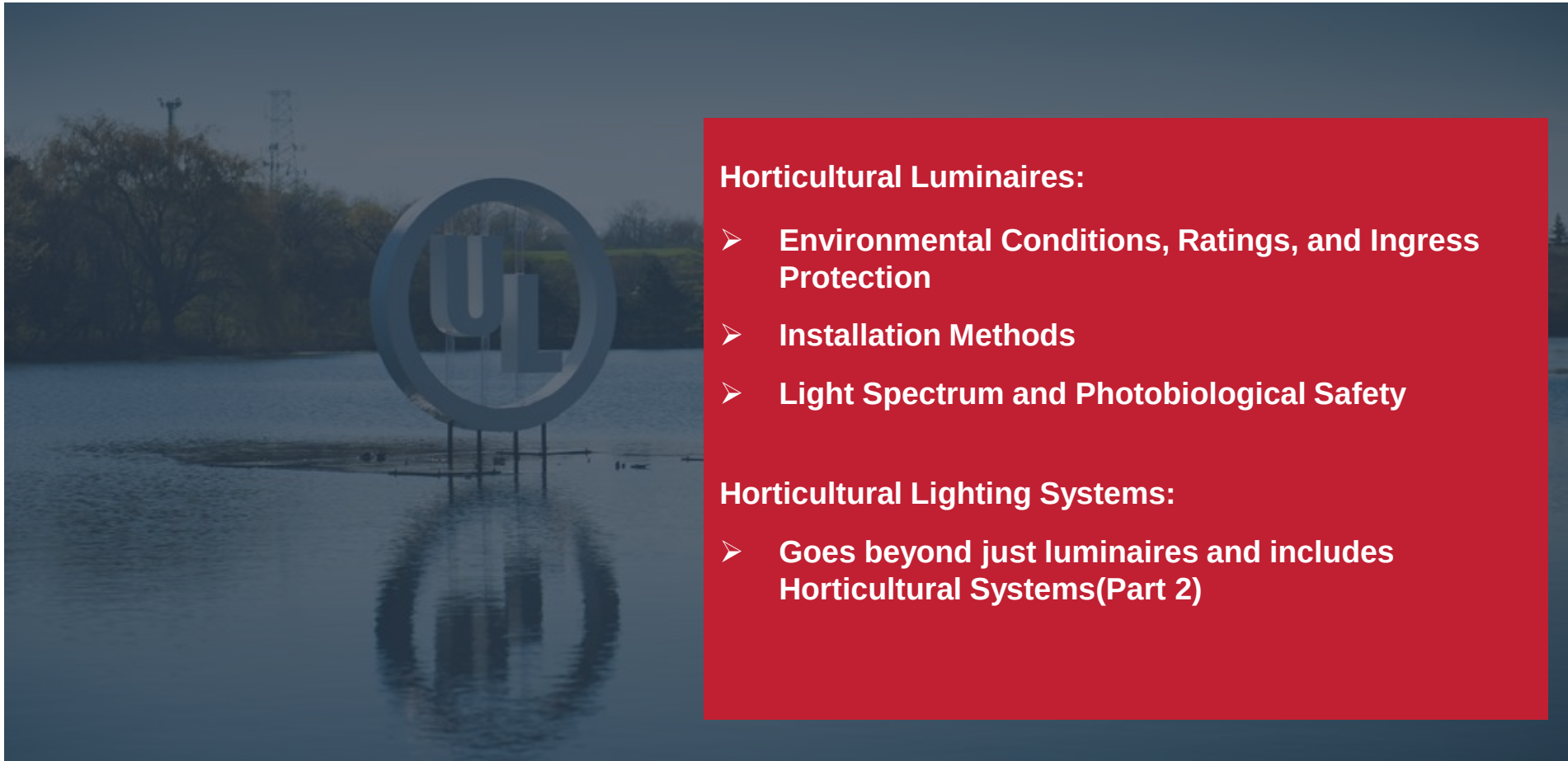
21.2 The overall mechanical strength of a rack horticultural system including shelves shall comply with the relevant requirements in UL 962 or CSA C22.2 No. 68 with respect to structural strength.

21.3 Luminaires and associated power units (i.e. ballasts, LED drivers, lighting controls) shall comply with the requirements in Part I of this outline of investigation.

21.4 A motor operated mechanical assembly shall comply with the relevant requirements in UL 73 or CSA C22.2 No. 68, with respect to the risk of electric shock, fire, and casualty hazards.

21.5 A fan shall comply with the relevant mechanical and electrical construction, performance and marking requirements in UL 507 or CSA C22.2 No. 113.

UL 8800 – Notable Differences



Horticultural Luminaires:

- **Environmental Conditions, Ratings, and Ingress Protection**
- **Installation Methods**
- **Light Spectrum and Photobiological Safety**

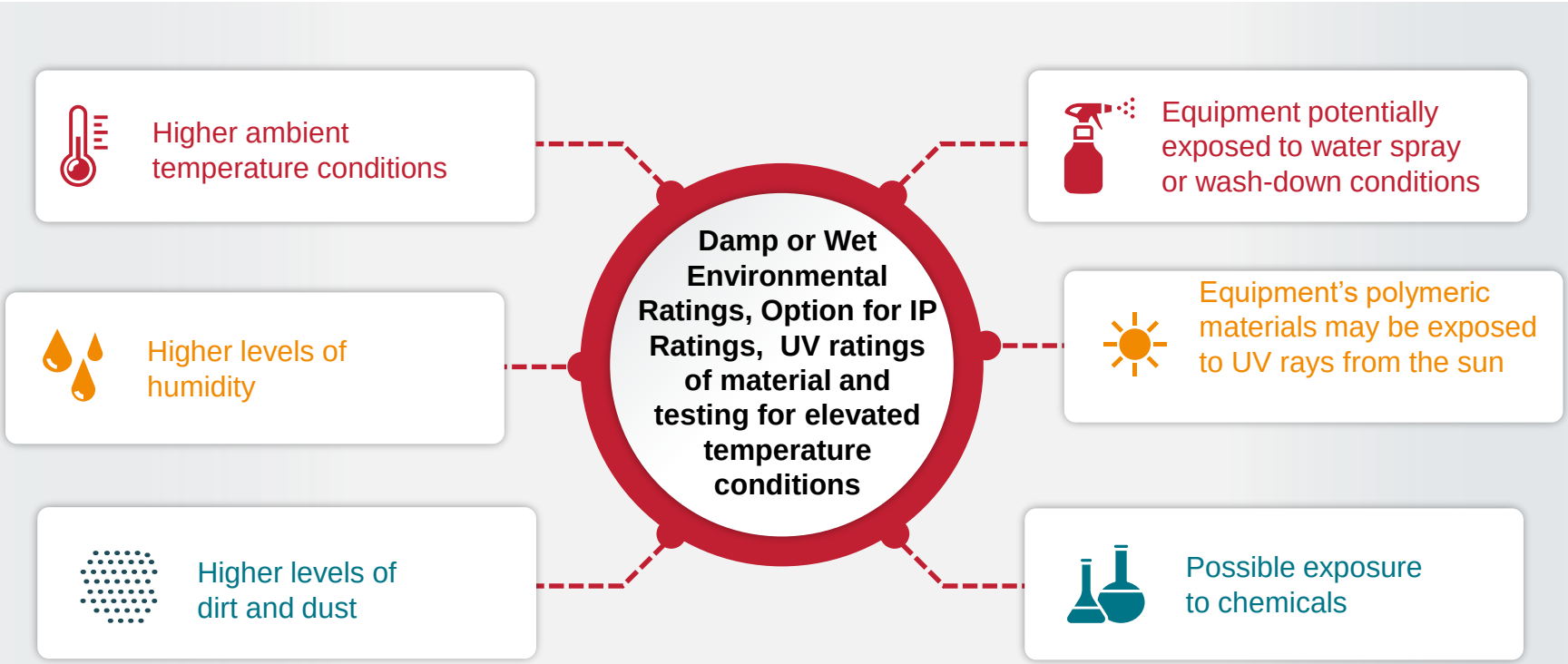
Horticultural Lighting Systems:

- **Goes beyond just luminaires and includes Horticultural Systems(Part 2)**

Horticultural Luminaire

Environmental Conditions, Ratings, and Ingress Protection

Environmental Conditions, Ratings, and Ingress Protection



Environmental Conditions, Ratings, and Ingress Protection

Section 13 - Environmental Ratings

13.1 Damp and wet locations.

13.1.1 A horticultural luminaire shall be rated suitable for a "damp" or "wet" location environment in accordance with the requirements in UL 1598 or CSA C22.2 No. 250.0. The determination for a "damp" or "wet" rating shall be based on the recommended installation environments in the manufacturer's installation instructions.

13.2 Exposure to dust and water (IP Codes).

13.2.1 A luminaire intended for use in an environment where it is exposed to excessive dust and water and is marked with an ingress protection code (IP code), shall be evaluated with the applicable tests for ingress of dust, solid objects and moisture of IEC 60598-1. The IP code marking on the horticultural luminaire shall be in format S24-L2, in accordance with the marking requirements in UL 1598 and CSA C22.2 No. 250.0.
13.2.2 When evaluated in accordance with 13.2.1, a horticultural luminaire shall have a minimum rating of IP54 (protection for dust and water splashing).

Section 8.2 - UV Protection of Polymeric Materials

8.2.1 A polymeric material such as an enclosure, barrier, baffle, or water shield exposed to the sun shall not degrade such that it no longer performs its intended function. Compliance shall be determined in accordance with either the UV Exposure Conditioning Test of UL 1598 or CSA C22.2 No 250.0, or the Ultraviolet Light Exposure Test of UL 746C or CSA C22.2 No. 0.17.

Horticultural Luminaire

Installation Methods, Wiring, and Connections

Installation Methods, Wiring, and Connections

- Often rack-mounted or chain-and-cable suspended
- Frequently moved or height-adjusted
- Common use of cords, plugs, and connectors for electrical connections
- Installation options for built-in vs. remotely located ballasts and/or LED drivers
- UL 8800 establishes requirements different from those in UL 1598 to address these installation needs

Installation Methods, Wiring, and Connections

Section 9 – Electrical Construction

9.3 Supply connections

9.3.1 A horticultural luminaire having metal parts or metallized polymeric parts that are accessible during user maintenance, or component replacement without the use of tools, and that can involve the risk of shock, shall be provided with a means of connection to a single branch circuit and shall have provisions for grounding in accordance with UL 1598 or CSA C22.2 No. 250.0, using one of the following methods:

a) Provisions for connection of conduit or other permanent wiring method as indicated in UL 1598 or CSA C22.2 No. 250.0
b) A length of a flexible cord
c) A length of flexible cord with an assembled-on plug having a NEMA configuration
d) A power supply cord (length of flexible cord with a molded-on plug) having a NEMA configuration
e) Provisions for a proprietary wiring system (harness) and the markings in accordance with 19.1.2

9.4 Connections to a remote power source.

9.4.1 A horticultural luminaire intended for connection to a remote power source shall be provided with a means of connection to the remote power source (LED driver, fluorescent ballast, or HID ballast) using one of the following methods:

a) Provisions for connection of conduit or other permanent wiring method as indicated in UL 1598 or CSA C22.2 No. 250.0
b) A length of a flexible cord
c) A length of flexible cord with an assembled-on plug having a non-NEMA configuration
d) A power supply cord (length of flexible cord with a molded-on plug having a non-NEMA configuration)
e) Provisions for a proprietary wiring system (harness)

Installation Methods, Wiring, and Connections

Section 9 – Electrical Construction

9.5 Flexible cord

9.5.1 Flexible cord may be used for the purpose of connecting a horticultural luminaire to the branch circuit, for the purpose of interconnecting horticultural luminaires, or for connecting a horticultural luminaire to a remote power source (e.g. LED driver, fluorescent ballast, or HID ballast).

9.5.2 Flexible cord used in accordance with 9.3 and 9.4 shall be:

a) At least of the hard-usage type as defined in UL 1598 or CSA C22.2 No. 250.0
b) No less than 18 AWG (0.82 mm2) and sized suitable for the current associated with its application taking into account manufacturer instructions for connection of interconnection cords and additional loads
c) Rated for a voltage, current and temperature suitable for the application
d) Rated "water resistant" for lighting equipment having a "wet location" or "IP" rating for protection against water ingress and "UV resistant" if exposed to the sun or to a light source having UV radiation output characteristics

9.6 Attachment plugs, mating receptacles, and connectors.

9.6.1 Attachment plugs, mating receptacles, and connectors shall be rated for the use, temperature, environmental condition, voltage, and current encountered during operation as described in the manufacturer's installation instructions.

9.6.2 Attachment plugs, mating receptacles, and connectors identified for horticultural use shall comply with the requirements in UL 498 or CSA C22.2 No. 42; or UL 1977 or CSA C22.2 No 42, if assembled-on; or UL 817 or CSA C22.2 No. 21, if molded-on. They shall additionally comply with applicable requirements in this outline of investigation based on their intended use and application as described in the manufacturer's installation instructions.

Horticultural Luminaire

Light Spectrum and Photobiological Safety

Light Spectrum and Photobiological Safety

Spectral Characteristics:

The spectral output characteristics of Horticultural luminaires is different than that of general lighting equipment and therefore requires different safety considerations.

Wavelengths of light important for plant growth can be potentially damaging to the human eyes and skin. (And, a Light source typically in close proximity to workers in the grow environment.)

UL 8800 includes a photobiological safety assessment, to determine the potential risk to people when exposed to these wavelengths of light emitted from a horticultural luminaire.

Tests are conducted in accordance with IEC 62471, Photobiological Safety of Lamps and Lamp Systems. Depending on the test results, product cautionary markings may be required.

Light Spectrum and Photobiological Safety

Section 15 – Photobiological Safety Assessment (Protection Against Injury to Persons)

15.1 A light source shall not pose a risk of optical injury to persons due to exposure necessary for the normal operation, maintenance and servicing of the equipment.

15.2 In order to determine compliance, a light source shall be subjected to a photobiological safety assessment across the wavelength range from 280 nm through 1400 nm 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 distance from the light source to the measuring instrument shall be set at 20 cm (7.9 in) as recommended in IEC 62471 for a non-GLS (general lighting services) light source.

a) Ultraviolet hazard– 280 nm to 400 nm
b) Retinal blue light hazard – 300 nm to 400 nm
c) Retinal blue light or thermal hazard – 400 nm to 780 nm
d) Cornea/lens infrared hazard – 780 nm to 1400 nm
e) Retinal thermal, weak visual stimulus hazard – 780 nm to 1400 nm

15.3 The assigned risk group classification for the lighting equipment resulting from the photobiological safety assessment shall be Risk Group 0 (Exempt), Risk Group 1, or Risk Group 2.

15.4 Lighting equipment having a light source classified as Risk Group 3 is not permitted.

15.5 A horticultural luminaire having a user-replaceable light source, such as a fluorescent or HID lamp, is not required to comply with 15.1 and 15.2 providing the lighting equipment is marked in accordance with 19.4.3 and repeated in the installation instructions.

UL's Safety Certification Offerings for Horticultural Lighting Equipment

UL’s Safety Certification Programs

Four Certification categories (CCNs) dedicated for Horticultural Lighting Equipment for which UL 8800 is applied:

- Provides manufacturers the opportunity to distinguish their lighting equipment for horticultural use from general lighting equipment.

IFAU	IFAU7	HRTI	HRTI7
Horticultural Luminaires Certified for use in the United States	Horticultural Luminaires Certified for use in Canada	Horticultural Lighting Systems Certified for use in the United States	Horticultural Lighting Systems Certified for use in the Canada

UL's Safety Certification Programs

Four Certification categories dedicated to Special Use lamps and Led Arrays that are designed for use in either germicidal or for horticultural lighting application.

OOLZ	OOLZ7	OORF2	OORF8
Special-Use Self-ballasted Lamps Certified for use in the United States	Special-Use Self-ballasted Lamps Certified for use in Canada	Special-Use Light-Emitting-Diode Arrays - Component Certified for use in the United States	Special-Use Light-Emitting-Diode Arrays-Component Certified for use in Canada

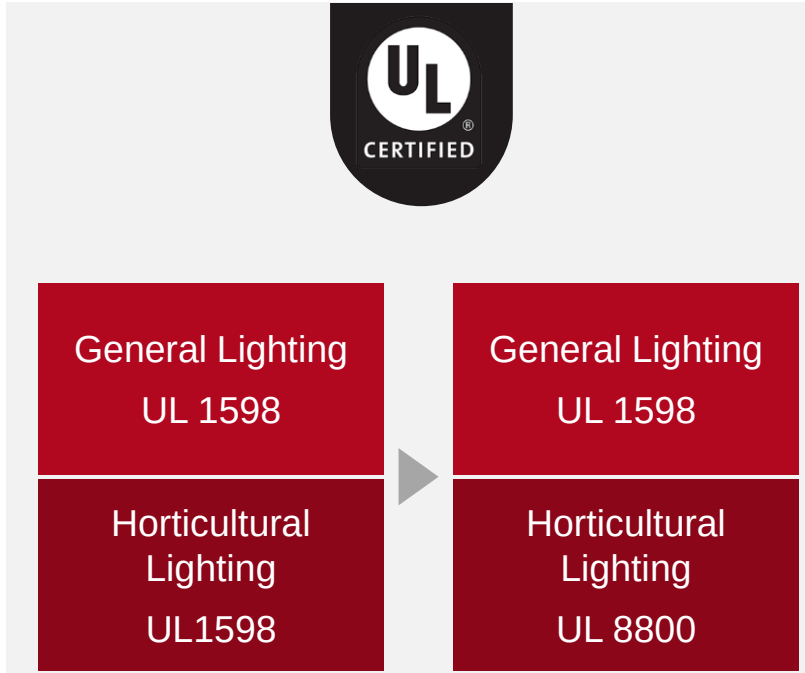
OOLZ, OOLZ7 - Evaluated using the self- ballasted lamp standards plus UL 8800 photobiologal safety evaluation.
OORF2, OORF8 - Evaluated using the LED Array standards plus UL 8800 photobiologal safety evaluation.

UL8800 - Benefits

Prior to UL 8800, lighting equipment used in a horticultural environment were evaluated by UL and others, using safety requirements established for general lighting equipment, UL 1598, and were certified under general lighting categories.

Horticultural Lighting equipment differs from general illumination lighting in several ways including: spectral output and photobiological considerations; operating environment, environmental ratings, and ingress protection (IP); and installation methods, wiring and connections.

UL 8800 was developed to provide a targeted scope for horticultural luminaires and systems in order to address these application differences.



How Can We Help?

Interested in a quote, an early engagement project, or a preliminary investigation?

Please reach out to:

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