

# INSTALLATION SAFETY

# LED LINEAR LAMPS

## PLUG AND GO™ - DIRECT REPLACEMENT LAMPS (PLUG AND PLAY) (UL TYPE A)

Like other lamps, all linear LED lamps (including plug-and-play) must meet the Standard C22.2 No. 1993-2012 – Self-ballasted lamps and lamp adapters. Retrofit lamps (ballast-bypass and LED lamps retrofit kits that include a driver) must additionally meet the standard ANSI/UL 1598C – 2014, Standard for light emitting diode (LED) retrofit luminaire conversion kits.

Both the UL (Underwriters Laboratories) and ETL (Electrical Testing Labs) marks demonstrate compliance with the minimum requirements of widely-accepted LED lamp safety standards as determined through the independent testing by UL or a third-party Nationally Recognized Testing Laboratory (NRTL). An NRTL is an independent laboratory recognized by the Occupational Safety and Health Administration (OSHA) to test and certify lamps to the specifications of applicable safety standards. As part of that testing regimen, the lamp manufacturer has agreed to periodic follow-up inspections to verify continued compliance.

Regardless of implementation type (plug-and-play LED linear lamps, ballast-bypass linear lamps, or linear lamps with a LED driver), the products are all tested in an existing fixture to the same standards for risk of fire, electric shock, or mechanical hazard.

Shock and fire hazard is evaluated by simulating and testing worst-case scenarios for current surges and temperature increases.

## UL 1598C - STANDARD FOR LIGHT-EMITTING DIODE (LED) RETROFIT LUMINAIRE CONVERSION KITS

- 1.1 These requirements apply to light-emitting diode (LED) retrofit luminaire conversion kits that are intended to replace existing light sources and systems including incandescent, fluorescent, induction, and high intensity discharge (HID) light sources in previously installed luminaires that already comply with the requirements in the Standard for Luminaires, UL 1598. The kits are intended for use on:
  - a) Luminaires where specific luminaire model or part numbers are identified in the kit installation instructions; or
  - b) One or more generic type luminaires that meet specific criteria identified in the installation kit instructions.
- 1.2 This standard contains requirements that supplement the luminaire requirements contained in the Standard for Luminaires, UL 1598, that apply to the retrofit kit and the luminaire.
- 1.3 LED retrofit kits covered by these requirements include but are not limited to LED lamps and arrays, LED control modules, LED drivers, LED power supplies, wiring, lampholders, brackets, wire connectors, reflectors, diffusers, and other associated mechanical, electrical, or optical devices.
- 1.4 This standard does not cover luminaire reflector kits covered by the Standard for Supplemental Requirements for Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, UL 1598B.
- 1.5 This standard does not cover luminaire conversion lamps that are intended to replace existing lamps without any modification, rewiring, or component replacement in the luminaire other than direct replacement of the lamp using the existing lampholder. Requirements for these direct replacement lamps are specified in the Standard for Self-Ballasted Lamps and Lamp Adapters, UL 1993.
- 1.6 This standard does not cover retrofit luminaire conversion kits for amateur movie lights; aquarium lights, cabinet lights, decorative lighting strings, combination fan/IR lamps used for heating, electric signs, exit signs, junction boxes for swimming pool fixtures, lamp adapters, low-level path marking and lighting systems, low-voltage landscape lighting, low voltage lighting fixtures for use in recreational vehicles, low voltage marine lighting, luminaires for hazardous locations, luminaires for recreational vehicles, marine navigational lights, portable electric displays, portable hand lamps, portable luminaires, portable sun/heat lamps, self-ballasted lamps and lamp adapters, submersible luminaires, swimming pool luminaires, temporary lighting strings, therapeutic lamps, track lighting systems, under-cabinet lights and cord-connected under-cabinet lights, and unit equipment for emergency lighting.
- 1.7 Additional requirements for LED retrofit luminaire conversion kits intended for marine luminaires (marine-type fixtures) are in Supplement sa.
- 1.8 Additional requirements for LED retrofit luminaire conversion kits intended for stage and studio luminaires are in Supplement sb.

## DIRECT WIRE (BY-PASS) INTERNAL DRIVER LAMP-STYLE RETROFIT KITS (UL TYPE B)

1. The customer is using the correct type of socket for the lamp (non-shunted).
2. The lampholders should be in good working order (not old and brittle).
3. The fixture is a quality UL listed fixture.
4. The customer installs them as directed and to electrical code.

### PATH OF ELECTRICAL CURRENT Non-Shunted vs. Shunted

