

Planning for Sustainability Success: Complete this **Site Survey before Installation** of LED Lighting

- _____ 1. Verify lighting circuit voltage with VOM

- _____ 2. Is the building electrical system a “No Ground Delta”?

- _____ 3. Have you Tested your Building’s Ground Resistance to confirm NEC compliance within the last year? Last three years?

- _____ 4. If using existing Controls, are they Compatible with the LED Fixtures? Are you ordering dimmable fixtures of the same type?

- _____ 5. Do you have Variable Frequency Drives (ex. Machine Tools, VFD HVAC fans), Welders, Large Induction Motors, Arc Furnaces or other potential sources of poor power quality?

- _____ 6. Have you confirmed maximum ceiling temperatures are less than the operating temperature limit for the LED fixtures?

- _____ 7. Have you experienced tripped circuit breakers, or occasional unexplained dimming or blinking of lights?

- _____ 8. Does your electrical system have a Surge Protection Device (SPD) at the service entrance, and also an SPD in the lighting distribution panel (these are known as Zone 1 and Zone 2 surge protection).

- _____ 9. Does your lighting distribution panel supply other loads? If so, what type?

- _____ 10. Does your lighting distribution wiring include EGCs (equipment grounding conductors) directly connected to the building ground?

Important Notice Concerning **Wiring & Grounding**

Big Shine's LED lighting fixtures will deliver many years of efficient service – if the fixtures are installed according to these instructions. Solid State LED Lighting and Lighting Controls are more sensitive to wiring and grounding problems than traditional lighting such as MH bulbs and fluorescent tubes. In addition, LED lighting has well-defined temperature limits which must not be exceeded. Failure to comply with these instructions may create a safety hazard and will void the warranty of the fixture.

GROUNDING

1. The ground wire in each fixture electrical cable must be connected to a dedicated grounding wire. The insulation jacket for the fixture ground wire will be green or green with a yellow stripe. Connect the ground wire first, then the neutral and then the line.
2. The grounding wire must be electrically separate from the ungrounded neutral conductor.
3. Grounding wires must be connected to a building ground with an impedance of less than 25 Ohms as required by the National Electrical Code (NEC). Impedance of 10 Ohms or less is strongly recommended to allow for seasonal variation in soil conditions. The International Electrical Testing Association specifies ground electrode testing every three years; annual inspections are recommended as part of routine facility maintenance plans.
4. Big Shine LED fixtures for outside/exterior lighting must be installed according to NEMA Lighting Systems Division Document LSD 80-2018, Installation Guidelines for Outdoor Luminaires – Grounding Considerations. This document is available for free download at the NEMA website.

RETROFIT OF EXISTING FIXTURES WITH LED TUBES AND BULBS

5. If an existing fixture with neutral-to-ground connection at the fixture terminals is to be retrofitted with LED tubes or bulbs, it must not be connected to a supply voltage that does not have a neutral reference.
6. If the existing fixtures have ballasts which are to be bypassed, install the adhesive label inside the fixture according to instructions provided with the bulbs or tubes. The label is necessary to document the electrical modification to the fixture. Failure to do so will create a safety hazard.

PROPER OPERATION OF EMERGENCY GENERATORS

7. If the new LED lighting will be connected to an emergency generator system during a power outage, verify that the emergency generator is able to operate with the resulting leading power factor and meet the inrush current demand. Computers, LED Lighting and other electronic devices have capacitors in their power supplies, all of which create a leading power factor and inrush current demand.

Important Notice Concerning **Wiring & Grounding**

POWER QUALITY AND SURGE PROTECTION DEVICES

8. Big Shine LED fixtures have an internal Surge Protection Device (SPD). Supplemental SPDs are required for outdoor installations, for industrial facilities, and for any installation which experiences power quality problems including impulsive transients (voltage spikes). Supplemental SPD requirements can be found in “Commercial and Industrial Outdoor LED Lighting Dept. of Energy Surge Requirements with reference to IEEE C.62.41-2002” and related documents (www.littelfuse.com and www.bigshineled.com/resources). Consult Big Shine Energy for more details.

Correct practice in Commercial buildings is to be equipped with ‘surge protection in layers’. The first layer is an SPD at the building power service entrance. This is known as “Zone 1 surge protection”. Next, there must be a coordinated SPD in the lighting distribution panel (“Zone 2 surge protection”). Big Shine LED fixtures are equipped with built-in and, for outdoor and for heavy industrial facilities, supplemental SPDs. Together these constitute “Zone 3 surge protection”. If LED fixtures are installed in a building lacking Zone 1 and/or Zone 2 protection, then the lighting fixtures will become the preferred path to ground for any voltage disturbance in the building. LED fixtures are not designed to cover for missing Zone 1 and Zone 2 surge protection. For a more detailed explanation see: http://lightningsafety.com/nlsi_lhm/surge.html

AVAILABLE SERVICES

Please contact us if you would like to discuss our available services to support your **Lighting, Controls, Measurement and Verification, Building Grounding Assessment, Lighting Panel SPD Assessment, Power Quality Correction** and more.

FAQs

1. Is it ok to incrementally replace the existing lighting fixtures (HID, MH, HPS, fluorescent) as they burn out with LED fixtures?

Ans. This is not recommended and will void the Warranty. Mixing LED and other fixture types on the same electrical branch circuit may expose the electronic drivers of the LED fixtures to impulse transients (‘voltage spikes’) and reduce the life of the drivers.

2. What is the concern about a “No Ground Delta” electrical system?

Ans. Operating systems ungrounded is a major problem in that power system overvoltages are not controlled. In some cases, these overvoltages are passed through transformers into the premises wiring system. Common sources of overvoltages include lightning, switching surges and contact with a high-voltage system. Transient overvoltages are not controlled, which, over time, can result in insulation degradation and failure. System voltages above ground are not necessarily balanced or controlled.

FAQs

Destructive arcing burndowns can result if a second fault occurs before the first fault is cleared. Ungrounded systems may experience severe transient overvoltages. LED lighting should not be installed in a No Ground Delta building unless special protections have been added. (<https://iaeimagazine.org/magazine/2010/03/16/are-we-really-ungrounded/>)

3. Why is the Building's Ground Resistance so important?

Ans. Traditional lighting, including metal halide and fluorescents, were not very sensitive to impulse transients ('voltage spikes'). In contrast, LED lighting requires a precision electronic power supply called a "driver". The driver converts higher voltage AC current into the carefully regulated DC current required by the semiconductor LED chips. The driver, and the LEDs themselves, must be protected from voltage spikes. This is accomplished by Surge Protection devices which become conductive when voltage exceeds a pre-set threshold. In order to divert the voltage spike away from the driver, the SPD must be connected to a low-resistance ground path. Before installing LED lighting, verify that the Earth Ground Resistance for the grounding conductor in the lighting circuits is less than 25 Ohms as specified in NEC 250.56, and preferably less than 5 Ohms as recommended by both the NFPA and the IEEE.

4. What are some examples of incompatible controls?

Ans. LED fixtures to be used with lighting controls should be ordered with "Dimmable" drivers; choose a dimming method that will be compatible between the driver and the controls (for example, 0 – 10V, DALI, DMX (Digital Multiplex) dimming). In general, dimmers that were used with incandescent lighting cannot be used with LED lighting. Examples include Phase-cut dimmers, forward-phase control (TRIAC) dimmers, and electronic low-voltage (ELV) (reverse-phase control) dimmers. Photosensors (photocells) used with tungsten (incandescent and metal halide) and fluorescent lighting may not work with LED lighting. Consult the manufacturer's specification sheet to determine if there is a listing for "LED" under the Rated Loads section and verify that, if installed, the total LED load is within the rating.

5. If we have Variable Frequency Drives or other potential sources of poor power quality, does it mean we can't install LED Fixtures?

Ans. Not at all, but it does mean that a power quality evaluation be performed prior to installation, and the likely requirement to add a panel mounted supplemental Surge Protection Device, for example ASCO Power Technologies™ devices.

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