

LED Emergency Retrofits

New Emergency Lighting Options for Fluorescent Tube Replacement Projects

Executive Overview

An easy way to reduce energy and labor costs is by retrofitting existing fluorescent lighting systems with LED tube lamps. Retrofitting has proven to be a cost-effective way to upgrade lighting systems and lower energy costs with minimum expense. Rather than replacing luminaires, users retrofit them with LED T8 and T5 lamps and receive the benefits of solid state lighting, often without requiring fixture modifications. There is, however, another factor to be considered in addition to a simple LED T8 conversion; any lighting retrofit must provide emergency lighting as an integral part of the conversion. For end-users and installers, upgrading to LED can be a challenge unless a simple, cost-effective way to include emergency lighting is included.

This white paper will discuss installation strategies for linear fluorescent to TLED retrofits that include emergency lighting options.

When the Lights Go Out...

Power failures happen. When power goes out in a manufacturing facility, the machinery stops, including many of the safety systems. Without power, retailers lose the ability to process transactions. Ventilation and communications systems shut down; elevators in high-rise office buildings stop running.

Loss of power could be the result of something simple, such as a tripped circuit, or it could be a symptom of something larger and more dangerous such as a fire or natural disaster. That's why regulators are increasingly requiring emergency lights in commercial or public buildings. Reliable emergency lighting is essential so people can see to navigate their way to the exits and safety.

Whether the building is equipped with fluorescent or LED lighting, regulations require adequate lighting so people can exit safely. For fluorescent lights, this usually means installing an emergency lighting ballast with a battery backup (BBU). When retrofitting to more energy-efficient, cost-effective TLEDs, there is still the requirement to provide emergency lighting, but this requires a new LED driver and backup power system.

Considering a retrofit project using LED tubes?

Don't forget Emergency
Lighting Requirements

What are your local lighting requirements?

Safety code specifications will outline strict guidelines, such as:

- Foot candles of light required for safe egress
- Length of time emergency lights must remain illuminated
- Time required for emergency lighting batteries to recharge
- Method and frequency of testing emergency lighting

Emergency lighting regulations vary by country, state and city. To learn more about safety requirements related to your project, consult:

- U.S. – The National Fire Protection Association (NFPA) 101 Life Safety Code, and be sure that emergency lighting retrofit kits are UL 924 certified.
- Europe – The International Electrotechnical Commission, which sets the required IEC / EN 60598-2-22 safety standard.

The larger the building, the more time required for evacuation. The National Fire Protection Association (NFPA) estimates that it takes a maximum of 30 minutes to evacuate most commercial structures (other than high-rise buildings), which is why most fire and safety codes require emergency lighting to operate for a minimum of 90 minutes, three times the safety factor, allowing for obstacles and challenges in evacuation.

The NFPA's Life Safety Code specifies that the minimum illumination from emergency lighting must be at least 1 foot candle (10 lux), measured throughout the exit path. Most emergency power systems depend on batteries that discharge over time; for this reason the lighting specifies that there are never less than 0.1 foot candles at any point along the exit way. This means that most buildings need to have multiple emergency luminaires strategically placed to illuminate the paths of egress.

Components of Emergency Lighting

Exit signs and path markers are important parts of the emergency lighting system, but they are limited to providing directional information. The critical components of an effective emergency lighting system are luminaires that generate sufficient illumination to light the exit path.

The battery power source needs to meet the minimum standard of providing 90 minutes of power for emergency illumination. Most emergency luminaires are equipped with their own battery packs connected between the building's power source and the luminaire so it remains charged until needed. Since LEDs require less power to operate, less expensive battery packs can be used to power emergency lighting.

Many lighting manufacturers are including emergency lighting in LED luminaires since many city and state building codes require that lighting installed in a new building or retrofit project provide it. When older fluorescent systems are replaced with energy-saving TLEDs, adding separate low-power LED emergency lighting should also be included.

LEDs Are Gaining Popularity for Lighting Retrofits

Another advantage of using LED linear lamps for lighting upgrades is that most lamps with linear LED arrays can be retrofitted into existing fixtures with little or no modification. Old fluorescent ballasts can be removed or taken out of the luminaire circuitry with a simple rewiring. For example, there are different lampholder types such as pre-heat, rapid-start, and instant-start, and some lamps are powered at both ends versus two pins in a single lampholder.

Three basic components of an emergency lighting system

- 1 Emergency lighting luminaires**
Standard luminaires fitted with emergency light source
- 2 Emergency power source**
Individual battery packs for each emergency luminaire
- 3 Transfer switch**
Triggers the emergency lighting systems when normal power is lost

This approach to retrofits also saves significantly on labor time and cost, since the lamps can be placed directly into the existing fluorescent fixtures by nearly anyone. No specific technical skill is needed; it's exactly like changing a standard fluorescent lamp.

Clearly, LED T8 lamps are more efficient, last longer, and reduce energy and maintenance costs over time when compared to fluorescent. However, retrofitting to LED lamps creates a performance gap when it comes to emergency lighting. When existing fluorescent fixtures are retrofitted to accommodate new LED tubes, the old electronics are removed, including any emergency ballasts, or if the ballasts remain, they no longer operate in emergency mode since there aren't any fluorescent lamps to illuminate.

A new and Unique Approach to Emergency Lighting Retrofits

As mentioned, safety regulations require adequate emergency lighting at specified intervals to provide a clearly lighted path in the event of a power outage. When replacing T8 fluorescents with LED lamps, installers have the option to either install separate emergency lighting fixtures, each with its own power source, or to add emergency lighting capability to the already-installed LED luminaires.

Increasingly, installers have determined that adding a self-contained emergency LED retrofit system to installed fixtures is the easiest and most cost-effective way to upgrade existing luminaires. Upgrading installed LED fixtures provides the option of upgrading only as many luminaires as are needed to meet safety regulations without having to upgrade every single luminaire.

The best designed LED emergency lighting systems include a light source (the LED module), an emergency LED driver that activates immediately when power is lost, and a separate backup battery that can be replaced as necessary over time. Emergency lighting systems also should be easy to install, ideally right into the existing fixture so they can be wired at the same time the LED lamps are installed to minimize labor costs.

Since these systems are specifically designed for emergency lighting, additional features to be aware of include operation at various light output levels and different run times to ensure compliance with regional and local safety standards. For installers, having universal input and adaptable low-voltage output means using the same system for various lighting installations, regardless of the luminaire. The batteries will require periodic replacement, so it's important to make sure the battery not only charges during normal operation, but also has an easy-to-read indicator to signify when the battery is approaching its end-of-life.

Why are LED tubes so popular?

- 1** Longer operating life than fluorescent. Fewer tube replacements and lower long-term maintenance costs.
- 2** Superior lumen maintenance. LEDs will remain bright longer than fluorescent.
- 3** LED luminosity is tunable. Light output can be adjusted so new fixtures match the characteristics of existing fixtures.
- 4** LED tubes with integrated drivers are more energy efficient than those that use fluorescent ballasts
- 5** Many LED tubes are eligible for rebates from local utility companies

A Case Study for LED Emergency Lighting Retrofits

One national bank is benefitting from adding emergency lighting to LED fixtures. The bank decided to upgrade its lighting to LED lamps at over 5,000 branches across the United States. The upgrade was estimated to save 50% on current energy costs, but each branch had to be equipped with emergency lighting as well.

With 5,000 locations, the bank's installation contract called for the retrofit of 1.4 million installed luminaires covering 25 million square feet. With so many branches, there were multiple types of fixtures. To simplify the emergency installation portion of the massive project, the company decided to standardize on one type of LED emergency lighting retrofit kit (in this case, Fulham's HotSpot1 LED Emergency Lighting System), taking advantage of its universal voltage input (120-277V) and multiple light output and run time configurations, which simplified installation. The HotSpot1 kits are also UL-Classified for in-field installation.

By using LED emergency kits, the lighting contractor could easily install as many emergency lighting modules as needed at each branch to comply with local safety codes; typically 10 to 30 LED kits per installation. The battery backup is guaranteed to deliver a minimum of 90 minutes of power, depending on the configuration. Batteries are easily replaced and the emergency lighting systems should function trouble-free for five years or more.

Conclusion

Clearly, fluorescent lighting is on its way out as new, more efficient LED lighting solutions come to market. Solid-state lighting is more energy efficient, lasts longer, and is non-toxic, unlike "glass and gas" fluorescent lamps. LED lamps can be easily installed in existing fluorescent fixtures with little or no modification. With any fluorescent to LED retrofit, the goal is to deliver maximum energy savings with minimal labor costs.

At the same time, a new generation of LED emergency lighting retrofit modules is simplifying the installation of emergency lighting as a vital component of LED lamp upgrades. LED emergency retrofit kits are available in various sizes and configurations and can be installed in virtually any LED lamp luminaire. These low-maintenance LED emergency systems should last for years without service.

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Emergency Lighting Retrofit with HotSpot1 Kit in a Typical Fluorescent Troffer

