

## Architects and Engineers give Green Light to Photo-luminescent Exit Signs

*Most of the USA's 100 million electrically powered exit signs use between 2 and 40 watts of power and contain batteries and circuit boards that are now recognized as hazardous "universal wastes." An increasing number of new and refurbishment building projects are 'glowing in the dark' with Photoluminescent exit signs that are powered from nearby area lighting and are constructed of non-hazardous recyclable materials.*



Progressive building owners, architects and engineers focusing on energy efficient and sustainable products are paying more attention to the types of exit signs on their lighting fixture schedules. From a 'green' perspective, they know the most popular fixture may not be the best choice.

Today, well over 90% of the exit signs being installed into new facilities employ LED [Light Emitting Diode] lamps that use 2 – 5 watts of power and have an expected service life of 20 – 25 years. Compare this to the popular exit signs of the 1970s and 1980s that used 20 to 40 watt incandescent and compact fluorescent bulbs with service lives of months, and its easy to see how the current love affair with LED exit signs evolved.



Although a giant step forward with respect to energy conservation and bulb life, LED exit signs have adverse safety, efficiency and sustainability issues when compared to another evolving technology, the non-electrical Photo-luminescent exit sign.

Not to be confused with industrial looking radio-luminescent Tritium exit signs that glow from the radioactive decay of hydrogen to helium, Photo-luminescent [PL] exit signs use a non-toxic, non-radioactive compound of strontium oxide aluminate to store ambient light energy, and then when the light is removed, to release the stored energy as an intense green-yellow glow. It's the same "glow-in-the-dark" technology used in toys and other curios, but with a radiance that is much brighter and longer lasting.

### Glow Safely

PL exit signs and systems have been marketed since the early 1990's, primarily for low level exit systems. However, with the advent of more effective glow-in-the-dark compounds, PL exit signs are now UL listed and accepted by the NFPA for both high and low level exit sign applications. UL and NFPA recognize that, as long as nearby lighting is on a few minutes before an emergency, PL exit signs are almost failsafe.

New York City went a step further last year and passed Local Law 26 requiring installation of PL exit signs and marker systems into many new and existing high rise office buildings. This extraordinary measure is a result of studies of the World Trade Center bombings which confirmed that building occupants exited faster and safer in those areas that were outfitted with PL technology. LED and other electrically based technologies rely on emergency generators, battery back-ups and light bulbs – all of which can and unfortunately do fail during emergencies.

## *Glow Efficiently*

On a sign in the box basis, architecturally attractive PL exit signs appear to cost more than lower end LED exit signs but after factoring-in the costs of installing and testing the signs, PL exit signs are considerably less expensive than nearly all LED exit signs – at least 40% less. Since PL exit signs work off of area lighting, there are *no* electrical connections to engineer, install and test, so the cost of installation is usually the cost of the sign and the cost of a tradesman [usually not an electrician] to spend 5 – 10 minutes affixing the sign to the building wall or ceiling.

The operating costs of a PL exit sign are also significantly less than an LED exit sign because there are no power costs, no batteries or bulbs to replace and no monthly and annual testing procedures. PL exit sign maintenance typically consists of verifying that charging lights are operational and periodic wipe-downs with a damp cloth.

With escalating construction and operational costs, these savings are increasingly attractive to building owners and operators. One large condominium community in San Diego is realizing savings of \$18,500 per year by using PL exit signs instead of LED exit signs in 70% of their exit sign locations.

## *Glow Green*

As sustainable design in the building industry becomes more prevalent, PL exit signs are the clear choice over radioactive tritium signs and electrically powered LED signs. Non-radioactive, non-toxic, non-hazardous, non-electrical and recyclable, PL exit signs are a green dream product.

The radioactive nature of Tritium exit signs increasingly precludes their use in many locations, including grade schools, college campuses, and corporate facilities. The United States Department of Defense Unified Facilities Criteria specifically prohibits Tritium exit signs in military facilities.

Regulated by the Nuclear Regulatory Agency, owners of tritium exit signs must notify the NRC if a sign is damaged or goes missing. Expressly prohibited from landfills, tritium exit sign owners must also notify the NRC when a sign is decommissioned and sent to a nuclear waste facility. Proper disposal typically costs about \$75 per sign.

To avoid the high costs and negative environmental impact of tritium exit signs, early in a project's schedule building owners should advise their architects and engineers that radioactive signs are not acceptable products. Although it only takes a little extra engineering to do it right, it is surprising how many architects and consulting engineers specify "self-luminous" tritium exit signs to minimize their workload.

Watt miser LED exit signs should not be considered a sustainable building product for 3 reasons.

1. Contribution to greenhouse gas inventory. Although 3 – 5 watts per sign is low compared to other electrically powered exit signs, it adds up when there are well over 100 million exit signs in the USA using about 35 megawatts of electricity [Energy Star info]. If all these signs were converted to LED technology tomorrow, it would still take nearly 5 megawatts of electricity to power them. Assuming this electricity is produced from fossil fuels, over 11,000 metric tons of carbon equivalent in greenhouse gases would continue to be released into the environment annually [Nuclear Energy Institute info].
2. Hazardous Chemicals are used during fabrication processes. The housings of many exit signs are PVC, which is associated with chlorinated dioxins and other extremely hazardous and long-lived pollutants. The fabrication of the circuit boards used in LED exit signs also involves environmentally unfriendly chemicals, including methyl ethyl ketone, hydrochloric acid and sulfuric acid.
3. Circuit Boards and Batteries are hazardous wastes. Federal Regulations [EPA 40CFR Part273] now consider the back-up batteries inside many LED exit signs to be a "Universal Waste" because they contain various heavy metals. In some states [i.e. California], the circuit boards inside LED exit signs are also a Universal Waste as they contain lead, chromium, cadmium and sometimes mercury. Universal Wastes are not permitted inside municipal landfills and must be directed to a recycler.

## *Glow Forward*

So next time you are reviewing your project's schedule of lighting fixtures, check out the exit sign specifications. If the specification lists 'self-luminous' tritium signs or 'internally illuminated' LED signs, consider changing to 'photo-luminescent' exit signs. That way you'll be getting an almost fail-safe product that is the most cost effective and sustainable exit sign technology on the market today.

Several companies make high quality photo-luminescent exit signs. Make sure that you specify an exit sign that is UL924 listed and install it per NFPA 101 and local codes.