

FOCUS ON

EMERGENCY

lighting equipment Part 1 of 3

By Mike Shulman

In recent months, several questions have been brought to the attention of Underwriters Laboratories Inc. regarding certain types of emergency lighting equipment, including load control relays, control panels and exit signs. This article is the first of a three-part series to provide UL's perspective and guidance for regulatory authorities encountering these situations.

Emergency lighting load control relays (LCRs)

In accordance with building and life safety code requirements, some facilities are required to maintain a minimum level of illumination along the entire means of egress whenever the facility is occupied. The means of egress may be more than just the aisles and main corridors, and may extend from each exit to every location where people might normally be found. Many of these spaces can be unoccupied for considerable portions of the day. Other spaces may require fully dimmable lights to facilitate any activity in the area. The desire to improve overall facility energy efficiency and eliminate potentially unnecessary redundant systems has stimulated an increased demand for LCRs to manage portions of a facility's emergency lighting system.

An emergency lighting LCR is intended to ensure that lighting levels along the means of egress meet the required minimums whenever they are needed but still allow controlled lighting circuits to be dimmed or de-energized at other times. An LCR is supplied by one of the facility's emergency power branch circuits and will always have power available to it (and to its controlled loads). It also concurrently monitors the availability of power to the non-emergency system in the facility. An important issue to recognize is that an LCR does not switch the load between normal and emergency supplies. Load switching of this type should only be performed by a

transfer switch Listed in accordance with UL 1008, Standard for Safety for Transfer Switch Equipment. An LCR has only one power input source and that is connected to the emergency power supply. An LCR requires a monitoring signal only (typically voltage) from the normal power source. Most LCRs will also accept and respond to a signal input from a facility's fire (or other) alarm system.

LCRs can be integral to the lighting control (fitting inside a switch box or a lighting control panel) or be installed in parallel with an existing control. A lighting control with an integral LCR would be evaluated for compliance with the applicable requirements from any one of a number of basic standards, such as UL 20, Standard for Safety for General-Use Snap Switches; UL 1472, Standard for Safety for Solid-State Dimming Controls; UL 508, Standard for Safety for Industrial Control Equipment; or UL 244A, Standard for Safety for Solid-State Controls for Appliances. In addition, it would be evaluated for compliance with the requirements of UL 924, Standard for Safety for Emergency Lighting and Power Equipment. The UL 924 evaluation primarily assesses the logic of the LCR to ensure that it will operate as intended, when intended, while the fire and injury prevention features of the device are evaluated through compliance with one of the basic standards noted above. UL Lists LCRs under the product category "Emergency Lighting and Power Equipment (FTBR)." Guide Information for this category can be found

in UL's Online Certifications Directory at www.ul.com/database and on page 36 of UL's 2004 General Information for Electrical Equipment Directory (White Book).

Whether integral to the lighting control or installed in parallel, an LCR is designed to override any existing setting (including "off") of its controlled loads and restore them to the output level needed to meet the minimum emergency lighting levels of the facility. For many LCRs, this action may be a simple bypass of a dimming or "off" position, resulting in full output. For programmable LCRs, the emergency lighting level could be less than full output if such levels achieve the minimum illumination levels required for compliance with NFPA 101, Life Safety Code, and have been included in the approved facility emergency lighting and power plan.

In summary, LCRs can play an important role in helping a facility meet the life safety and code compliance goals associated with emergency lighting as well as the economic and environmental goals of increased energy efficiency. LCRs are not transfer switches, but rather bypass or override devices that operate when normal power is interrupted or an emergency evacuation signal is activated.

For more information on LCRs, contact Mike Shulman in Santa Clara, Calif., by phone at +1-408-876-2770; or by e-mail at Michael.Shulman@us.ul.com.



FOCUS ON EMERGENCY lighting equipment

By Mike Shulman

Regulatory authorities frequently contact Underwriters Laboratories Inc. with questions about the certifications of various types of emergency lighting equipment. This article is the second of a three-part series to provide UL's perspective and guidance for regulatory authorities encountering these situations.

National Electrical Code® (NEC®) Article 700 identifies the equipment associated with a facility's emergency systems. These systems can be broken down into three groups: power sources, distribution equipment and utilization equipment.

Power sources

Power sources include storage batteries, fuel-powered generators and fuel cells. Storage batteries are Listed under the product category "Emergency Lighting and Power Equipment (FTBR)." UL 924, Standard for Safety for Emergency Lighting and Power Equipment, evaluates both the charging and supply performance of storage batteries to verify their ability to provide the minimum 1 1/2 hour-rated performance required by NEC 700.12(A) and model building and life safety codes.

Fuel-powered generators for emergency service are Listed under the product category "Engine Generators (FTSR)." This product category covers stationary generators intended for this service.

Fuel cell systems have previously been evaluated in accordance with ANSI Z21.83, Stationary Fuel Cell Power Systems, but in the future will be evaluated per ANSI FC 1. They are Classified under the product category "Stationary Fuel Cell Power Systems (IRGX)."

Distribution equipment

Distribution equipment includes automatic transfer switches, feeder wiring, panelboards, control panels, branch circuit wiring and any downstream load control relays (LCRs). LCRs were discussed in the spring 2005 issue of The Code Authority®. Automatic transfer switches are Listed under the product category "Automatic Transfer Switches for Use in Emergency Systems (WPWR)." The feeder and branch circuit wiring, and the panelboards and control panels that constitute the remainder of a facility's emergency power distribution system are the same as those used for the facility's normal power distribution needs.

One common area of confusion concerns emergency lighting control panels. If a lighting control panel incorporates a Listed LCR, the panel as a whole could be considered eligible to bear an emergency lighting Listing Mark. At the discretion of the regulatory authority, however, it is also reasonable to simply require the LCR itself to be Listed under FTBR, and not the entire panel. In either situation, the emergency power circuits would require segregation from any non-emergency circuits in accordance with NEC 700.9(B)(3).

Some lighting control panels include only contactors or relays wired to automatically pass upstream emergency power through to designated loads when normal power is disrupted. A field test at the time of commissioning is needed to verify that a panel of this configuration will serve its intended purpose, whether the panel carries an emergency lighting and power equipment Listing Mark, evaluated to UL 924, or a basic industrial control panel Listing Mark, evaluated to UL 508A, Standard for Safety for Industrial Control Panels, and Listed under the product category “Industrial Control Panels (NITW).” In this application, there is no additional evaluation under UL 924 that would imply a higher service performance level, other than that included with the UL 508A evaluation.

Utilization equipment

Utilization equipment includes luminaires to illuminate and mark (with signage) egress paths and other specialized areas where such continuous lighting is required by code. It

may also include ventilation, communication, detection, suppression or process equipment where interruption would cause serious safety hazards. Directional signage will be discussed in the next article in this series.

Where supplied by a branch circuit originating in an emergency power distribution panel (on the load side of an automatic transfer switch), the luminaires that provide egress path illumination are typically the same luminaires that provide normal illumination for the facility. These luminaires are Listed in accordance with UL 1598, Standard for Safety for Luminaires, under one of several luminaire product categories (IEZR, IEZX, IEUZ, IEVV, etc.). Products bearing a basic luminaire Listing Mark should be suitable for use in this application.

UL also investigates luminaires that provide egress path illumination that are not intended for installation on the load side of an automatic power switch. These products are Listed under FTBR, and include an

emergency lighting equipment Listing Mark. These luminaires may be designed for concurrent connection to two separate supplies (one normal, one emergency) controlling separate lamp loads within the luminaire, or may incorporate their own emergency supply. Lamp assemblies intended for remote connection to emergency luminaires or unit equipment are also covered under this product category. Emergency lighting and power equipment Listed under FTBR has been investigated to provide 90 minutes of rated power or light, unless specifically marked for a longer period of time. Emergency luminaires have also been investigated for their ability to contribute to the required illumination of the path of egress. However, compliance with the code required lighting levels must be determined in the actual application.

For more information on emergency lighting equipment, contact Mike Shulman in San Jose, Calif., by phone at +1-408-754-6703; or by e-mail at Michael.Shulman@us.ul.com.

Exit signs — EVOLVING PRODUCTS, EVOLVING STANDARD

By Mike Shulman

The original “EXIT” sign was probably black paint on a white wall. Such painted signs and placards are still in use today, but their effectiveness is dependent on external light sources. To comply with model code requirements stating that exit signs be continuously illuminated while the building is occupied, most facilities choose internally illuminated exit signs. Per Section 7.10.7 of NFPA 101-2006, Life Safety Code, and Clause 1011.4 of the International Building Code (IBC), such internally illuminated signs must be listed.

The ninth edition of ANSI/UL 924, Standard for Safety for Emergency Lighting and Power Equipment, was published on Feb. 24, 2006. In addition to updating terminology and streamlining requirements, the new edition directly addresses some of the technology changes that have occurred over the past decade. Light-emitting diode (LED)-based designs have replaced incandescent or fluorescent technology as the dominant electrical product. Electroluminescent designs provide considerable energy savings over these historically dominant technologies. All of these electrical exit signs are Listed under either “Emergency Lighting and Power Equipment (FTBR)” or “Exit Fixtures (FWBO).” Photoluminescent and tritium products have become increasingly competitive, offering installation ease, flexibility and zero direct energy consumption. These signs are Listed under the product category “Exit Signs, Self-luminous and Photoluminescent (FWBX).”

LED, electroluminescent and photoluminescent products are also widely available as floor proximity path markers, as may be required by NFPA 101, clause 7.10.1.7. They are Listed under the product category “Floor Proximity Egress Path Marking Systems (IMZI)” for compliance with UL 1994, Standard for Safety for Low Level Path Marking and Lighting Systems.

UL 924 still offers two paths to determine compliance with minimum visibility requirements. The luminance and contrast measurement method determines a sign visibility’s equivalence to the historic benchmark — the black-on-white placard that is externally illuminated at 5 footcandles. The observation test uses human observers and statistical analysis to directly determine whether the image on the sign is discernible at its intended viewing distance, at the end of its rated time (typically 90 minutes), when



compared to a slightly different image. With few exceptions, electrically powered signs are tested using the luminance and contrast measurement method, while photoluminescent and tritium signs are tested using the observation method.

Both the observation visibility and the luminance measurement and contrast measurement test procedures have been expanded to accommodate graphical symbol (pictogram) signs, such as the silhouette of a man running through a door. The allowance for regulatory authorities to accept such signs was added to NFPA 101-2003 (7.10.3.2), with an annex note (A7.10.3) that states such signs need to provide “equal visibility and illumination.” Prior to the new edition of UL 924, there

was no test protocol to make this determination. Both NFPA 101 and UL 924 require the symbols themselves to conform to those shown in NFPA 170, Standard for Fire Safety and Emergency Symbols. The IBC does not yet address graphical symbol signs and still requires the text letters “EXIT.”

More changes are surely ahead for UL 924. Many have expressed interest in replacing the observation test with an equivalent measurement approach to eliminate “human” variables. Interest has also been expressed in developing a Listing program for smaller exit signs, for transportation and other applications where viewing distances are less and space constraints are greater. There have also been interesting developments in the

field of audible guidance systems to supplement (or replace) visual systems in dense smoke conditions.

Guide Information for each of the exit sign (FTBR, FWBO and FWBX) and path marker (IMZI) product categories provide use and installation information that should be consulted to ensure that a particular type of sign is appropriate for the needs and constraints of a given application. This can be found in UL's Online Certifications Directory at www.ul.com/database.

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