

LIFE SAFETY CODE FOR STAIRWELL APPLICATIONS

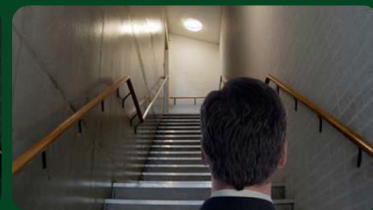
UNDERSTANDING THE IMPORTANCE OF SAFE ILLUMINATION & COMPLYING WITH NFPA 101

WHY IS LIFE SAFETY CODE SO IMPORTANT?

Stairwell lighting in multi-story buildings helps provide the critical path to safe egress, especially in emergency situations. As a life safety environment, code compliance is essential to mitigate potential liability.

Building owners not only need to meet various code requirements but are legally obligated to provide occupants with a safe pathway to exit a building.

This environment and application is not the place to value engineer or cut corners when it comes to light levels, motion sensor technology, or to procure fixtures with workarounds that are not fully compliant.



PAY SPECIAL ATTENTION TO UL924 REQUIREMENTS CODIFIED BY NFPA 101:

7.9.2.5 Unit equipment [*light fixture*] AND battery systems for emergency luminaires shall be listed to ANSI/UL924, Standard for Emergency Lighting and Power Equipment.

LAMAR LED strives to be the continued expert in code compliance, developing the first and only fixture that meets the full intent of NFPA 101 - Life Safety Code.



**VOYAGER
SERIES**

LAMAR LED's Voyager Series is compliant with NFPA 101 because the entire light fixture assembly is listed to UL924 including the battery pack and the light fixture itself. Most competitive products are only listed to UL1598.

Note that within the code description, the "unit equipment" is the light fixture, which must be UL924 listed in addition to or inclusive of the battery pack. Most sensor controlled bi-level stairwell luminaires do not meet this requirement, rather manufacturers state that their emergency battery backup units are listed to UL924, but this does not apply to the complete luminaire nor meet the intent of the code, resulting in a possible violation. **Ensure that the entire luminaire is listed to UL924, not just the battery system.**

Just because a luminaire is 'UL Listed' does not mean it's suitable for a specific application or environment.

Light Levels: In general, NFPA codes require 10 fc (foot-candles) during periods of occupancy in new construction. Substantial renovation may also require the building to meet this requirement. In most existing buildings, 1 fc is acceptable. It is prudent to confirm the actual requirements with your local authorities.

For reference, a **foot-candle is defined as one lumen per square foot**. Simply put, it's the amount of light that a candle would make one foot away in a square foot area. This is not considered very bright, hence the changes requiring 10 fc on the stairwell walking surface in new construction. As a point of reference, a typical office space may be 30-50 fc.

Providing a properly lit stairwell is not just about meeting a minimum required light level, it's a general safety concern for building occupants. As people age, their visual acuity can fade, and navigating dimly lit stairwells especially during an emergency can be quite hazardous if the occupants cannot see. **High-quality bi-level luminaires not only offer energy savings to the building owner when the stairwells are unoccupied, but they provide higher light levels typically exceeding code minimums for safety while in use. The luminaires should be specifically suited for the application and equipped with motion sensors that will detect motion before the occupant is right in front of the light source.**

There are many codes that apply to stairwell, egress, and emergency lighting, including ones issued by NFPA (National Fire Protection Association) namely NFPA 1-Uniform Fire Code, NFPA 101-Life Safety Code, and NFPA 70-National Electric Code. There are also applicable codes and standards by IBC (International Building Code), IFC (International Fire Code), and UL (Underwriters Laboratories) for both standard LED lighting (UL1598) and Emergency Lighting (UL924). Additionally, there are various other fire, electrical, and building codes issued or modified by municipal governing bodies. These local and municipal government agencies may or may not adopt any or all sections of these various codes. Sorting through these codes can be an onerous task.

This paper is only intended to focus on the primary codes as they apply to provide a safe, properly lit stairwell in commercial and other multi-story buildings interior egress pathways.

SAFETY LIGHTING IN YOUR STAIRWELL

Most codes accept motion sensor-controlled lighting.

The following are excerpted from NFPA-101 (2021 Edition) Life Safety Code:

7.8 Illumination of Means of Egress.

7.8.1 General.

7.8.1 | *The following comments focus on stairwell lighting applications.*

Δ 7.8.1.1* Illumination of means of egress shall be provided in accordance with Section 7.8 for every building and structure where required in Chapters 11 through 43. For the purposes of this requirement, exit access shall include only designated stairs, aisles, corridors, ramps, escalators, and passageways leading to an exit. For the purposes of this requirement, exit discharge shall include only designated stairs, aisles, corridors, ramps, escalators, walkways, and passageways leading to a public way.

7.8.1.1 | *LAMAR LED provides fixtures designed specifically for these applications.*

7.8.1.2 Illumination of means of egress shall be continuous during the time that the conditions of occupancy require that the means of egress be available for use, unless otherwise provided in 7.8.1.2.2.

7.8.1.2 | *Bi-level lighting is never off.*

7.8.1.2.1 Artificial lighting shall be employed at such locations and for such periods of time as are necessary to maintain the illumination to the minimum criteria values herein specified.

7.8.1.2.1 | *The lighting is never off, but if the 10 fc requirement applies, adjustable bi-level lighting can be set to provide at least 1 fc or more for increased safety.*

7.8.1.2.2* Unless prohibited by Chapters 11 through 43, automatic lighting control devices shall be permitted to temporarily turn off the illumination within the means of egress, provided that each lighting control device complies with all of the following:

1. In new installations, the lighting control device is listed.
2. The lighting control device is equipped to automatically energize the controlled lights upon loss of normal power and is evaluated for this purpose.
3. Illumination timers are provided and are set for a minimum 15-minute duration.
4. The lighting control device is activated by any occupant movement in the area served by the lighting units.
5. In new installations, the lighting control device is activated by activation of the building fire alarm system, if provided.
6. The lighting control device does not turn off any lights relied upon for activation of photoluminescence exit signs or path markers.
7. The lighting control device does not turn off any battery-equipped emergency luminaires, unit equipment, or exit signs.

7.8.1.2.2 | *Bi-level lighting is never turned off by design.*

7.8.1.2.2 | **(1)** *The luminaire must be listed to at least UL1598 unless equipped with emergency battery backup in which case the entire luminaire should be listed to UL924. If there is external inverter or generator backup, the fixture must be listed at least to UL1598 and may require a UL924 shunt relay.*

(2) *This means the luminaire must have an integral battery backup or be powered by external emergency generator or inverter power. Listings as required above.*

(3) *Many models have adjustable time delay, typically up to 30 minutes.*

(4) *Ultrasonic motion sensors offer the highest level of detection as they are not limited to line of sight and can be triggered by the stairwell door opening.*

(5) *This can be provided by adding an optional UL924 shunt relay device to the luminaire at the factory that must be connected to the fire system by qualified personnel. This will bring the lights to full brightness in event of a fire alarm.*

(6) *As the bi-level lights are never off, most higher quality photoluminescent tapes should charge with at least 2 fc, however tests have shown that 5000K CCT offers the best spectrum for charging tape as LED have little to no UV light, and 5000K has more blue light in the spectrum to help charge the phosphors in the tape. In-situ tests should be performed to ensure compliance.*

(7) *Bi-level luminaires do not turn off any other devices.*

7.8.1.2.3* Energy-saving sensors, switches, timers, or controllers shall be approved and shall not compromise the continuity of illumination of the means of egress required by 7.8.1.2.

7.8.1.2.3 | *LAMAR LED's sensors are all UL listed. Bi-level luminaires when properly configured should provide higher light levels than code minimums during times of occupancy to provide a safer stairwell passage.*



SAFETY LIGHTING IN YOUR STAIRWELL

7.9.2.5 Unit equipment and battery systems for emergency luminaires shall be listed to ANSI/UL 924, Standard for Emergency Lighting and Power Equipment.

7.9.2.5 | LAMAR LED's fixture and battery backup modules are UL924 listed. Ensure that the entire luminaire is listed to UL924. It should be noted that most sensor controlled bi-level stairwell luminaires do not meet this requirement, as stated on the previous page.

Δ 7.9.2.6 Existing battery-operated emergency lights shall use only reliable types of rechargeable batteries provided with suitable facilities for maintaining them in properly charged condition. Batteries used in such lights or units shall be approved for their intended use and shall comply with NFPA 70.

7.9.2.6 | The batteries are either internal to the emergency pack or supplied with it by the manufacturer and therefore are listed and compliant.

7.9.2.7 The emergency lighting system shall be either continuously in operation or shall be capable of repeated automatic operation without manual intervention.

7.9.2.7 | LAMAR LED's battery backup modules recharge automatically without user intervention.

7.9.3 Periodic Testing of Emergency Lighting Equipment.

Δ 7.9.3.1 Required emergency lighting systems shall be tested in accordance with one of the four options offered by 7.9.3.1.1, 7.9.3.1.2, 7.9.3.1.3, or 7.9.3.1.4.

Δ 7.9.3.1.1 Testing of required emergency lighting systems shall be permitted to be conducted as follows:

1. Functional testing shall be conducted monthly, with a minimum of 3 weeks and a maximum of 5 weeks in between tests, for not less than 30 seconds, except as otherwise permitted by 7.9.3.1.1(2).
2. *The test interval shall be permitted to be extended beyond 30 days with the approval of the authority having jurisdiction.
3. Functional testing shall be conducted annually for a minimum of 1.5 hours if the emergency lighting system is battery-powered.
4. The emergency lighting equipment shall be fully operational for the duration of the tests required by 7.9.3.1.1(2) and 7.9.3.1.1(3).
5. Written records of visual inspections and tests shall be kept by the owner for inspection by the authority having jurisdiction.

7.9.3.1.1 | (1) This requires building personnel to go to every fixture equipped with battery backup and push and hold the test button for 30 seconds, unless equipped with self-test feature as mentioned in the next section.

(3) To meet this requirement, the power to the stairwell lighting must be turned off for at least 90 minutes to confirm the emergency battery packs remain lit for 90 minutes.

(5) Written test logs must be maintained for review by AHJ.

7.9.3.1.1 | (1-6) Some battery backup units are available with integral self-test feature to meet this code section. These are typically optional and eliminate the need to conduct monthly manual testing. In the event the unit fails the self-test, a visual status indicator will identify the failed unit. These units also conduct the yearly 1.5 hour automatically. Personnel are still required to confirm that none of the units failed the self-test and keep the appropriate records.

7.9.3.1.2 Testing of required emergency lighting systems shall be permitted to be conducted as follows:

1. Self-testing/self-diagnostic battery-operated emergency lighting equipment shall be provided.
2. Not less than once every 30 days, self-testing/self-diagnostic battery-operated emergency lighting equipment shall automatically perform a test with a duration of a minimum of 30 seconds and a diagnostic routine.
3. Self-testing/self-diagnostic battery-operated emergency lighting equipment shall indicate failures by a status indicator.
4. A visual inspection shall be performed at intervals not exceeding 30 days.
5. Functional testing shall be conducted annually for a minimum of 1.5 hours.
6. Self-testing/self-diagnostic battery-operated emergency lighting equipment shall be fully operational for the duration of the 1.5-hour test.
7. Written records of visual inspections and tests shall be kept by the owner for inspection by the authority having jurisdiction.

As previously mentioned, this paper is not intended to include every possible applicable code. The intent is to help specifiers of motion sensor-controlled, bi-level lighting select the proper code-compliant luminaires suitable for the application and meet the most common code requirements.

Stairwell lighting is a life safety issue and attention to providing a brighter stairwell environment should be a key consideration for every building owner or operator. Fully code-compliant motion sensor-controlled, bi-level lighting provides a safe environment for occupants while offering energy savings for the building operator by keeping the lights at a low level during unoccupied periods. The energy savings can typically offer an attractive short-term payback.

