

## Designers Lighting Forum

Emergency Egress Lighting and LED  
Lighting

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



# Learning Objectives

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At the end of this course, participants will be able to:

1. What buildings require emergency egress
2. What constitutes emergency egress
3. How much light is required for emergency egress
4. What types of equipment can be used for emergency egress
5. Who has final authority of all aspects of emergency egress



## Building Codes Require Emergency Egress lighting

**You're in the office, shopping or leaving your multi story condo and the power fails You want to exit the structure- first thought how do I exit?**

**The National Fire Protection Association (NFPA) International Building Code (IBC), OSHA defers to NFPA, and the Federal Regulation (CFR) require Emergency Egress lighting.**

**National Fire Protection Association (NFPA) was established in 1895. To establish building codes for new and existing buildings to minimize loss of Life and Property. Buildings in that period were mostly wood and fire and was a major concern for the occupants.**

### **NFPA Life Safety Code 101.**

Chapter 7.8, 7.9 and 7.10 provide the lighting requirements for egress lighting when building power is interrupted for any reason. Updated every three years, the current edition is 2021. All codes and updates can be found by going to [www.nfpa.org](http://www.nfpa.org)



## What buildings require Egress lighting

Nearly all Buildings are required to have Egress lighting

*Limited exceptions*

- One and two-family residences
- Rooming houses
- Agricultural and livestock buildings
  
- Who has final say on the requirements/layout and equipment for Egress Lighting...The Authority Having Jurisdiction (AHJ)  
Fire Marshall/Chief, Building Inspector, etc

Egress lighting must remain active whenever the building is occupied



## What is Egress

### NFPA 7.8. Illumination of Means of Egress

Illumination of means of egress shall be provided for designated stairs, aisles, corridors, ramps, escalators and passageways leading to a means of exit, through the exit, to a public way. [Public Ways](#) means streets, roads, and ways that are recorded in the Registry of Deeds, defined by metes and bounds, and are available for use by the general public. Such ways may be owned by the state or a municipality, or they may be privately owned by Customer(s). Similarly defined and recorded rights-of- ways located on or across Private Property may also be acceptable for the purpose of the Company to install, own, and maintain a Line Extension.

Illumination of the means of egress shall be continuous during occupancy and shall be from a source considered reliable by the **AHJ**.

Battery operated lights are permitted as an emergency power source but are not the only permitted source.



## How is Egress lighting provided

Under normal conditions, Egress lighting is served by the building's primary electrical supply. When that supply fails, an **emergency power supply must illuminate specific areas** that lead to **exits, the exits themselves, and exit discharges**. Codes allows for several options, for an emergency power system. It may be an **onsite generator, a central battery-powered system, or batteries attached to individual luminaires**.

In addition to Buildings, Egress Lighting may be required in fire **command centers, fire pump rooms, and generator rooms**.

**The AHJ has the final word on what is needed**

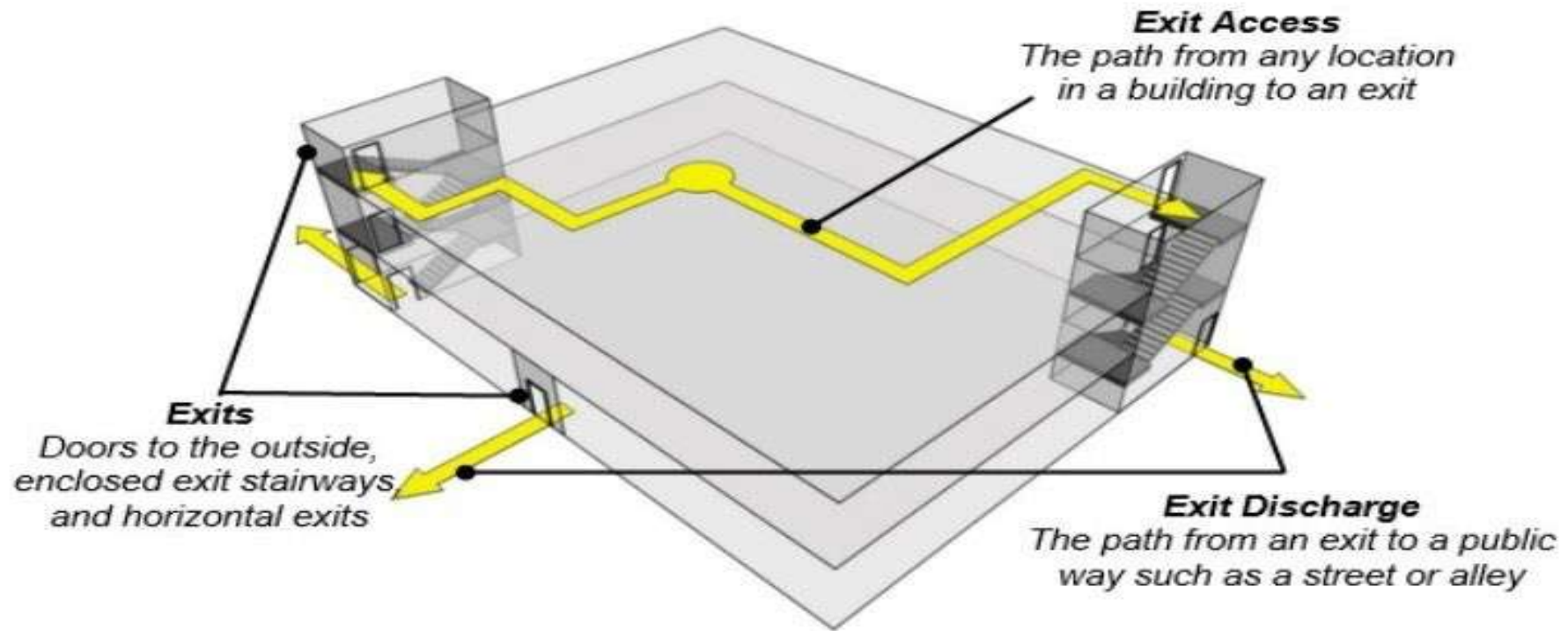


## Egress Lighting shall include

**Exits Access** – path in a building to an exit

**Exit** – door to the outside, enclosed stairway and horizontal exit

**Exit Discharge** – Path from an exit to a public way





**Warehouse – Industrial – Retail**

**High/Low bay  
application**



## Exit Path – Stairway example



## Exit Discharge



# NFPA 7.9 Emergency Lighting requirement

Emergency Lighting for is required a *minimum* of **90 minutes** in the event of failure of normal lighting. Arranged to provide **initial average footcandle level\*\* of 1 FC, not less than 0.1 along the path of egress at floor level. Min-Max ratio of not more than 40-1**

The emergency system **comes on automatically** in the event of interruption of normal lighting

## Methods of emergency power

Emergency generators

Building backup battery systems (Non-Integrated)

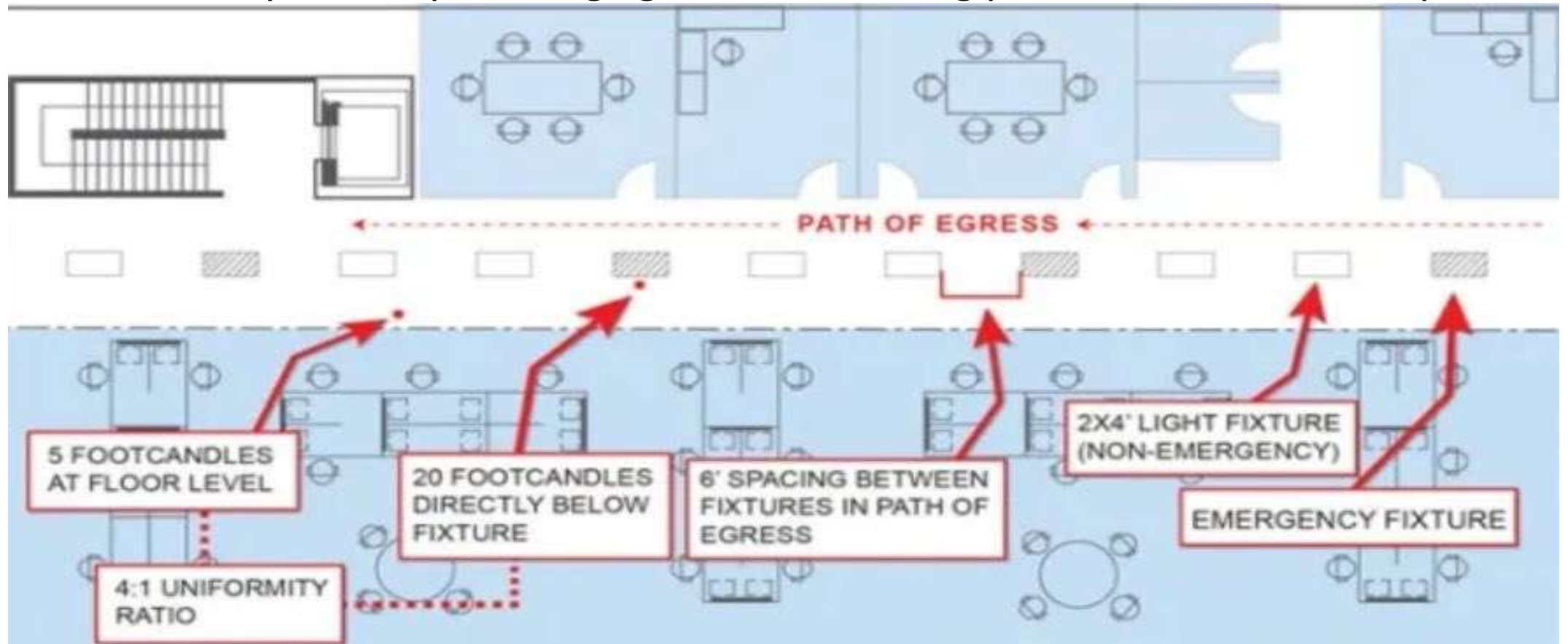
Emergency lighting units with battery back up (integrated)

\*\*A foot-candle (or foot-candle, fc, lm/ft<sup>2</sup>, or ft-c) is a **measurement of light intensity**. One foot-candle is defined as enough light to saturate a one-foot square with one lumen of light.

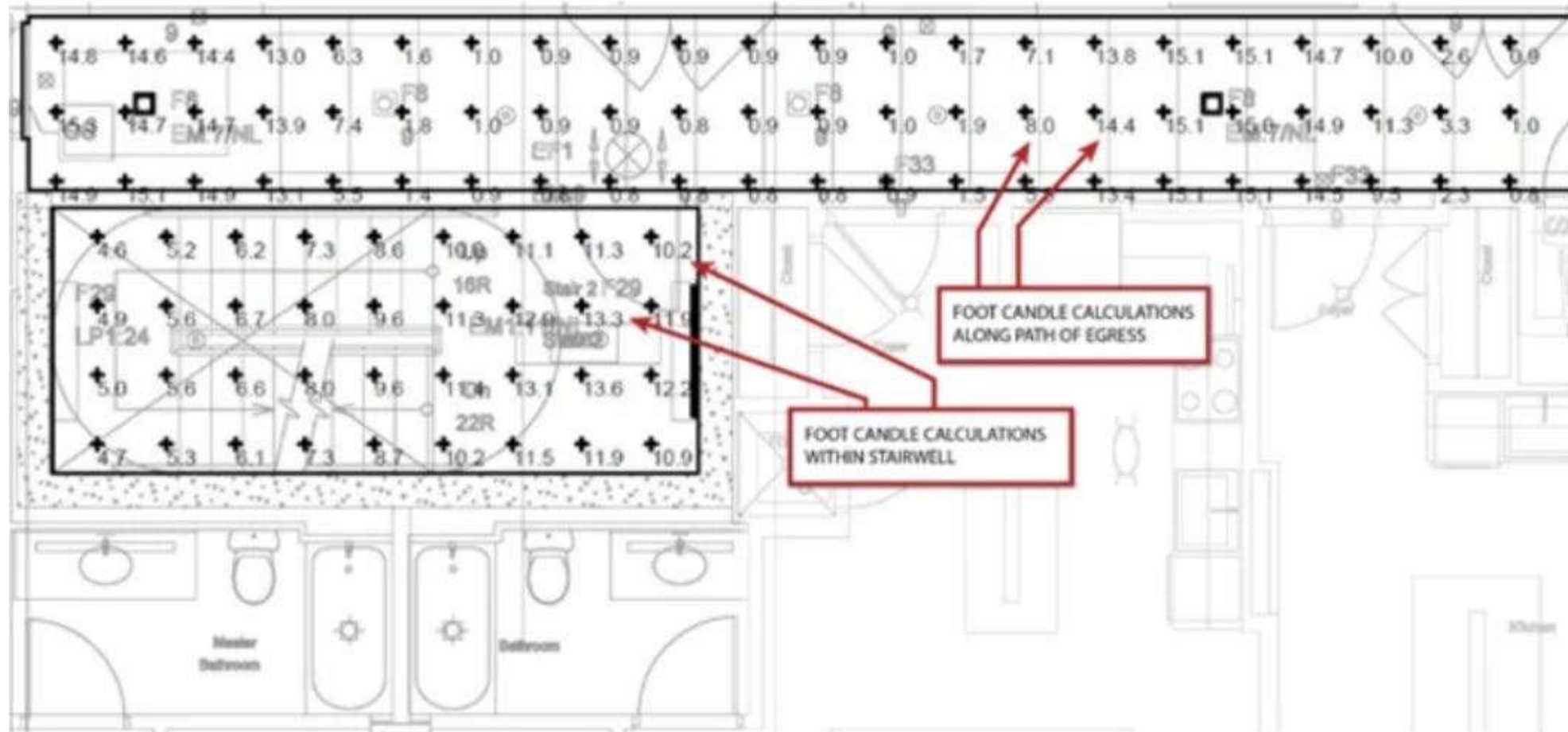




Example of Egress Lighting under normal building power and placement of Emergency Fixtures capable of providing light when building power fails or is interrupted

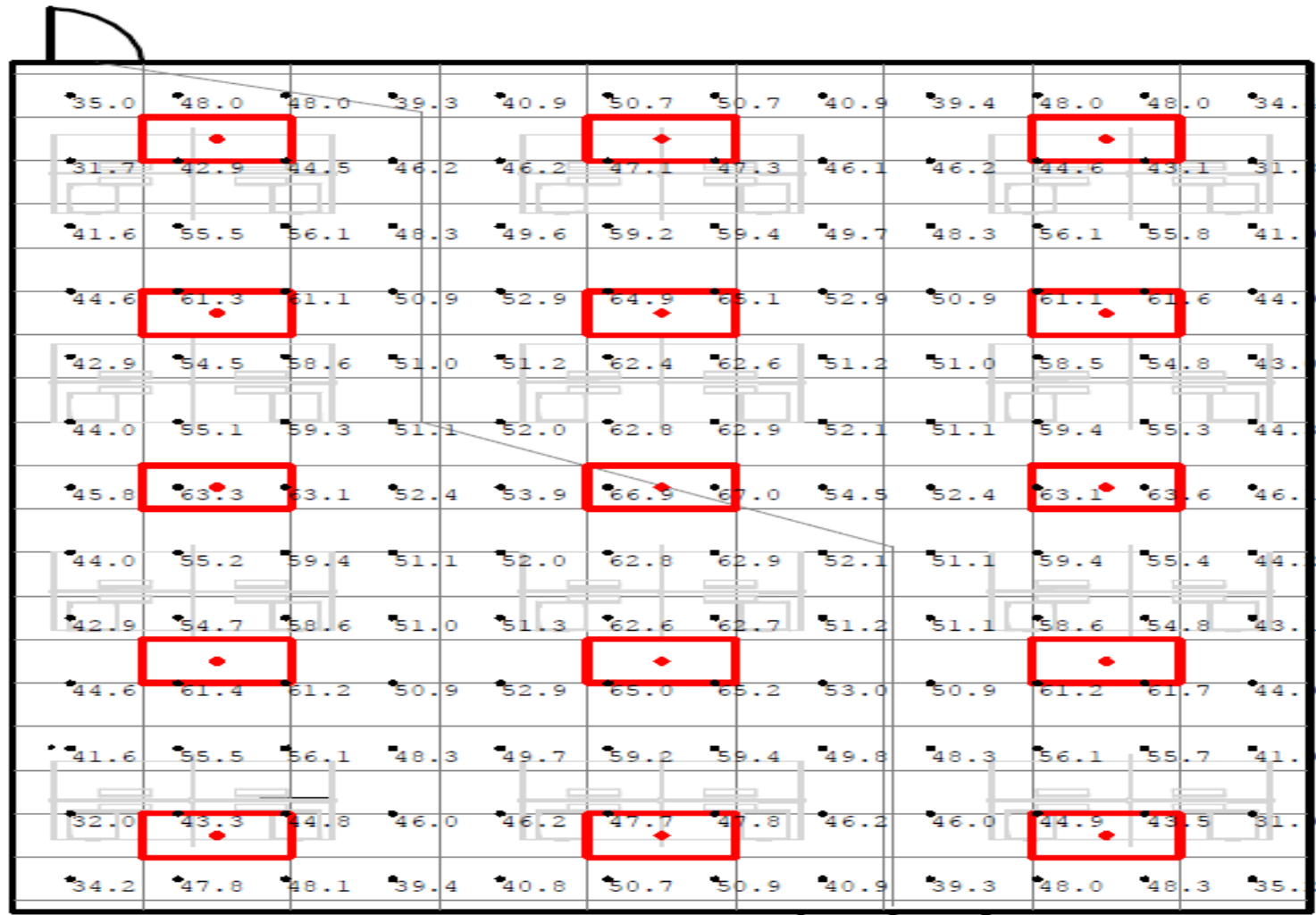


Calculations for the FC reading to be achieved



# Normal light levels

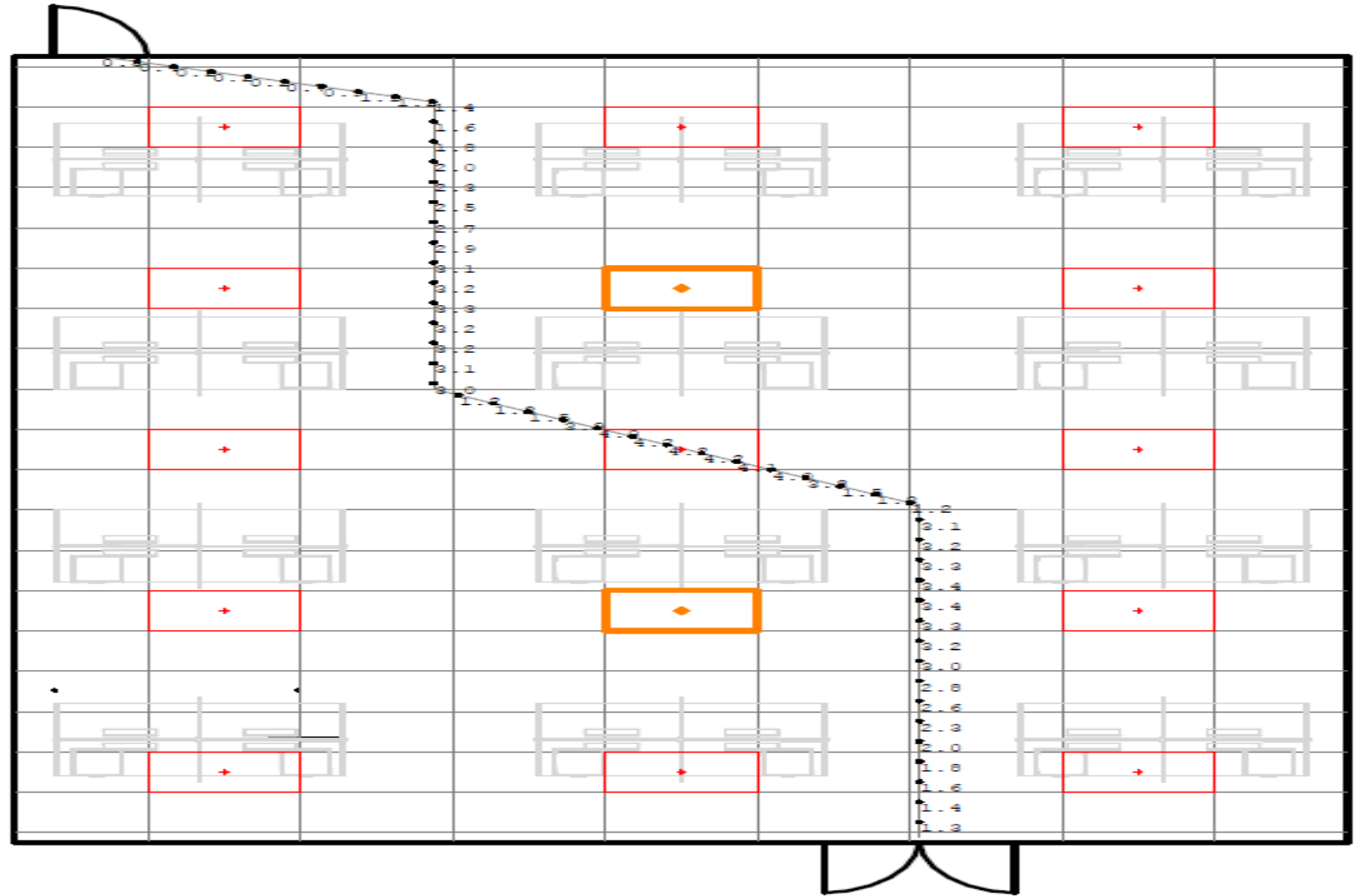
Foot candles on workspace  
Above the floor height



## Emergency Lighting Levels

Footcandles are measured at the floor  
Require 1-footcandle average along path of egress

In this case the equipment is battery back up fixtures.



## **NFPA PERIODIC TESTING OF EMERGENCY LIGHTING EQUIPMENT**

Regardless of the type of emergency egress lighting used, it must be **tested** for a duration of 30 seconds, generally, once **every 30 days** and **annually for a duration of 1.5 hours**. Additionally, all emergency lighting must be fully operational throughout the duration of all tests conducted.

Maintaining complete written records of all tests and inspections is critical as you may be required to provide them to the authority having jurisdiction if requested. If using a computer-controlled system, the system should be capable at all times of providing a report of testing history as well as any failures that occur.

For specific rules and regulations required, contact your local **authority having jurisdiction (AHJ)**.





## Emergency Battery Back up in Lighting Fixtures Integrated or Add on

Emergency battery packs for fixtures come in two ways

- 1) **Integrated** into the fixture- requires no additional wiring other than power, note the wattage of emergency light vs full power fixture
- 2) **Add on** battery pack – additional wiring and drilling may be required
  - From the **fixture manufacturer** –
    - All wiring details will be provided
    - Wattage of emergency light
  - From **third party EM manufacturer**
    - Ensure compatibility to LED module and fixture mounting
    - Note electrical specs, watts etc.
    - Wiring may be generic not specific to fixture



## Emergency Battery Back Integrated into fixtures

Flat Panel



Single Basket Troffer



Strip Lights

Wall Pack



### Battery Back up equipped fixtures need to be identified and Tested

#### LED Indicator Colors/Functions:

- Solid Red, indicates the Emergency LED Driver battery is charging.
- Flashing Red, Indicates low battery.
- Indicator light off indicates the battery is discharged.
- Flashing Green, Indicates the battery is recharging.
- In the event of a power outage, the Emergency LED Driver detects the power outage and will switch to the Emergency mode and run the light for 90-Minutes.
- Once the AC power is restored the Emergency LED Driver will switch to charging mode.

## Examples of Commercial fixtures with Battery Back up installed

No additional wiring required –

Egress lighting with building power and becomes part of Egress when building power fails

Troffers



Strips



Exterior and Interior  
Wall packs



# Emergency Battery Back add on from fixture manufacturer

Types of add ons readily available

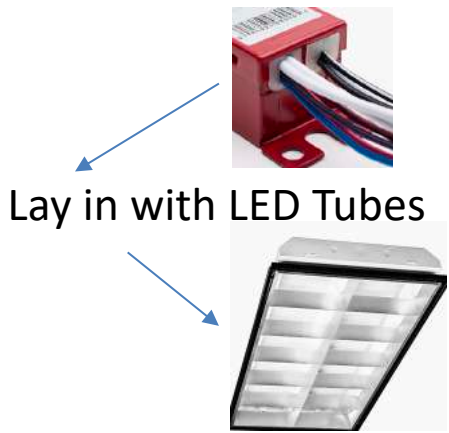
Troffers  
Flush Mounts



Strips  
Canopy



Downlights  
LED Linear Lamps



High Bay



Add on Emergency packs from the manufacturer of the fixture will include installation instructions for wiring, indicator light, test buttons and wattages

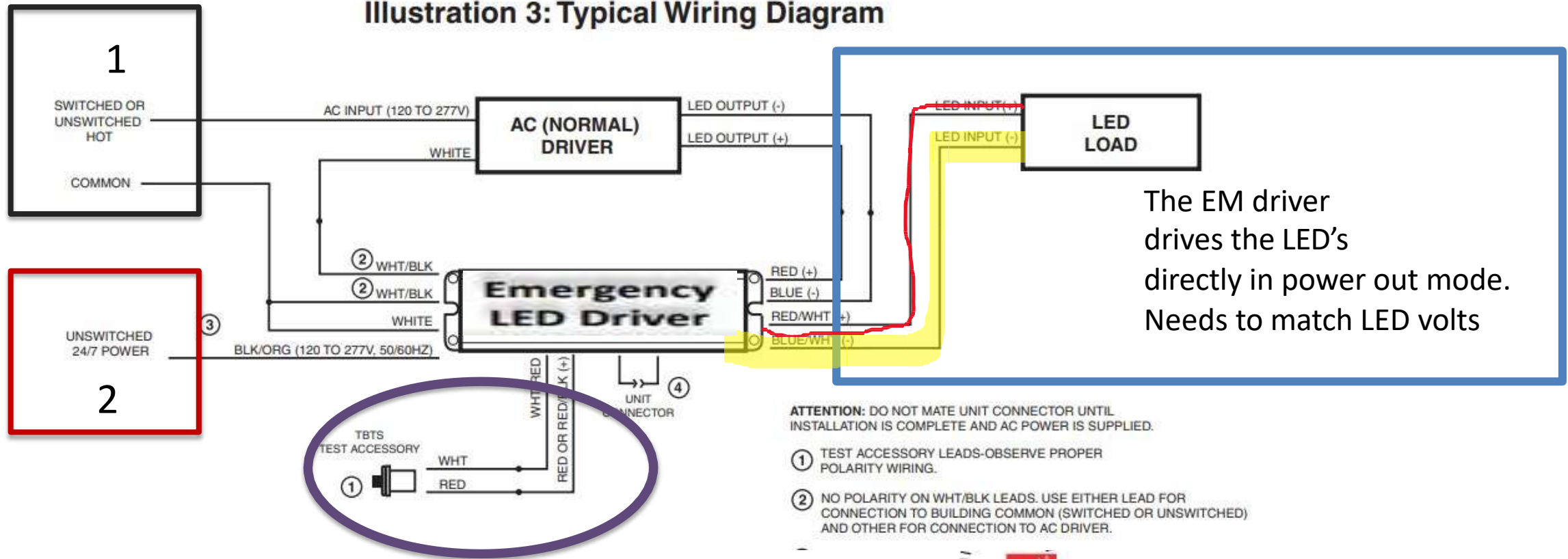




# Installing an EM driver

Note when a switched (1) line is required, an additional unswitched line(2) is needed to ensure battery can be charged as needed. This will insure that the driver has a constant source of power.

**Illustration 3: Typical Wiring Diagram**



## **Third Party Emergency Battery Driver**

Will need to verify the Emergency battery is compatible with the fixture housing and LED module. Consult with fixture and Emergency Battery manufacturer.

Ensure wiring diagram is clear on how to install emergency battery with current driver and there is room in or on the fixture for battery, indicator light and test button

Know the watts of the emergency driver to determine lumens for Emergency Egress calculation. Having the proper lumen output will give you the required Footcandles for egress.



## Examples of EM battery outputs

	LED Fixture Watts	EM Driver Watts
High Bay	150-240	8, 30, 40
Troffers	20-60	6-10
Downlights	10-50	4-8
Outdoor	30-120	9-15
Flush Mounts	10-20	9-15
Linear LED Lamps	9-15	5-10



## Exit Sign Requirements

Codes for exit signs are incorporated into CFR, IBC, OSHA, NFPA and ANSI

**Each exit must be clearly marked by a sign reading “EXIT”**

### Requirements include

- Exit sign have 5 footcandles on the face
- Self Luminous Exit signs require 0.06 foot-lamberts on the face
- Exit sign lettering be at least 6” tall and  $\frac{3}{4}$ ” wide
- Exit sign have distinctive color, and design that it is readily visible

### Specific City Codes – Example NYC codes require –

- The letters for the word “EXIT” must be in RED  
Green, white and black are not acceptable.
- The letters must be 8 inches tall, with a 1 -inch stroke
- Internally lighted signs must be lighted with RED light





## Common exit sign examples



Photoluminscent



Photoluminescence is when light energy, or photons, stimulate the emission of a photon.





## NEW YORK SELF LUMINOUS EXIT SIGN EXAMPLE



- No Power Needed
- Uses Tritium
- Meets all New York Fire & Building Codes
- 100-foot required viewing distance
- NYC-approved red stencil
- UL 924 Listed
- Compliant with NFPA 101, Ch. 50 & 70
- UL Listed for Wet Locations
- Operating range from -76° F to 180° F
- Tritium gas** is the self-illuminating light source for this type of exit sign. Tritium, a naturally occurring isotope of hydrogen, glows when enclosed in glass tubes and infused with phosphorous materials

## Photoluminescent Exit Sign

Is a self-powered, self-illuminating. This glow-in-the-dark

- No power needed
- Uses Photoluminescent Letters
- Meets NFPA, IBC and OSHA
- UL 924 Listed
- 50/75 foot viewing distance

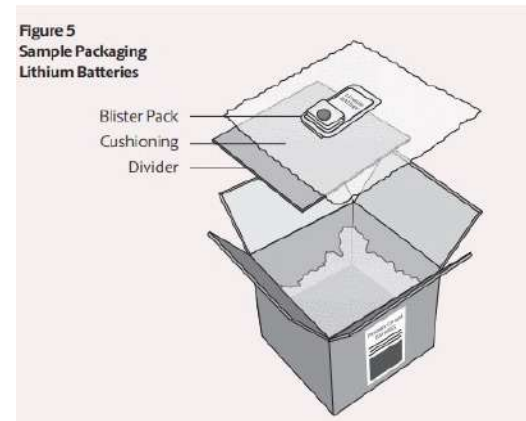


**Photoluminescent signs** (aka “glow-in-the-dark signs”) are a useful technology for exit and egress signage. They glow without a dedicated power source. Instead, they absorb the well-lit surroundings—release it over time as a glow. Are NFPA-, IBC-, and OSHA-compliant remain visible long enough to get people to safety.



## Batteries options available for battery back up Egress lighting

	Lithium LFP	Ni Cad	Lead Acid
<b>Discharge Rate/Month</b>	<b>3-5%</b>	<b>20%</b>	<b>15%</b>
<b>Max Temp F</b>	<b>130</b>	<b>120</b>	<b>120</b>
<b>Life - years</b>	<b>8-10</b>	<b>3-4</b>	<b>2-4</b>
<b>Shipping</b>			
<b>Air highly restricted</b>	✓	✓	✓
<b>Ground - labeling/packaging</b>	Yes	Yes	Yes



Recap

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How much light is required for Emergency egress

What types of equipment can be used for EEL

Who has final authority of all aspects of egress lighting





This concludes The American Institute of Architects Continuing  
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