

A 26.1 Emergency Lighting Systems

GENERAL

Designers shall verify that all applicable portions of these standards are incorporated into the project's design, drawings, specifications and final construction. Requests for variances from these standards shall be submitted in writing to the DCM Project Manager, using the KU Standards Variance Request Form found in [Appendix A1.1](#), for review and written approval or rejection as indicated on the form.

OBJECTIVE OF STANDARD

Comply with all applicable codes adopted by the State Fire Marshal and DFM including the Kansas Fire Prevention Code to provide safe egress in the event of loss of power.

- Provide a central system for emergency lighting in all buildings.
- Be energy efficient utilizing minimum lighting levels for 'always on' night lights.
- Provide non-switched egress lighting to comply with the Kansas Fire Prevention Code.
- Provide 'NORMALLY OFF' emergency lighting in all lecture/classrooms above 49.
- Provide system incorporating features that minimize maintenance and testing requirements. Testing is required every 30 days.
- Provide exterior egress and emergency lighting.
- Provide emergency lighting that activates upon loss of branch power per code.

DESIGN PROCESS

It is the Designer's responsibility to prepare a code-compliant emergency lighting design and submit it to both the DCM project manager and the University Fire Marshal Authority (UFMA) for review before completion of the Contract Documents. Contract documents then get reviewed by the AHJ in Topeka submitted through UFMA.

Performance: Emergency and Egress lighting shall exceed minimum levels prescribed by code (1 foot-candle at the floor within a 40 to 1 brightness ratio). The University's experience, from previous completed projects, is that this range shall be an average of between **3** and **5** foot-candles, with a minimum level of **1** foot-candles and a maximum level of 20 foot-candles. A level of 20 foot-candles below any fixture would allow for a 1 foot-candle minimum between fixtures, which stays within the 40 to 1 ratio as required by code. At the conclusion of the project, egress and emergency lighting levels shall be verified during commissioning and testing. Systems **MUST** maintain full lighting levels for 90 minutes.

Design Criteria: The Designer shall use the following criteria as guidelines in evaluating and selecting a system with the appropriate functional performance for the specific project circumstances. Systems utilizing emergency ballast type fixtures shall only be allowed with special permission from the University Fire Marshal Authority and DCM.

System types by order of preference:

- ALWAYS ON (NIGHT LIGHT) SYSTEM-** Emergency and egress lighting utilizing the general lighting system connected directly to the emergency power source through the emergency power transfer switch. Exit signs, fire alarm, egress elevators, fire pumps and all life safety associated equipment shall be connected. Any other loads shall be on their own transfer switch per NEC. Circuits will be verified by the AHJ at final inspection.
 - Classrooms and Lecture rooms-** Utilize normally off emergency lighting- Smart, self-diagnostic battery packs or room lighting on relays connected to the local hot leg of the lighting circuits. Fixtures must be labeled.
 - Egress lighting in normally off areas-** must provide minimum lighting at egress paths within rooms or areas in assembly occupancies over 49 where normally off emergency lighting is used. Wall LED floor wash lighting or strip/rope lighting is recommended circuited to the emergency lighting circuit.
 - Relay controlled lighting-** for normally off areas must be labeled at each room for annual and 30 day testing. Provide 2" x 4 1/2" sign as noted below.
 - Exterior Emergency Lighting-** provided at all required exits up to 30 feet away from building or to the public way. Lighting should be connected to emergency power switched off during the day with photo cell.
 - Stairwells-** Provide minimal lighting to meet code, recommend two level lighting.
 - Theatrical Dimmed Lighting systems-** Require egress lighting per code and emergency lighting connected to a UL labeled system relay integrated into the system. Provide test information and label fixtures connected to relay.

- NORMALLY OFF EMERGENCY LIGHTING-** Self contained individual or tandem smart self-diagnostic battery packs connected to local lighting circuit. This system requires exhaustive testing every 30 days and is not to be used without permission from DCM and UFMA.
 - CONCEALED 'POP OUT' FIXTURES ARE NOT TO BE USED!
 - INTERGRATED EMERGENCY BALLAST TYPE FIXTURES ARE NOT TO BE USED.
 - Classrooms and Lecture rooms-** Smart, self-diagnostic battery packs.
 - Egress lighting in assembly occupancies-** Wall LED floor wash lighting or strip/rope on normal power not switched.
 - Egress lighting (night lights)-** provide non-switched lighting throughout exit path including stairwells, restrooms and exterior paths.
 - Exterior Emergency Lighting-** Smart, self-diagnostic battery packs.
 - Stairwells-** Provide smart, self-diagnostic battery packs.

- EXISTING LIGHTING INSTALLATION FOR ALWAYS ON (NIGHT LIGHT) SYSTEM-**
This system would re-circuit existing lights to a separate, (always-on) circuit connected to

the an emergency generator. In this system, it is imperative that the lighting levels be at the minimum design criteria since they will be on 24 hours a day. This is generally the most economical system since existing lighting circuits are not easily re-grouped for control purposes.

- Classrooms and Lecture rooms over 49 occupants-** Smart, self-diagnostic battery packs. Review with KU on normally off relay option. Provide egress lighting.
- Exterior Emergency Lighting-** provided at all required exits up to 30 feet away from building or to the public way. Lighting should be connected to emergency power switched off during the day with photo cell.
- Stairwells-** Provide minimal lighting to meet code, recommend two level lighting. Try to capture the existing lighting circuit and change light fixtures as needed. Remove switches to existing circuits. Egress and Emergency lighting can not be switched.
- Theatrical Dimmed Lighting systems-** Require egress lighting per code and emergency lighting connected to a UL labeled system relay integrated into the system. Provide test information and label fixtures connected to relay.

General Lighting Criteria:

Emergency light fixtures shall be located at the following locations:

- Interior egress paths-** Provide in corridors and stairwells at 3 to 5 fc.
- Exterior egress paths-** Provide to the public way or 30 foot away from building at 1 fc.
- Electrical and mechanical equipment rooms-** Provide at 1 fc. Small rooms can be switched since these areas are not required to have emergency lighting.
- Public restrooms-** Provide at minimum levels- (not required by code but requested by KU) If existing circuits cannot be isolated to switch a single fixture to the emergency lights, then a separate fluorescent fixture may be added.
- Private restrooms-** not required, not requested.
- Lecture and classrooms with occupancy of over 49 (required)-** Recommended normally OFF lighting. Provide smart, self-diagnostic battery packs or room lighting on relays connected to the local hot leg of the lighting circuits is recommended. Fixtures must be labeled, testing instructions must be provided at each room.
- Lecture / Classrooms devoid of windows-** 25 to 49 occupants. These rooms should have emergency lighting same as rooms with 49 or more occupants however they are not required by code. Normal classrooms and labs with exterior windows shall not receive emergency lights.
- Tunnels-** utilize smart self diagnostic battery pack units if no generator circuit is available. Egress lighting is not required therefore the .01 foot-candle minimum is allowed.
- Generator and generator support equipment areas-** Provide smart self diagnostic battery packs as prescribed by code for maintenance of generator equipment and circuits if system is down.
- Occupied Roofs-** Required, provide to the exits. Should be on photo cell.
- Normal Roof Areas-** not required, not requested.

Emergency and Egress Lighting Design Criteria

- Emergency light fixtures shall be located throughout the exit path at intervals that are designed to maintain a minimum light intensity of 1 foot-candle at floor. In a normal 8-foot wide corridor it has been found that 35 to 45 foot spacing for a typical 2 light T-8 fluorescent fixture is acceptable. This yields approximately 1 to 3 fc
- Stairwells shall be partially lit by none-switched emergency/egress lights. To save energy switched lighting also should be utilized. All night lighting should be minimum levels.
- Control relays shall be fused; accessible and labeled with the area serve.
- Control relays must have testing instructions within the room they serve indicating what breaker and panel serves the emergency lighting. Provide a sign; gray with red letters, 4 1/2 inches wide (the width of double gang wall switch) and 2 inches high; text 1/4" high, located just above the typical room lighting wall switch on the latch side of the primary entrance door to the room. Sign should be mounted just above the wall switch or at 60" above finished floor. Sign shall state the following:

**EMERGENCY LIGHTING PROVIDED
TO TEST (REQUIRED MONTHLY)
TRIP CIRCUIT _____ AT PANEL _____
PANEL LOCATED IN ROOM _____**

- All emergency light fixtures shall be labeled with a 3/4" permanent red DOT.
- All conduits connecting the emergency lighting system shall be labeled with red and green electrical tape at all junction boxes and spans over 30 feet.

Exit and Area of Refuge Sign Criteria: New signs shall be placed in all locations required by the applicable codes.

- New exit signs shall be LED type, without flashing function.
- Locations shall reflect egress paths as defined by the approved code footprint.
- Shall be submitted to both the DCM project manager and UFMA for approval before CDs are completed.
- Areas of refuge signs, if any, shall be similar to exit signs connected to the emergency lighting system in compliance with applicable codes and the ADAAG. Text on the sign shall read "AREA OF REFUGE", and shall display the universal accessibility symbol.

SPECIFICATION DETAILS

The Designer shall use the following as guidance in the preparation of specification documents for installation of emergency lighting system equipment on campus.

General: An Integrated Life Safety System shall be furnished to provide a reliable source of power and shall operate during a utility line deficiency without interruptions of power to the load.

- The Integrated Life Safety (ILS) System shall be UL listed.

- ❑ Applicable codes and standards include UL924 Standard for Emergency Lighting and Power Equipment; UL1778 Standard Uninterruptible Power Supplies; and ANSI C62.41.

Emergency Generator: Diesel generators with #2 diesel fuel are preferred.

- ❑ Environmental air permitting is required for emergency generators. No construction work can begin on the project until the required permits are obtained. Permitting process is a minimum of six months.
 - ❑ Provide University with required data on the generator so that permit application can be submitted.
 - ❑ Generator sets shall be located to disperse exhaust fumes and noise without affecting the normal functions of the building and surrounding site.
 - ❑ Specify a method of damping vibrations to acceptable levels.
- ❑ The Designer shall specify that the manufacturer provides contacts for remote indication of generator status, alarm and shutdown, and battery charger alarm to the campus BACS network. Provide auxiliary contacts for remote indication of transfer switch position.
- ❑ Size generator with a minimum or 25% additional capacity for future loads.
- ❑ Provide separate transfer switch per NEC for life safety loads.

Centralized Battery Inverter: SHALL NOT BE USED !

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