

## SECTION 26 51 00 - INTERIOR LIGHTING

### PART 1 - GENERAL

#### 1.1 DESIGN REQUIREMENTS

##### A. General Information:

1. Lighting design shall take into consideration for fixture and remote driver maintenance and replacement. Fixtures shall be accessible from a standard ladder located on a level floor or landing.
2. Lighting Requirements:
  - a. General:
    - 1) Provide energy efficient LED luminaries wherever possible.
    - 2) Color temperature shall be 4000K unless requested otherwise. Minimum CRI shall be 80.
    - 3) Luminary installations must comply with requirements set forth in other sections of this Division 26.
    - 4) Provide emergency and exit lighting per NFPA, IBC and NEC requirements and recommendations. Exit lights should be LED type.
    - 5) If emergency generator circuits are not available, provide emergency lighting battery packs in elevator machine rooms, mechanical rooms electrical rooms. Fire, Security rooms and Egress Lighting per Fire Code.
    - 6) Refer to current edition of the IES for lighting levels in areas not included in the following paragraphs.
    - 7) LED drivers shall be low inrush current type.
    - 8) Provide LED luminaries with 0-10V flicker-free dimming to 10%, power factor >0.90, less than 20% THD.
    - 9) Provide Energy Star or DLC listed-LED fixtures.
    - 10) Minimum foot-candle level in corridors shall be 20 foot candles.
    - 11) Minimum foot-candle level in lobbies shall be 15 foot-candles.
    - 12) The university standard corridor lighting consists of 2'x4' recessed luminary consistent with current LEED design.
  - b. Offices:
    - 1) Minimum foot-candle level shall be 30 foot-candles. Offices that require detail work at their desk shall be provided with minimum of 50 foot-candles. Rooms with special VDT requirements may be provided with less than 30 foot-candles, personal dimming control shall be provided.
    - 2) The university standard office lighting consists of 2'x4' recessed luminary
  - c. Laboratories:
    - 1) Minimum foot-candle level shall be 75 or current NIH Standards whichever is higher. This light level shall be achieved without the use of task lights.
  - d. Classrooms:
    - 1) Minimum foot-candle level shall be 40.
    - 2) Computer classrooms shall be provided with pendant-mounted indirect luminaries. Luminaries shall be mounted with aircraft cable. Maximum length of steel indirect product shall be 12'-0". Minimum foot-candle level shall be 25.
    - 3) Laboratory classrooms: Minimum foot-candle level shall be 75.
    - 4) Coordinate fixture type with ceiling projectors as needed. Fixture location shall not obstruct projector.
    - 5) Lighting shall be LED with 0-10V flicker free dimming to 1%.
  - e. Equipment Rooms:
    - 1) Provide a minimum of 3 foot-candles on vertical surfaces and 30 footcandles at 30" high horizontal surfaces.
  - f. Lecture Halls/Auditoriums:
    - 1) Lighting shall be LED with 0-10V flicker free dimming to 1%.

- 2) Lighting zones and control locations shall be coordinated with the university prior to final construction drawings.
- 3) Lighting design shall take into consideration for fixture maintenance and replacement. Review fixture accessibility with the University Project Manager prior to Design Completion.
- g. Exit/Egress Lighting:
  - 1) Provide adequate exit/egress lighting per code requirements.
  - 2) Coordinate with the university project manager if the egress fixtures are to be controlled with the normal adjacent fixture or if they are to be used as night lights.
- h. Dark Rooms:
  - 1) Provide local manual controls for dark room light fixtures.
- i. Outdoor Lighting
  - 1) Outdoor lighting should be zoned to provide flexibility for safety and economy.
- j. Animal Facilities
  - 1) Provide dual level lighting in all holding rooms. Provide 30 foot-candles at half level and 60-70 foot-candles at full "On".
  - 2) Provide red filter on one lamp controlled separately in all holding rooms which eliminates wave lengths visible to animals, verify with the university.
  - 3) Provide surface mounted, lensed "wash down" and gasketed fixtures throughout the facility.
- k. Janitor Closets
  - 1) Provide Lensed LED strip light fixture.

## 1.2 SUBMITTALS

### 1.3 Product Data: Submit product data with mounting type and installation instructions for each proposed types of luminary and accessories. DELIVERY, STORAGE AND HANDLING

- A. Deliver luminaries in factory-fabricated containers or wrappings, which properly protect them from damage.
- B. Store luminaries in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, laid flat, and blocked off ground.
- C. Handle luminaries carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURES

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
  1. LED Fixtures:
    - a. Lithonia Lighting
    - b. Gotham Lighting
    - c. Peerless Lighting
    - d. CREE Lighting
    - e. Philips Lighting

### 2.2 MATERIALS, GENERAL

- A. Provide low-energy LED drivers capable of operating with high power factor >0.90, rapid-start, and low-noise features; Type 1, Class P; sound-rated A. Total Harmonic Distortion shall be less than 20%.

- B. Wiring: Provide electrical wiring within luminary suitable for connecting to branch circuit wiring as follows:
  - 1. NEC Type THHN for 120 volt, minimum #18 AWG
  - 2. NEC Type THHN for 277 volt, minimum #18 AWG
  - 3. Provide a green grounding wire in flexible conduit connection to all recessed fixtures. Provide green grounding wire to all power outlets. Provide green grounding wire in all runs from panels to fixtures and devices.
- C. Provide LED drivers with low in-rush current.
- D. Exit Signs: Housing shall be extruded aluminum. Face shall be translucent white with green lettering. Directional arrows shall be universal for field adjustment. Mounting shall be as indicated on project drawings. Battery shall be provided if an emergency source is not available. Lamp shall be LED type. Input voltage shall be as shown on drawings. H-3 radioactive exit signs must not be specified.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and conditions under which lighting is to be installed, and substrate for supporting lighting. Notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

#### 3.2 INSTALLATION, GENERAL

- A. Install lighting at locations and heights as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation," NEMA standards, and with recognized industry practices to ensure that lighting fulfills requirements.
- B. Provide luminaries and/or outlet boxes with hangers to properly support luminary weight. Comply with IBC luminary support requirements.
- C. Install flush-mounted luminaries properly to eliminate light leakage between frame and finished surface.
- D. Provide plaster frames for recessed luminaries installed in other than suspended grid-type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.
- E. Fasten luminaries securely to indicate structural supports; and ensure that pendant luminaries are plumb and level. Provide individually mounted pendant luminaries longer than 2 feet with twin hangers. Mount continuous rows of luminaries with one more aircraft cable support greater than number of luminaries in the row.
- F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and 486B, and the National Electrical Code (NEC).
- G. Provide additional supports for all surface-mounted luminaries greater than 2 feet in length in addition to the outlet box.
- H. Overall dimensions of incandescent or fluorescent fixtures recessed in suspended grid ceilings shall be such that they will fit into grid ceiling with no distortion or field repair to fixtures and with no distortion of ceiling grids. If field repair is required, the engineer shall be notified immediately. All fixtures must be supported independent of the ceiling grid per NEC. Coordinate installation of the fixtures with installer of ceiling so that ceiling will be absolutely level after completion.

- I. Grounding: Provide equipment-grounding connections for lighting as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.
- J. Install exit signs per manufactures recommendations.

### 3.3 TESTING, CLEANING, AND CERTIFICATION

- A. Clean luminaries of dirt and construction debris upon completion of installation, and again prior to project turnover. Clean fingerprints and smudges from lenses.
- B. Protect installed luminaries from damage during remainder of construction period.
- C. At Date of Final Completion, replace lamps in luminaries that are observed to be noticeably dimmed after Contractor's use and testing, as judged by Engineer.
  - 1. Refer to Division 1 sections for the replacement/restoration of lamps in lighting where used for temporary lighting prior to Date of Final Completion.

**END OF SECTION 26 51 00**