

University Contact: Electrical Services, Maintenance & Operations
(302) 831-1744

26 51 00_INTERIOR LIGHTING

PART 1 - DESIGN REQUIREMENTS

1.1 ILLUMINATION LEVELS:

- A. Design illumination levels for different activities and spaces shall correspond to those listed below, "LIGHTING LEVEL REQUIREMENTS." These levels are based on the Illuminance Standards found in the 10th Edition of the IESNA Lighting Handbook. The designer shall confirm the levels given in the edition of the IESNA Lighting Handbook relevant to the project; any subsequent criteria shall supersede the levels indicated below. For activities not covered by the University standards below, refer to IES recommendations.

LIGHTING LEVEL REQUIREMENTS	
<i>TYPE OF AREAS</i> <i>(Height of Task Area)</i>	<i>RECOMMENDED AVERAGE MAINTAINED HORIZONTAL FOOTCANDLE LEVELS AT TASK SURFACE</i>
Corridor and stairway <i>(floor level)</i>	25
Lounge, lobby and reception area <i>(30" AFF)</i>	30
Secretary/Reception area <i>(30" AFF)</i>	40
Toilet room and locker room <i>(30" AFF)</i>	18
Classroom/Lecture Hall, general seating area <i>(30" AFF)</i>	40
Classroom/Lecture Hall, front teaching area around lecturer <i>(30" AFF)</i>	40-50
Conference room <i>(30" AFF)</i>	30
Areas where writing, reading, and typing are performed <i>(30" AFF)</i>	40-50
Office <i>(30" AFF)</i>	40
Laboratory <i>(Lab Bench Countertop)</i>	50

Note: AFF means Above Finished Floor

- B. Designer shall refer to IESNA Lighting Handbook and relevant IESNA RP guides relevant to the project, for lighting considerations with respect to uniformity ratios and quality of light per respective space. The designer shall document the targeted footcandle levels specific to the project on a space-by-space method and issue this information to the University for review and approval no later than the design development phase of a project.

- C. Security night lighting shall be provided for all public spaces and shall match the lighting requirements described in NFPA for emergency lighting.

1.2 LIGHTING POWER DENSITIES:

- A. Adjusted power densities for lighting as calculated in IECC-2015 compliance procedures shall not exceed the ranges outlined below for the different building spaces, in the space-by-space method. These levels indicated below are based on the 2015 edition of IECC. The designer shall confirm the levels given in the edition of ASHRAE 90.1 or IECC, whichever is more stringent, that is relevant to the project; any subsequent criteria shall supersede the levels below. For spaces not indicated below, refer to the edition of ASHRAE 90.1 that is relevant to the project.

LIGHTING POWER DENSITIES	
Library Stacks	1.7 W/ft ²
Electrical/Mechanical Room	0.95 W/ft ²
Conference/Meeting/Multipurpose	1.23 W/ft ²
Classroom/Lecture/Training/Labs	1.24 W/ft ²
Lounge/Recreation/Library Reading Area	1.06 W/ft ²
Offices/Library Card File & Cataloging/Dormitory	0.98 W/ft ²
Dining Area/Restrooms	0.65 W/ft ²
Storage	0.63 W/ft ²
Dressing/Locker/Fitting Room/Stairs	0.69 W/ft ²
Corridor/Transition	0.66 W/ft ²

1.3 LIGHTING FIXTURES:

- A. Fixtures shall be accessible for cleaning and revamping without complete disassembly. Lenses (where used) shall be one-hundred percent (100%) virgin acrylic with a minimum lens thickness of 0.125”.
- B. Parabolic-type reflector fixtures (where used) shall have minimum three inch (3”) deep louvers.
- C. Vertical lamp recessed compact fluorescent downlights or LED shall be used due to better optics and ease of re- lamping. If the ceiling plenum space is too shallow for the vertical lamp downlights, then horizontal lamp recessed compact fluorescent downlights shall be used with university approval.
- D. LED shall be used in classrooms, hallways, laboratories, restrooms, etc.
- E. Use LED in high bay areas.
- F. Provide Johnson hangers on High Bay Fixtures above 25’-0”.

- G. Specular reflectors in light fixtures shall NOT be specified.
- H. Minimum six (6) inch diameter or square downlights shall be specified. Four (4) inch downlights shall NOT be specified.
- I. Incandescent light source use shall NOT be permitted unless approved by the University.
- J. DO NOT Use battery pack self-contained LED or fluorescent fixtures

1.4 UNIVERSITY PRE-APPROVED LIGHT FIXTURE MANUFACTURERS:

- A. Lithonia
- B. Lightolier
- C. Cooper Lighting
- D. Hubbell Lighting
- E. Sylvania
- F. Topaz
- G. Finelight
- H. This is a general list of pre-approved manufacturers acceptable to the University. The use of other lighting fixture manufacturers shall be allowed, as approved by the University, on a project-by-project basis.
- I. Use of recessed lighting must be pre-approved.

1.5 EMERGENCY SYSTEM EXIT SIGNS:

- A. General purpose Exit Lights shall be DualLite EVE-LED Series, unless otherwise approved by the University.
- B. Dorm Exit Lights shall be Evenlite CDW - LED – vandal resistant and energy efficient
- C. DO NOT Install self-powered radioactive exit signs under any circumstances

1.6 CONTROLS:

- A. Designers shall consider and design for control schemes to limit the unnecessary operation of artificial lighting. These include:

1. Combination manual switching for multiple lighting zones with occupancy sensor Auto "OFF"
 2. Dual technology occupancy sensors:
 3. With manual override for classrooms, conference rooms and offices
 4. Ceiling mounted sensors are preferred
 5. Wall switch mounted occupancy sensors for private offices are acceptable.
 6. Dimming controls (Refer to, "INTERIOR DIMMING SYSTEM")
 7. Auto time schedule clock controls
 8. Lighting control integration through the university BAS system, where desired by the University
- B. In accordance with ASHRAE 90.1 energy standards, provide automatic lighting controls (occupancy sensor or time scheduled) for all buildings >5,000 sf.
EXCEPTION – Lighting intended for 24-hour operation.
- C. Provide multiple zones of lighting in classrooms. At a minimum, teaching wall lights and any ceiling lights that could contribute incident light on the projection screen should be separated from the lights in the remainder of the room. During A/V presentations, the control scheme should be flexible to turn off these lights completely.
- D. Automatic daylight controls shall be considered for all new work projects on a space-by-space basis. For spaces where natural daylighting is abundant, it is recommended that artificial lighting systems be controlled to eliminate unnecessary illumination. Controls shall be capable of dimming or turning off lights completely. Where lights are dimmed in response to natural light, follow Energy Code. Reduction shall be based on the requirement of the IECC.

1.7 LIGHT SOURCE:

- A. All new interior and exterior fixtures shall utilize a LED light source. The use of lamp types other than what is listed below shall not be permitted, unless approved by the University.
- B. LED
1. Driver: 120-277 volt. 0-10 volt dimming electronic type.
 2. Tunable white LED driver: To be used only with permission of the University.
 3. Use 3500K LED fixtures with minimum CRI of 80 for interior fixtures.
 4. Use 4000K LED fixtures with minimum CRI of 90 for laboratories and hallways/corridors.
- C. FLUORESCENT LAMPS (TO BE USED ONLY FOR REPLACEMENT IN EXISTING FIXTURES)

1. Low-Mercury Lamps: Comply with EPA's toxicity characteristic leaching procedure test; shall yield less than 0.2 mg of mercury per liter when tested according to NEMA LL 1.
2. T8 rapid-start low-mercury lamps, rated 32 W maximum, nominal length of 48 inches, 2800 initial lumens (minimum), CRI 80 (minimum), color temperature 3500 K, and average rated life 20,000 hours.
3. T8 rapid-start low-mercury lamps, rated 17 W maximum, nominal length of 24 inches, 1300 initial lumens (minimum), CRI 80 (minimum), color temperature 3500 K, and average rated life of 20,000 hours.
4. T5 rapid-start low-mercury lamps, rated 28 W maximum, nominal length of 45.2 inches, 2900 initial lumens (minimum), CRI 85 (minimum), color temperature 3500 K, and average rated life of 20,000 hours. T5 lamps shall be used for renovation projects only when the entire building is being renovated, and for new construction of buildings. There shall not be a mix of T5 and T8 lamps in a building.
5. T5 rapid-start low-mercury lamps, rated 14 W maximum, nominal length of 22.2 inches, 1350 initial lumens (minimum), CRI 85 (minimum), color temperature 3500 K, and average rated life of 20,000 hours.
6. T5HO rapid-start, high-output low-mercury lamps, rated 54 W maximum, nominal length of 45.2 inches, 5000 initial lumens (minimum), CRI 85 (minimum), color temperature 3500 K, and average rated life of 20,000 hours. T5HO lamps shall be used for renovation projects only when the entire building is being renovated, and for new construction of buildings. There shall not be a mix of T5HO and T8 lamps in a building.
7. Compact Fluorescent Lamps: 4-Pin, low mercury, CRI 80 (minimum), color temperature 3500 K, average rated life of 10,000 hours at 3 hours operation per start, and suitable for use with dimming ballasts.
 - a. 13 W: T4, double or triple tube, rated 900 initial lumens (minimum).
 - b. 18 W: T4, double or triple tube, rated 1200 initial lumens (minimum).
 - c. 26 W: T4, double or triple tube, rated 1800 initial lumens (minimum).
 - d. 32 W: T4, triple tube, rated 2400 initial lumens (minimum).
 - e. 42 W: T4, triple tube, rated 3200 initial lumens (minimum).
 - f. 55 W: T4, triple tube, rated 4300 initial lumens (minimum).
8. High Lumen Compact Fluorescent Lamps: 4-Pin, low mercury, 82 CRI (minimum), color temperature 3500 K, and suitable for use with dimming ballasts.
 - a. 40 W: T5, long double tube, rated 3150 initial lumens (minimum), average rated life of 20,000 hours at 3 hours operation per start.
 - b. 55 W: T5, long double tube, rated 4800 initial lumens (minimum), average rated life of 12,000 hours at 3 hours operation per start.

D. HID LAMPS (TO BE USED ONLY FOR REPLACEMENT IN EXISTING FIXTURES)

1. Metal-Halide Lamps: ANSI C78.1372, with a minimum CRI 65, and color temperature 4000 K.

2. Pulse-Start, Metal-Halide Lamps: Minimum CRI 65, and color temperature 4000 K.
3. Ceramic, Pulse-Start, Metal-Halide Lamps: Minimum CRI 80, and color temperature 4000 K.

1.8 UNIVERSITY APPROVED LAMP MANUFACTURERS:

- A. Philips
- B. Osram-Sylvania
- C. GE
- D. Cree

PART 2 END OF SECTION