

SECTION 26 50 00: INTERIOR LIGHTING

1. GENERAL

- A. This standard is intended to establish a basis of design for building lighting in new construction and existing facility renovations such that the University may achieve a level of quality and consistency in the design and construction of their facilities.
- B. In addition to code requirements, lighting levels/design should be in accordance with Illuminating Engineering Society of North America (IESNA) Handbook and specialty uses or applications such as The National Collegiate Athletic Association (NCAA) requirements.
- C. Maximize use of automatic lighting controls; considerations include:
 - Day-Night-Weekend Scheduling
 - Occupancy Sensors
 - Daylighting Sensors
 - Automatic Time Switches
- D. Programming of preset lighting control systems to be coordinated with the FM Sustainable Energy & Environmental Initiatives office and building occupants. A record of settings to be provided to each.
- E. Exercise care in the selection and location of fixtures installed above hard ceilings or suspended acoustical ceilings to allow for ready access of components that require regular service or replacement.
- F. Require in-line fuses in fixtures, which are not locally switched, or where lighting circuit should not be turned off for safety reasons (i.e. stairwells).
- G. Stairwell light fixtures shall be located such that they may be reached safely with no more than an 8-foot ladder; alternative access means require FM operations approval.
- H. All mechanical/electrical/plumbing utility room and stock room fixtures shall include wire guard.
- I. Do not use open type, high intensity discharge lighting fixtures indoors.
- J. Lighting control system to be tested and validated by the Commissioning Agent for all projects.
- K. Fixtures to be listed by the Design Lighting Consortium (DLC) for energy rebates.
- L. Selection of lighting fixtures should minimize the number of different lamp types utilized and required to be stocked.
- M. Provide spare fixtures in quantities equal to 5 percent of the amount used on the project, with no less than one of each type.
- N. Coordinate with Brown PM for space within the building to store spare lamp/spent lamp storage and fixture spare parts.

- O. Label each lighting fixture with:
 - Manufacturer
 - Model number
 - Lamp type
- P. Label lighting fixtures and lighting controls with:
 - Source electrical power
 - Circuit number

2. LAMP TYPES

- A. Incandescent lighting is discouraged and only to be used with prior approval; applications include theatrical and special-purpose lighting only.
- B. Fluorescent lighting may utilize T-5, T-8, biax, or compact-fluorescent lamps; fluorescent “U” and “circline” lamps, 6 ft and 8 ft straight lamps are not acceptable.
- C. Metal halide is acceptable for certain high ceiling and specialty applications; avoid use on emergency or life safety circuits.
- D. Light Emitting Diode (LED)
- E. Do not use low pressure sodium or mercury vapor lamps.
- F. Lighting Color Temperatures:
 - Lamp color temperatures to be consistent within a building; exceptions only for specialty use in specific open labs and workshops, i.e. 5000K daylight bulbs for print shops or graphic studios
 - 3,000K: typical for residential halls
 - 3,500K: typical for libraries & dining facilities
 - 4,100K: typical for classroom, office, and research facilities

3. SWITCHING & OCCUPANCY CONTROLS

- A. Lighting within building common areas, assembly spaces, large meeting rooms, public spaces and large central corridors—control via a lighting control system. Where rooms are used for a variety of functions, provide multi-level switching, fixture zoning, or dimming to accommodate light level flexibility for occupants.
- B. In larger new construction projects, consider the design of load shedding and dimming for lighting controls, integrated with the campus Building Automation System (BAS) controls for control and status monitoring.
- C. In wet lab facilities that include fume hoods, lighting controls to be integrated into the campus BAS controls for occupied / unoccupied control of the space HVAC systems. When available in other spaces, provide occupancy sensors with isolated relays for use by local HVAC controls.
- D. Daylight harvesting / lamp dimming to be investigated for all non-research spaces. When daylight harvesting is used, gradual dimming control, versus “stepped” control is preferred to minimize user distractions.
- E. Occupancy sensors, with local override on/off switches, are the preferred control method in all private offices, restrooms, classrooms, conference rooms, storage rooms and other enclosed areas of intermittent use. Dual Technology (infrared and ultrasonic) sensors should be used in private offices, conference rooms, and restrooms.

- F. Occupancy sensors are not allowed in electrical and mechanical rooms with electrical distribution equipment, motors, pumps, mechanical equipment or other devices that, without appropriate light levels, would create a safety hazard. Use local lighting time switches that incorporate a flashing feature prior to shutting off the lights.
- G. Occupancy sensors are not allowed in areas where hazardous tasks are being performed (e.g. research labs involving chemical use).
- H. Provide local override switches in offices, conference rooms, common spaces and classrooms where lighting is controlled by Code-required automatic shut-off.
- I. Locate lighting control stations and relay cabinets in readily accessible, floor-level locations, such as in electrical closets; installation above suspended ceilings is not considered an accessible location. Occupancy sensor relay packs may be located above ceilings.
- J. Lighting contactors to be electrically actuated, mechanically held.
- K. Occupancy Sensor Manufacturers:
 - Sensor-Switch
 - Watt-Stopper
- L. Dimming Systems/Master Lighting Controls Manufacturers:
 - Lutron
 - Crestron
 - Watt-Stopper

4. FIXTURES

- A. Lighting fixtures for use in University buildings to be commercially available, commercial-grade, standard models. Fixtures to be UL-listed as an assembly and approved for use in the application to which they are specified.
- B. Custom designed/built fixtures are not to be used when standard models similar in appearance and performance are available. Where deemed essential, limited use of custom fixtures to be permitted provided they are designed, constructed and installed in conformance with the following criteria:
 - The fixtures utilize standard commercially available lamps.
 - The fixtures are readily serviceable for lamp and ballast replacement without major disassembly or removal of fixture. Lenses shall be well secured and readily replaceable.
 - Ballasts are approved for the application.
 - Custom fixtures shall be UL-listed (or equivalent 3rd party) assemblies approved for use in the application to which they are specified.

5. BALLASTS

- A. Fluorescent: electronic, Class P
- B. Electronic ballasts to be specified to have less than 10% total harmonic distortion.
- C. Fluorescent Dimming Ballasts Manufacturer: Lutron; provide with 5-year warranty
- D. Provide identical ballasts within each fixture type unless otherwise noted.
- E. Provide ballasts having the lowest sound rating available for the lamps specified and clearly showing their respective sound ratings.

- F. For outdoor use and wherever ballasts are used outside of a heated environment, provide ballasts capable of lamp starting at any temperature down to 0°F.
- G. HID Lamps:
 - Provide isolation mounting and insulation of HID ballasts to reduce sound transmission or radiation.
 - Include a fast-acting primary inline fuse built into the fixture assembly by the manufacturer.

6. DOCUMENTATION/CLOSEOUT DATA

- A. Include the following O & M information for building lighting systems:
 - Light Fixtures: cut sheets and bill of materials for each with all selected fixture options identified
 - Lighting Control System: cut sheets and bill of materials for each with all selected components identified
 - Complete narrative of how each lighting control system is supposed to operate, including recommended settings; include final programming schedule for preset (time of day) lighting control systems
- B. As-Built lighting control record drawings including the following:
 - Floor plan drawings of the lighting control system showing locations of all lighting controllers
 - Single-line diagram showing all lighting control system components and associated interconnection wiring.
 - Control interfaces to other systems, such as building automation system, fire alarm, security controls and standby power system.
 - Room control schedule indicating areas controlled, method of control, circuit and zone number.