

SECTION 26 51 00 - INTERIOR LIGHTING

PART I - GENERAL

1.1 SUBMITTALS

- A. Photometric Data: Submit manufacturer's data on lighting fixtures, assembled by luminaire "type" in alphabetical order, with the proposed fixture and accessories clearly labeled. Include photometric data. Ballast and lamp product data shall accompany fixture submittals.
- B. Samples: Sample fixtures, diffusers and stems may be requested for inspection before acceptance.

PART 2 - PRODUCTS

2.1 FIXTURES, GENERAL

- A. All fixtures shall be UL listed for the environment where they will be installed, including damp or wet label where required.
- B. Polycarbonate lenses shall be used at locations susceptible to abuse and vandalism.
- C. All fixtures shall be installed so that they can be maintained from a common ladder or have access panels and/or catwalks built into the structure for fixture maintenance. Access to these fixtures shall not require scaffolding or other special rigging.
- D. All fixtures must have been marketed for at least 3 years.
- E. In stairwells, light fixtures shall be ceiling mount type except when the mounting height will pose a maintenance problem. Glare shall be considered when wall mounting fixtures. Fixtures shall not be mounted above stair risers, but only at flat landings for accessibility.
- F. Lighting shall be provided in each access compartment of air handling units and other large equipment, with a switch and indicating lamp on the exterior of the chamber. Lamps in air handling units shall be Compact Fluorescent, rough-duty rated, Phillips TuffGuard or approved equal. (compact fluor lamps will last longer – TuffGuard is a tougher lamp coating to withstand vibration/temp/etc)
- G. If different levels of lighting are necessary in a room, switching shall be installed to separately control the fluorescent lamps. If very low light levels are necessary, dimmable fluorescent fixtures shall be installed.
- H. Fluorescent fixture lenses shall be 100 percent virgin acrylic with a minimum thickness of 0.125" inch or greater. Prismatic patterns shall be used except when glare is a problem. Glass lenses shall not be used unless required by the manufacturer or the situation.

2.2 LINEAR FLUORESCENT LIGHTING FIXTURES

- A. Metal parts of fluorescent fixtures shall be made of 20 gauge thick steel.
- B. Fluorescent fixtures shall be designed with ample space for removal of lamps.
- C. All surface mounted fixtures shall have flat sides and bottoms except hallway fixtures. Wraparound fixtures are unacceptable, except in hallways.
- D. All wiring in fluorescent fixture channels shall be UL, NEMA, and FM listed.
- E. Fluorescent Lamps

1. T8 lamps are preferred. General lighting for new construction and major building renovations shall be by 48 inch, 3500 degree color temperature, T8 lamps. Minimum 82 CRI. Lamps shall constitute "High performance" or "Super T8" system in combination with ballasts for >90 lumens per watt.
2. T5 lamps are not permitted. Standard T5 28 watt lamps shall never be used. High-output T5HO 54 watt lamps may only be considered if no T8 fixture will meet the design requirements, and if the fixture is designed to conceal the T5HO lamp from direct view.
3. U-lamps are not permitted. Fixtures shall use straight fluorescent lamps only.
4. Manufacturers: General Electric, Philips, or Sylvania.

F. Fluorescent Ballasts

1. Ballasts shall be manufactured to UL Standards, carry UL label and shall be ETL certified to CBM Standards and comply with the current Federal Efficiency Law.
2. Minimum efficacy for fluorescent installations shall be 90 lumens per input watt to provide a "Super T8" or "High performance T8" system.
3. Ballasts shall be instant-start or programmed rapid-start, high frequency (>20 kHz) electronic type.
4. All Ballasts controlled by Occupancy Sensors shall be programmed rapid-start.
5. All fluorescent ballasts shall be individually fused, with quick disconnects. The ballasts shall produce <10% harmonic distortion. All ballasts shall have a sound level of A or better.
6. Power factor greater than or equal to 95 percent.
7. Ballasts shall meet FCC requirements governing electromagnetic and radio frequency interference.
8. Four lamp ballasts shall be used whenever possible. Tandem wiring of two 2-lamp fixtures with one 4-lamp ballast shall be used where practical.
9. Ballasts shall be guaranteed for a minimum of 5 years from all defects.
10. Ballasts shall be manufactured by Advance, Osram Sylvania, Universal Lighting Technologies or Howard Industries.

2.3 LIGHT EMITTING DIODE (LED) LIGHTING FIXTURES

- A. *[Note to AE: LED fixtures are preferred for all applications other than general illumination. Some areas may include under cabinets, cold rooms, display cases, down lights, elevators, etc. Life cycle cost analysis shall be performed.]*
- B. White LED fixtures for general illumination shall have been tested by the US Dept. of Energy's CALiPER program, IES LM-79 and LM-80. *[Note to AE: This information shall be made available for review prior to specification.]*
- C. Color temperature: No greater than 5000K for indoor illumination. 3500K strongly preferred.
- D. All LED luminaires shall have been designed around the LED source. LED lamps marketed as replacements for four foot fluorescent T8s shall never be used.
- E. LED systems shall be modular and allow for separate replacement of the LEDs and driver. "Throw-away" fixtures with non-replaceable components are not permitted.
- F. Warranty: Minimum 3-year manufacturer warranty on LED lamps and drivers.
- G. Allowed LED light fixtures to be used on campus shall be the following types, unless approved in writing by F&S Engineering Department:
 1. Strip light fixtures 4 foot in length.

2. 2 ft X 2 ft light fixtures.
3. 2 ft X 4 ft. light fixtures.
4. Can light fixtures.

H. Provide at least 10% spare lighting fixtures of every LED light fixture provided on the project. However, if LED light fixture count is less than 5 light fixtures, then no spares are required.

2.4 COMPACT FLUORESCENT LIGHTING FIXTURES

- A. Fixtures installed outdoors and over food handling areas shall be lensed.
- B. Fixtures installed in shower locations shall be provided with flush type plastic reflector with opal lens and shall be wet location rated.
- C. Compact fluorescent ballasts shall produce <10% harmonic distortion.
- D. Use of compact fluorescent dimming ballasts should be kept to a minimum.
- E. Compact fluorescent lamps shall be twin or double twin tube, 9, 13, 18 or 26 watt T-4. 'Long' compact fluorescent lamps in nominal 39 and 40 watt sizes are acceptable. Compact fluorescent lamps shall be 2700K-3500K color temperature.
- F. Ballasts shall be guaranteed for a minimum of 5 years from all defects.

2.5 HIGH INTENSITY DISCHARGE (HID) LIGHTING FIXTURES

- A. Type: HID lighting shall be of the type that is compatible with existing area lighting. Pulse-start ceramic metal halide is recommended for energy conservation. High pressure sodium shall not be used indoors.
- B. No dimming: HID installations may be on/off or bi-level (50%). If continuous dimming is required, HID lighting shall not be used.
- C. Protection: HID fixtures shall be protected from damage by providing wire guards or lenses, depending on the location and expected level of abuse.
- D. HID Lamps
 1. All lamps shall be diffuse coated, Pulse-start ceramic metal halide.
 2. All metal halide lamps shall have a self-extinguishing feature to disconnect the electrical supply to the arc tube if outer glass envelope is broken. If the fixture is of the totally enclosed type, the self-extinguishing feature is not required.
 3. Manufacturers: General Electric, Osram-Sylvania or Philips.
- E. HID Ballasts:
 1. Electronic, pulse-start, stabilized type for various types and sizes of lamps.
 2. Ballasts shall be guaranteed for a minimum of 5 years from all defects.
 3. All HID ballasts shall be individually fused.

2.6 SPECIAL APPLICATION AND FUNCTION:

- A. Low voltage fixtures utilizing MR16 lamps shall be lensed.
- B. 'Clean-room' type fixtures for high purity areas and special laboratory functions shall be triple gasketed, with sealed cam latches.
- C. Warning signs (In Use, Beam On, X-Ray In Use, etc.) shall be LED illuminated with housing and face color as specified.
- D. Task lights shall be equipped with an integral rocker switch. Where two or more task lights are located in a room, a wall switch shall be installed at the entry door for control.

- E. In environmentally sensitive rooms, enclosures shall be complete with gaskets to form weatherproof seal and UL approved for wet locations.
- F. In cold environments, provide low temperature ballasts with reliable starting to 0 degrees.

2.7 LAMPS

- A. Incandescent lamps shall not be used.
- B. Halogen PAR lamps shall be 130 volts, 2000 hour minimum.
- C. MR16 lamps shall use LED source (no incandescent or halogen).
- D. Lamps, including linear fluorescent, compact fluorescent and high intensity discharge, shall be low mercury type and shall pass all federal TCLP (Toxicity Characteristic Leaching Procedure) test requirements at the time of manufacture.

PART 3 - EXECUTION

3.1 SUPPORT

- A. Where fixtures of considerable weight are used, special hanging anchorage shall be provided.
- B. Fixtures shall be securely supported from the building structure and to the ceiling system. Where recessed fixtures occur in a grid system, install tie wires on 2 opposite corners of the fixture. Fixtures so supported shall be securely fastened to the grid system members with safety tee-bar clips.
- C. Where a fixture occurs under ducts, the width of duct shall be spanned with metal channel suspended and supported at both ends and the fixture attached to the channel.
- D. Provide all pendant mounted fixtures with canopies and ball aligners.
- E. Fixtures provided with chain hangers shall have chain of length to clear ducts, piping and other obstructions. Provide flexible conduit connections to outlet box. Length shall not exceed 6 feet.

3.2 WIRING METHODS:

- A. Lighting fixtures shall be connected to a typical metal conduit, junction box, and wire lighting grid system.
- B. Where required, junction boxes shall be standard 4-inch square or larger with blank cover, located adjacent to recessed unit. The boxes shall be rigidly fastened in place to the steel framing system or structure. Install separate junction boxes for the emergency and normal power sources, but the flexible metal conduit shall terminate at the same junction box on the light fixture.
- C. From the junction boxes, install 1/2-inch flexible conduit to the fixture. Flexible metal conduit of 3/8-inch nominal trade size shall be permitted in the lengths not to exceed 6 feet as part of an approved assembly for tap connections to lighting fixtures.
- D. Modular cabling, flexible whip assemblies, feed through wiring, 'daisy-chain' feeds, tandem wiring and other similar wiring methods are not acceptable for the lighting circuit distribution and wiring system.

END OF SECTION 26 51 00

This section of the *U of I Facilities Standards* establishes minimum requirements only.
It should not be used as a complete specification.