

## SECTION 263000 - LIGHTING

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. All work in this Section shall comply with the provisions of Section 260100.
- B. Provide all lighting fixtures and lamps as specified herein and as shown.
- C. All lamps shall be operating at the time of the final inspection and for a period of six (6) months after the final acceptance of the project by the Owner.
- D. Confirm exact locations of all lighting fixtures by coordination with the Architects Reflected Ceiling Plans and mechanical equipment above or on the ceiling.
- E. Confirm all ceiling types before ordering lighting fixtures.
- F. Each lighting fixture shall have been tested and certified for proper operation by the fixture manufacturer for the type mounting and ceiling on/in, which it is installed.

### PART 2 - PRODUCTS

#### 2.1 LIGHTING FIXTURES

- A. Each lighting fixture shall be as specified in the Lighting Fixture Schedule corresponding with its fixture type indication (letter).
- B. Most lighting outlets are lettered or groups of outlets are indicated by a letter.
- C. Each lighting fixture shall have a manufacturer's label affixed and shall comply with the requirements of all authorities having jurisdiction.
- D. The lighting fixtures that are indicated by the letters shall be as indicated on the Lighting Fixture Schedule.

#### 2.2 LAMPS

- A. The type lamps shall be as specified for each lighting fixture in the lighting fixture schedule.
- B. The lamp catalog number is the catalog number is generally for Sylvania Lighting and is given as a standard of the quality and performance required. Equal lamps by General Electric or Philips will be acceptable. When a lamp manufacturer's name is used along with the catalog number in the lighting fixture schedule, it is considered unequalled by any other lamp and shall not be substituted for. The lamp performance with energy conserving ballasts furnished under this Section shall be certified by a nationally recognized independent testing laboratory.
- C. Fluorescent lamps shall be as specified in the Lighting Fixture Schedule.
- D. Incandescent lamps shall be as specified in Lighting Fixture Schedule.
- E. All incandescent lamps, except quartz tubes, shall be rated for 130 volt operation.
- F. High Intensity Discharge (HID) lamps shall be as specified in the Lighting Fixture Schedule.

## **2.3 BALLASTS**

- A. Fluorescent ballast shall be electronic type manufactured by Motorola, Magnetek or Advance.
- B. Ballast shall operate lamps at a frequency of 25 KHz or higher with less than 2% lamp flicker.
- C. Ballast shall operate at an input voltage of 108 - 132 Vac (120V line) or 249 - 305 Vac (277V line) at an input frequency of 60 Hz. Light output shall remain constant for line voltage fluctuation of  $\pm 5\%$ .
- D. Ballast shall comply with EMI and RFI limits set by the FCC (CFR 47 part 18) for non-residential applications and not interfere with normal electrical equipment.
- E. Ballast shall withstand transients as specified by ANSI C.62.41 for location category A3 in the normal mode and location category A1 in the common mode.
- F. Ballast shall meet applicable ANSI standards.
- G. Ballast shall have a minimum power factor of 0.99.
- H. Ballast shall not be potted or weigh more than 1.3 pounds.
- I. Ballast shall have less than 10% Total Harmonic Distortion.
- J. Ballast shall have less than 6% Third Harmonic Distortion.
- K. Ballast height shall be less than or equal to 1.5 inches.
- L. Ballast shall have a poke-in wiretrap connector.
- M. Ballast shall meet sound rating "A".
- N. Ballast must be Underwriters Laboratories (UL) listed Class P, Type 1 Outdoor.
- O. Ballast shall provide normal rated lamp life as stated by lamp manufacturers.
- P. Rapid start ballasts are series wired and shall maintain full cathode heat during operation.
- Q. Rapid start ballast shall have less than a 1.5 Lamp Current Crest Factor (LCCF) and instant start ballasts have less than a 1.7 LCCF.
- R. Instant start ballast shall have parallel lamp operation.
- S. Ballast factor standard is  $.875 \pm 0.025$  on all normal light output products.
- T. Ballasts for "PL" fluorescent lamps shall be coordinated with lamps and 2-pin or 4-pin configuration ballasts shall be provided to match lamps. Manufacturer for "PL" fluorescent fixtures shall be Advance, Roberson, Lightolier or Lutron.
- U. Ballasts for High Intensity Discharge (HID) lamps shall be Constant Wattage Autotransformer (CWA) type or equal type with minimum power factor of 0.9.

## **2.4 DIFFUSERS**

- A. Unless specified otherwise, all prismatic diffusers for fluorescent lighting fixtures shall be prismatic acrylic KSH K12 with a thickness of 0.125", measured from the back side to the peak of the prism.
- B. All wraparound lenses shall be virgin acrylic, one-piece and injection molded.

## **2.5 EMERGENCY BATTERY LIGHTING**

- A. Lighting fixtures indicated on the drawings to be provided with an emergency battery ballast shall provide emergency lighting by using a standard fluorescent lamp or lamps and an emergency battery ballast. The ballast shall consist of a field replaceable high temperature, maintenance free nickel cadmium battery, charger and electronic circuitry contained in one metal case. Provide a solid state charging indicator light to monitor the charger and battery, double pole test switch and installation hardware. The battery ballast shall provide power to the fluorescent lamp upon failure of the normal supply to the fixture.
- B. The test button and indicator light shall be integral in the fixture reflector and shall be positioned within or on the surface of the fixture so as to be accessible and identifiable.
- C. Under normal mode the battery ballast shall keep the batteries at full charge. Upon loss of normal power the battery ballast shall operate the fluorescent lamp or lamps for 90 minutes.
- D. Battery recharge time shall not exceed 16 hours to fully recharge and shall not exceed 225 milliamperes charging current
- E. The lumen output of the lamp or lamps powered by battery unit shall be not less than 1,100 lumens initially for a four-foot fluorescent lamp.
- F. The battery ballast shall meet or exceed all the requirements set forth in UL924 "Emergency Lighting and Power Equipment" and shall be UL listed for installation on top of or remote from the fixture. Emergency illumination shall meet or exceed the requirements set forth in the National Electric Code, Life Safety Code and UL 90-Minute Requirements.

## **2.6 LIGHT FIXTURE TRIM**

- A. Each recessed lighting fixture shall have a trim to match the type of ceiling (plaster, exposed grid, concealed spline, exposed panel, etc.) in which it is being installed, regardless of catalog number given. Coordinate with the Architect's reflected ceiling plan to provide the right trim for the type of ceiling the fixture is to be installed in.
- B. Each lighting fixture recessed in a plastered ceiling of any type shall have a plaster frame.

## **2.7 LIGHTING CONTROL**

- A. Coordinate lighting control with building energy management system.

## **2.8 RECESSED INCANDESCENT FIXTURES**

- A. All recessed incandescent fixtures shall comply with Article 410-65, C of the N.E.C.

## **2.9 FLUORESCENT FIXTURES**

- A. All indoor fluorescent fixtures utilizing double ended lamps or that are supplied from multi-wire branch circuits, shall have a disconnecting means that complies with Article 410-73, G of the N.E.C.

## **2.10 LED LIGHTING FIXTURES**

- A. LED lamps for interior use shall be 3500K, CRI 80 (min.), unless noted otherwise. Color temperature chromaticity over the lifetime of the product shall be within 0.007 on the CIE 1976 (u',v') diagram.
- B. System shall be rated at a minimum for 50,000 hours (min.) at 70% lumen maintenance (L80).
- C. System shall comply with the following:
  - 1. ENERGY STAR® SSL Requirements for Luminaires
  - 2. IESNA LM-16
  - 3. IESNA LM-58-94
  - 4. IESNA LM-79
  - 5. IESNA LM-80
  - 6. ANSI C82.2-2002
  - 7. ANSI C82.77-2002
  - 8. ANSI C78.377-2008
  - 9. CIE 13.3-1995
  - 10. CIE 15-2002
  - 11. ANSI/UL 153
  - 12. UL 1598
- D. LED drivers shall be electronic, thermally protected and have an input voltage at 120/277VAC, 60Hz with a power factor of >0.90.
- E. LED boards and drivers shall be provided with plug-in connections for tool-less replacement of components.
- F. Compatibility of dimming switches for control of dimmable LED drivers shall be confirmed with LED fixture manufacturer.

### **PART 3 - EXECUTION**

#### **3.1 SUPPORT OF LIGHTING FIXTURES**

- A. All lighting shall be supported from the building structure. The fixtures shall be supported in a manner that will insure the fixture weight being equally distributed from each support and the fixture remaining in a level position.
- B. Fluorescent fixtures installed recessed in a suspended ceiling system shall be supported from the building structure with two (2) 12 gauge wires on diagonal corners of the fixture. In addition, the fixture shall be clipped to members of the ceiling suspension system.
- C. Fluorescent fixtures installed in or on any ceiling other than a suspended ceiling system specifically mentioned above shall be supported with concealed steel rods. Rods shall be 1/4" diameter minimum and shall be located where recommended by the fixture manufacturer. Provide a minimum of two (2) supports for each 4' or 8' fixture chassis. Supports shall be maximum of 48" centers. For incandescent fixtures, steel hanging wire may be used by attaching the wire to the fixture mounting frame.
- D. Pendant mounted incandescent fixtures shall be stem supported by a fixture stud mounted in the outlet box. Suspended fluorescent fixtures shall have mounting stems located as per the manufacturer's recommendations, but in no case shall have less than two (2) stems per chassis.

**3.2 AIMING OF ADJUSTABLE LIGHT FIXTURES**

- A. All fixtures with lamp position, tilt, shutters, rotation, or other types of adjustments during the final inspection. Fixtures serving areas where day lighting is predominant will be adjusted after sunset.

**3.3 LIGHTING FIXTURES IN MILLWORK**

- A. Special attention shall be given to lighting fixtures indicated to be mounted within, under, on or otherwise incorporated into millwork or cabinetry.
- B. Refer to the Architectural drawings and details for specific dimensions. This coordination shall occur prior to ordering fixtures to assure fixtures will fit the space limitations of the millwork.
- C. This requirement is intended to preclude incurring additions to the Contract due to fixtures being too small or too large for the space.

**3.4 FINAL PREPARATION**

- A. All plastic covers shall be removed from fluorescent fixtures.
- B. Clean all lens and reflectors from debris, fingerprints, dust, etc.

**END OF SECTION 263000**