

SECTION 16500 - LIGHTING

PART 1 - GENERAL

1.1 RELATED CONDITIONS

- A. Provisions established within the General Conditions and Supplementary General Conditions of the Contract, Division 1 - General Requirements, and the Drawings are collectively applicable to this Section.

1.2 SECTION INCLUDES

- A. Incandescent lighting fixture.
- B. Fluorescent lighting fixture.
- C. High intensity discharge lighting fixtures.
- D. Associated lamps and ballasts.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. provide products of acceptable manufacturers which have been in satisfactory use in similar service.
- B. Comply with the following applicable standards and codes: UL, ANSI, NEMA, and National Electrical Code.
- C. Lighting fixtures and ballasts shall bear the U.L. label.

1.4 SUBMITTALS

- A. General: Submit in accordance with Section 01340.
- B. Product Data: Submit manufacturer's catalog cut sheets, data sheets and installation instructions.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Light Fixtures: Provide light fixtures as specified on the Light Fixture Schedule located on the drawings or approved substitution.
- B. Lamps: General Electric, Osram-Sylvania or Philips.
- C. Standard Energy Saving Ballasts: Advance, Motorola, Universal or Valmont.
- D. Electronic Ballasts: Advance, Motorola.

2.2 LAMPS

- A. Incandescent lamps shall be extended service, 2500 hour, 130 volt. Provide special lamps from longest life available in each category.
- B. Fluorescent lamps shall be energy-saving type, rapid start with the following minimum requirements:

Lamp <u>Type</u>	<u>Wattage</u>	Lamp Color <u>Temp °K</u>	Minimum Initial <u>Lumens</u>	Rated Average <u>Life Hours</u>	GE Lamp <u>Catalog No.</u>
T8	32 (Straight Tube-48")	*3500	2850	20,000	F32T8/SP35
T8	32U(U-Tube)	*3500	2850	20,000	F32T8/SP35/U6

- C. *Standard lamp color and type unless required otherwise to match surrounding light fixture lamps or specified otherwise on the Light Fixture Schedule located on the Drawings. Compact fluorescent lamps shall have 3500°K lamp color unless required otherwise to match surrounding light

fixture lamps or specified otherwise on the Light Fixture Schedule located on the Drawings.

D. High intensity discharge shall be from longest life available.

2.3 BALLASTS

A. Fluorescent:

1. Magnetic energy saving interior ballasts:
2. Voltage as indicated, automatic reset, thermal protection, U.L. Class P listed with 90 percent minimum power factor, CBM Certified, Group A sound rating.
3. T8 Instant Start Electronic Ballasts:
 - a. Ballast shall operate lamps at a frequency of 20 KHZ or higher with less than 2% lamp flicker, and shall operate at an input voltage of 108 - 132 Vac (120V line) or 249 - 305 Vac (277V line) as applicable, at an input frequency of 60 HZ. Light output shall remain constant for line voltage fluctuation of $\pm 5\%$.
 - b. 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.
 - c. Ballast shall withstand transients as specified by ANSI C.62.41 and meet all applicable ANSI standards.
 - d. Ballast shall have a minimum power factor of .99 and meet sound rating class "A".
 - e. Ballast shall have less than 10% Total Harmonic Distortion and less than 6% Third Harmonic Distortion.
 - f. Ballast must be Underwriters Laboratories (UL) listed Class P, Type 1 Outdoor.
 - g. Ballast shall provide normal rated lamp life as stated by lamp manufacturers.
 - h. Instant start ballast shall have parallel lamp operation, and shall have less than a 1.7 LCCF.
 - i. Ballast factor standard is $.875 \pm 0.025$ on all normal light output products.
 - j. T8 instant start electronic ballasts shall be:
 - k. Motorola Lighting, Inc. #M(1, 2, 3 or 4)-IN-120 or 277 volt, or: Advance Centium #(R or V)CN-(1, 2, 3 or 4)P-32-120 or 277 volt as applicable.
 - l. Utilize 1, 2, 3 or 4 lamp ballast to match quantity of lamps in fixture.

B. High Intensity Discharge:

1. Voltage as indicated, single lamp of constant wattage regulating type, 90 percent minimum power factor. Ballasts shall comply with U.L. 1029.

2.4 FIXTURES

A. Fluorescent Luminaries

1. Prime coat and finish in high reflectance baked white enamel, two coats minimum on exposed and reflective surfaces, providing minimum reflectance of 90 percent.
2. Reflective plates shall be 22 gauge metal minimum.

3. Provide 20 gauge minimum steel housing.
 4. Provide hinged frames with catches, removable for cleaning without tools. Support lay-in lenses on four sides with flip ends on short dimension.
 5. Provide gasketing, stops, and barriers to form light traps and prevent light leaks.
 6. Design luminaire to dissipate ballast and lamp heat.
 7. Use formed or ribbed backplates, endplates, reinforcing channels.
 8. Provide virgin acrylic diffusers, 0.125 inch thick minimum, unless otherwise noted.
- B. Down Light Type Recessed Luminaries
1. Prewired type with junction box forming an integral part of the assembly.
 2. Supply recessed luminaire complete with trim type required for ceiling system installed. Before ordering, confirm ceiling construction details and architectural finish for each area.
 3. Select reflector and lamp positions to provide high efficiency, and even brightness to eliminate lamp lines
- C. Exit lights: Thin profile; cast metal frame with white faceplate, chevron arrows, LED light source with diffuser, dual voltage 120/277 volts. Exit lights shall be UL listed and shall comply with NEC, OSHA, NFPA Life Safety Codes, and ADA/TAS.
- D. Parking Lot and Area Lighting Pole Assemblies :
1. Area luminaries shall be square, vertical burning 400 watt metal halide mounted on 25 foot round tapered pole.
 2. Fixtures shall have symmetrical or asymmetrical light distribution as shown on the Light Fixture Schedule.

PART 3 - EXECUTION

3.1 INSTALLATION OF FIXTURES

- A. Locate outlet boxes to coincide with chain and stem hangers where such occur. Outlet box locations, if shown on the drawings, are diagrammatic only.
- B. Provide a suitable plaster ring or frame for each fixture recessed in a plaster or non-removable ceiling. Provide mountings for recessed fixtures in other types of ceiling suspension systems which are suitable for the system installed. All such accessories shall be manufactured by the light fixture manufacturer. Verify the ceiling type in every space before ordering fixtures.
- C. Refer to ceiling installers layout for exact ceiling layout. Locate surface or suspended fixtures to conform to ceiling patterns; center all recessed fixtures in ceiling grids.
- D. Wire lay-in type fixtures in ceilings using concealed outlet boxes accessible through ceiling panels; install conductors, including a grounding conductor, in AC90 BX cable from box to fixture.
- E. Fasten luminaries to ceiling suspension system.
- F. Provide lens or louver, as indicated on the architectural drawings, for cove lighting applications.
- G. Fit and adjust all fixtures and check and call to the Architect's attention any job conditions, which may cause conflicts between fixtures and the building structure or other trades.

- H. Prior to final acceptance, thoroughly clean all fixtures inside and out, including plastics and glassware. Adjust all trim to properly fit adjacent surface, replace broken or damaged parts and lamps. Test all fixtures for proper operation.

3.2 PARKING LOT AND AREA LIGHTING POLE ASSEMBLIES

- A. Furnish and install ground rod at each pole base as indicated on the pole base detail shown on the drawings.
- B. Concrete bases will be furnished and installed under another Division of the Specifications unless noted otherwise. Furnish the Contractor installing the concrete bases with mounting bolts and appropriate base dimensions for the poles to be installed.
- C. Install poles on the base assembly using instruments to insure pole alignment.
- D. Allow sufficient conductor length to facilitate pole-hinged feature.

END OF SECTION