

SECTION 16500

LIGHTING SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Description Of Systems
 - 1. Provide lighting systems as required, and all materials and equipment, including lighting fixtures, accessories and associated systems and equipment, as indicated or specified.
- B. Related Work Specified Under Other Sections
 - 1. Ceiling Materials - 09000 Series SECTIONS.
 - 2. Painting of Lighting Poles - SECTION 09900.
 - 3. Temporary Lighting - SECTION 01510.

1.2 QUALITY ASSURANCE

- A. Requirements Of Regulatory Agencies
 - 1. Furnish lighting fixtures and other equipment, including all modifications thereto and component electrical parts, listed by Underwriters' Laboratories as meeting National Electrical Code requirements, National Appliance Energy Conservation Act of 1987; Amendments of 1988 (Public Law 100.357 dated June 28, 1988) requirements for energy-efficient ballast, Energy Policy Act of 1992 requirements for lamp efficiency standards, also bearing the UL and energy-efficient labels where such service is available for equipment specified.
 - 2. All lighting fixtures using metal halide lamps shall have a tempered glass barrier between the lamp and the bottom of the fixture to contain and prevent hot glass particles and hot quartz particles from falling out of the fixture in the event of breakage of the outer glass bulb and the quartz arc tube. The glass barrier shall also prevent any ultra-violet radiation from leaving the fixture. Any manufacturer proposing to use any material other than glass shall submit test results proving the material can prevent hot glass and hot quartz from burning thru the material and falling out of the fixture and prevent any ultra-violet radiation from leaving the fixture.
 - 3. All H.I.D. fixtures shall be enclosed.
- B. Source Quality Control
 - 1. Fluorescent Lenses. Prismatic lenses on recessed fluorescent fixtures shall be acrylic and shall not be less than 0.125 inches in overall thickness.

1.3 SUBMITTALS

- A. Furnish submittals for items that are identified in this SECTION by a different typeface and a bracketed code (e.g., *Item [L]*). Refer to SECTION 01340 for definition of codes for types of submittals and the administrative requirements governing submittal procedure. Additional submittal requirements pertaining to this SECTION are specified herein under this Article.

- B. Submit product data for each type of lighting fixture, equipment, and accessory, identify each item by fixture specification type number, manufacturer catalog number, ballast type and manufacturer, coefficients of utilization and sufficient detailed information to allow the ARCHITECT-ENGINEER to accurately evaluate the products.

PART 2 PRODUCTS

2.1 MATERIALS

A. Ballasts

1. *Fluorescent Electronic [U]*: Unless otherwise indicated in lighting fixture specification or schedule, ballasts shall be high-frequency, full light-output-type for use on programmed rapid start (T-8) lamps and compatible for use with energy saving lamps. All ballasts for each fixture type shall be of the same type and shall be the product of one manufacturer.
 - a. Furnish commercial and recessed fixtures with ballasts having a NEMA "A" sound rating or better.
 - b. Individually fused with Bussman type GLP fuses in HLP holders. Except in recessed fixtures, fuses shall be accessible from outside the fixture chassis. Use fuse rating as recommended by fixture manufacturer.
 - c. Shall be UL Listed, ETL certified, Class "P" high power factor (minimum .95 or better).
 - d. Shall have less than 20 percent total harmonic distortion and minimum ballast factor of .85 percent.
 - e. Shall withstand voltage transients as defined in ANSI/IEEE C62.41 Category B. Medium Exposure, 4000 volts.
 - f. Electromagnetic interference shall not be greater than allowed by the FCC Rules and Regulations, Part 15 Subpart J, Part 18 for RF lighting devices.
 - g. Shall provide lamp current crest factor less than 1.5 and normal rated life for the lamp specified.
 - h. Shall have a 3 year warranty including 10 dollar labor allowance.
 - i. Approved manufacturers. The following manufacturers are approved for use on programmed rapid start T-8 lamps. No substitutions permitted.
 - 1) Advance "
 - 2) Osrom Sylvania "Quicktronic"
 - 3) Motorola "Motorola"
 - 4) Universal Lighting Technologies "Triad".
2. *Compact Fluorescent Electronic[U]*: *ETL certified, full light output type, regulating electronic high power factor, compatible for use with energy-saving lamps.*
 - a. Furnish commercial and recessed fixtures with ballasts having a NEMA sound rating of "A" or better.
 - b. Individually fused with Bussman Type GLP fuses in HLP holders. Use fuse rating as recommended by fixture manufacturer.
 - 1) Advance
 - 2) Universal Lighting Technologies
3. *High Pressure Sodium [U]*: High power factor, non-PCB, lead-peak auto-transformer (CWA) type with starting current not exceeding the operating current. Individually fuse

all ungrounded legs of ballasts. Use fuse ratings as recommended by manufacturer. Use ballasts rated for operation in 55 degC ambient temperature for fixtures mounted indoors, except where otherwise specified in the fixture specification or schedule. Use ballasts rated for reliable starting down to minus 20 degF for fixtures mounted outdoors.

- a. Advance
 - b. Powerlighting Products, Inc.
 - c. Magnetic/Universal
4. *High Pressure Sodium-Premium (for 250 and 400 watt lamps only) [U]*: Minimum 90 percent power factor, non-PCB, regulated, lag type Constant Wattage (CW), starting current not exceeding the operating current, isolated copper windings, capacitor connected in tertiary winding, ambient temperatures from minus 40 degC to plus 55 degC, lamp operation within ANSI trapezoidal limits, lamp crest factor not to exceed 1.8, lamp wattage spread shall not exceed 18 percent appreciable loss of ballast or starting device life, all at nominal line voltage plus or minus 10 percent and any lamp voltage throughout rated lamp life. Submit volt-watt traces. Individually fuse all ungrounded legs of ballasts. Use fuse ratings as recommended by manufacturer.
- a. Advance
 - b. General Electric "Magnetic-Regulator"
 - c. Hubbell "Electro-Reg 2"
 - d. Universal Lighting Technologies

B. Lamps

1. Incandescent: 130 volts extended service, 2500 hours rated life, inside frosted, except where otherwise indicated or specified in the fixture specification or schedule. Provide sizes as indicated or specified in the fixture specification or schedule.
 - a. General Electric
 - b. North American Philips
 - c. Osram Sylvania
2. Fluorescent: Type F-4100 K, unless otherwise indicated or specified in the fixture specification or schedule.
 - a. General Electric "SP" Series
 - b. North American Philips "SPEC" Series
 - c. Osram Sylvania "DESIGNER" Series
3. Compact Fluorescent . As specified in the fixture specification or schedule.
 - a. General electric "BIAX" series.
 - b. North American Philips "PL" Series.
 - c. Osram Sylvania.
4. *High Pressure Sodium [U]*: ANSI Code as specified in the fixture specification or schedule.
 - a. General Electric
 - b. North American Philips
 - c. Osram Sylvania

C. Fixture Schedules

1. *FIXTURE TYPES [P]*:
 - a. Provide as indicated on DRAWINGS.

D. Industrial Fixture Hanger

1. *Combination Threaded Cast Box or Conduit Body Conduit Stem, Fixture Stud and Self-Aligning Hanger [U]:*
 - a. Appleton Hanger. Type UNJ
 - b. Other approved

PART 3 EXECUTION

3.1 INSTALLATION

A. Supports

1. Provide supports for all lighting fixtures as detailed, as specified or as otherwise required by the fixture specified. Support single units from fixture studs in outlet boxes. For continuous row fluorescent type, provide a support for each end plus at least one for each channel section, or as required. Swivel mount all stems. Provide concrete inserts at points of fixture support in unfinished areas where a concrete slab serves as the ceiling. In finished areas, provide supports independent of the acoustic tile or plaster; support fixtures from the ceiling support system, or from the concrete floor or roof steel above the ceiling.
2. Provide supports for recessed fixtures as recommended by the fixture manufacturer or as specified. Furnish plaster frames for all recessed fixtures mounted in plaster ceilings. Coordinate fixture mounting with type of ceilings specified. Verify ceiling support systems and coordinate fixture installation. Fasten "lay-in" fixtures to the ceiling grid.
3. For industrial fixtures suspended from ceiling outlet boxes, provide 1/2 inch rigid combination conduit stems, fixture stud, and self-aligning hangers. In other locations, except as otherwise detailed or required, provide ceiling or wall outlet boxes with 3/8 inch, no-bolt fixture studs. Provide special hangers for support of any fixture which weighs more than 50 pounds.
4. For chain hung industrial fixtures, provide a six foot three conductor cord with twist lock plug and six foot chains.
5. All cable splices in pole bases shall be bolted connector and sealed watertight.

END OF SECTION

Revision History	
Date	Rev. No.
A	0
B	0
D	0
E	0
F	0
02-19-09	0

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