

SECTION 16500 LIGHTING

PART 1 - GENERAL

1.01 NOTE

- A. The requirements of Sections 16010 and 16100 apply to work performed under this Section.

1.02 SCOPE

- A. Provide a lighting fixture for each lighting fixture symbol shown on the Drawings, of the type and quality described herein. Fixtures shall be installed complete with lamps of the wattage indicated, sockets, housing, ballast, shades, diffusers and supports, and wired for operation.

1.03 NATIONAL ACCOUNTS AGREEMENT

- A. Owner has a National Accounts Agreement with GE Supply Company in Worcester, Massachusetts and the local office of Holophane Company, Inc. in Westwood, Massachusetts to supply the Type A and W light fixtures. This is a sole source supplier. Contact Bernard (Bernie) R. Lizotte at (508) 754-2134 or (800) 215-2787 or by e-mail at: bernard.lizotte@supply.ge.com.

1.04 SUBMITTALS

- A. The submittal shall be bound in booklet form. It shall include an 'Index' sheet listing the manufacturers and complete catalog numbers. The submittal shall include manufacturer's product and data sheet, one per each item listed on the 'Index'. Data shall consist of construction details, operating characteristics, performance curves, lens and diffuser specifications, necessary for complete evaluation of compliance with Contract Documents.

1.05 SUBSTITUTIONS

- A. The lighting design was based on the fixture type and manufacturers specified and only the fixture indicated by catalog number has been approved. If the Contractor elects to substitute a fixture for that specified, he shall, as indicated by the Architect in the preliminary list of materials, submit a sample of the proposed fixture for evaluation. The substituted fixture shall be equal or better in quality to that specified and will be evaluated on the following comparisons:
 1. Appearance
 2. Performance: Distribution (ITL/ETL photometrics, VCP data, etc.), Efficiency and Utilization, Spacing Ratios.
 3. Construction: Gauge of Materials, Quality of Materials, Finishes of Materials, Workmanship, Rigidity, Installation Ease.
 4. Maintenance: Hinging and Latching, Cleaning and Relamping.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Provide equipment and instruments necessary for testing the complete fixture installation, as may be directed by the Architect. The tests shall demonstrate to the satisfaction of the Architect the following:
1. That fixtures are free from short circuits and unspecified ground.
 2. That fixtures operate satisfactorily and quietly.

Defects shall be repaired at once, and the tests reconducted.

- B. Fixtures shall be protected until final acceptance.
- C. Work, fixtures and installation, shall be fully guaranteed for a period of one (1) year from the date of final acceptance.
- D. Material shall be of the best grade of approved manufacturing standards and workmanship shall be first class, such as shall produce fixtures of a high character and fine finish of the type specified.
- E. Fixtures shall be wired for polarized system with one wire in each fixture to be distinctly marked for its entire length. Wire shall bear the label of approval of the Underwriter's Laboratory, Inc. Fixture wiring for fluorescent fixtures and branch circuit wiring in fluorescent fixture channels shall be type THHN. Type AF wire shall only be used for interior incandescent fixture wiring.
- F. Fixtures shall be in accordance with local Municipal and State requirements governing same and shall be U.L. approved.
- G. Fixtures shall be equipped with lamps of the size, type, wattage, and shape indicated and specified. Lamps shall be manufactured by the G.E. Lighting Company, Philips Lighting or OSRAM/Sylvania of standard schedule make. Lumen output and life of lamps shall be equivalent to those specified.
- H. Fluorescent lamps shall be rapid start, Type T8 FO32/735 lamps, a color rendering index of 75 (min.) and average rated life of 20,000 hours, unless otherwise specified.
- I. Incandescent lamps shall be inside frosted, 130 volts, unless otherwise specified.
- J. Electronic Ballasts:
1. Performance:
 - a. Ballasts shall operate at a frequency above 20KHz and lamps shall have no detectable flicker.
 - b. Ballasts shall operate from 50 to 60Hz input of +/- 10% nominal ballast line

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- voltage.
- c. Ballasts shall have input power factor above 97%.
 - d. Ballast shall have Total Harmonic Distortion (THD) of less than (<10% for compact fluorescent and <25% for T2 models.)
 - e. Ballast shall have inrush current limiting circuitry to assure compatibility with all lighting system controls (not applicable with T8<10% THD models.)
 - f. Ballast shall provide lamp starting conditions and operating parameters consistent with lamp manufacturers recommendations.
 - g. Ballast shall be instant start w/o continuous cathode heating, for maximum efficiency (rapid start T12/HO.)
 - h. Ballast circuit shall operate lamps in parallel, such that if one lamp fails, the others will remain lit (series for T12/HO, compact fluorescent and T2 models)
 - i. Ballast shall provide for a minimum lamp starting temperature 0 deg F (depending on ballast model, lamp type and installation conditions).
 - j. Ballast shall have remote/tandem wiring capability of up to 18 feet maximum depending on installation conditions (10 - 12 feet maximum for T12/HO, compact fluorescent and T2 models).
 - k. Ballasts for T4 and T2 diameter lamps shall have dynamic end-of-life sensing to help protect against overheated bases and sockets.
 - l. Ballast shall have a maximum enclosure temperature rating of 70 deg. C.
 - m. Ballast shall be compatible with powerline carrier systems (depending on ballast model and carrier signal characteristics).
 - n. Ballast shall have internal electrical protection to prevent catastrophic failure.
 - o. Ballast factor shall be 0.88-0.90 for T8 lamps unless otherwise specified, (0.90-1.00 for compact and linear compact fluorescent and T2 ballasts).
 - p. Ballasts shall be as manufactured by OSRAM/Sylvania, Advance, Magnetek-Triad.
 - q. Regulatory Requirements:
 - 1) The electronic ballast shall be UL listed, Class P, Type 1, CSA certified.
 - 2) Ballast shall meet FCC standard for EMI/RFI ensuring suitability for both commercial and industrial installations.
 - 3) Ballast shall comply with applicable ANSI and IEEE standards for harmonic distortion and line voltage transient, and immune to electrical disturbances.
 - 4) Ballast shall have audible noise rating of Class A
 - 5) Integral leaded ballasts shall be color-coded to ANSI Standard C82.11.
 - 6) Ballast shall not contain PCB's.
 - 7) Ballast shall be encapsulated (potted) to ensure maximum thermal and structural integrity.
 - 8) Ballast size and mounting configuration shall be compatible with existing ballasts for the same application.

K. Fluorescent fixtures located in unheated spaces or exterior spaces shall be equipped with cold

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weather ballasts.

- L. Ballasts for H.I.D. fixtures shall be as indicated on Drawings, 60 Hz operation and shall be reactor, high power factor (HPF) type. Ballasts shall be suitable for lamp wattage and type specified. Ballasts shall be General Electric. Acceptable alternates: Advance, Magnetek or Jefferson.
- M. At the locations of the fixtures indicated on the various drawings, the type of fixture required is designated by a letter. Under the 'Lighting Fixture Schedule' these letters are carefully explained and specified. Fixtures furnished shall be in strict accordance with these descriptions and Specifications. Fixtures shall be furnished in the quantities, sizes and types as indicated on Drawings.
- N. Recessed incandescent and fluorescent fixtures in tee-bar ceilings shall be supported independently from the suspended ceiling construction. Box and fixture supports shall be fastened securely to structural system main supports. Where fixtures are surface mounted, neat holes shall be cut in the hung ceilings as required for the fixture supports. Support hangers, channels and bolts shall be galvanized.
- O. Exterior hardware such as screws, nuts, washers and anchor bolts shall be rustproof.
- P. Consult the Architect's reflected ceiling plans and the installer of the ceilings to insure that fixtures are properly aligned, ventilated and located. Under this Section, provide adequate supports for fixtures. Provide accessories, as required, to support the fixtures independently of the ceiling system.
- Q. Where a letter designating fixture type is adjacent to a row of fluorescent fixtures, it shall be understood that fixtures in the row shall be of the type consisting of 4' x 8' tandem units and the rows shall consist of the total lengths indicated. Although the catalog numbers of the fluorescent fixtures hereinafter described refer to 4 foot units, 8 foot units may be used where applicable.
- R. Prismatic plastic troffer lenses shall be 100 percent virgin acrylic with nominal thickness of .125 inch unless otherwise indicated on Drawings.

2.02 LIGHTING FIXTURE TYPES

- A. See "Lighting Fixture Schedule" on drawings for description of fixtures. Fixtures shall be as specified or an acceptable alternate.

2.03 LIGHTING CONTROL SYSTEM

- A. General
 - 1. Control of lighting shall be accomplished by using the 'Com-trol' Energy Management System (E.M.S.).

2. The E.M.S., through its low voltage system shall control the coils of the remote control (RC) contactors. These contactors are located in cabinets designated as LCP1, LCP2, LCP3, LCP4, LCP5 and LCP6. Cabinets LCP1, LCP2, LCP4 and LCP5 are in the Main Electric Room. Cabinet LCP3 and LCP6 are adjacent to Panels in the facility.
3. There are as least eleven (11) stages or tasks of lighting for this project. For the actual breakdown of the stages or tasks of light control, see Drawing E-6.2 of the Construction Document drawings.
4. The E.M.S. shall include a photo-control, mounted above the roof line facing north. The photo-control shall help in controlling the signage and site lighting.

PART 3 - EXECUTION

3.01 LOCATION

- A. Coordinate the exact location of lighting fixtures with the Architect before final installation. A reasonable amount of shifting shall be allowed for fixture locations.

3.02 INSTALLATION

- A. Metal halide fixtures shall be mounted between roof trusses and shall be supported from secondary support members, provided by the Electrical Contractor, support members shall be in contact with, but not attached to, the underside of the roof deck. Secondary members shall be supported from the top angle of the roof trusses.
- B. Back-mounted fixtures shall be mounted on columns or on masonry wall.
- C. Recessed fixtures shall be provided with approved "Earthquake" hold down clips.
- D. Stem mounted fixtures shall be suspended independent of grid.
- E. Recessed fixtures shall be installed with at least two (2) grid drop wires supported from building structural system.
- F. Fluorescent lighting fixtures located in food preparation areas, food display cases and above food display cases shall be provided with acrylic tube guards.
- G. Ballasts for fluorescent and HID fixtures shall be of the proper voltage for the building. Exact voltage shall be checked before ordering fixtures. See also Lighting Fixture Schedule on the drawings. If there appears to be a discrepancy, Contractor shall contact Architect for clarification/resolution.

END OF SECTION