

SECTION 26 50 00

LIGHTING

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope:
1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install lighting fixtures and associated controls.
- B. Coordination:
1. Coordinate location of fixtures with piping, ductwork, openings, and other systems and equipment and locate clear of interferences.
 2. Coordinate fixtures to be mounted in hung ceilings with the ceiling suspension system proposed.
- C. Related Sections:
1. Section 01 74 05, Cleaning
 2. Section 26 05 05, General Provisions for Electrical Systems.
 3. Section 26 05 53, Identification for Electrical Systems.

1.2 REFERENCES

- A. Standards referenced in this Section are:
1. UL 844, Luminaires for Use in Hazardous (Classified) Locations.
 2. UL 935, Safety of Fluorescent Lamp Ballasts.
 3. UL 1029, Safety of High-Intensity- Discharge Lamp Ballasts.
 4. UL 1598, Safety of Luminaires.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the following:
1. NEC Article 410, Luminaires, Lampholders, and Lamps.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
1. Shop Drawings:
 - a. Schedule of light fixtures to be furnished, indicating fixture type and location for each.
 - b. Customized wiring diagrams.
 2. Product Data:
 - a. Manufacturer's technical information, specifications, standard wiring diagrams, and catalog cuts for lighting fixtures proposed.

- b. Fixture construction details.
 - c. ETL photometric and isocandle curves for each fixture proposed.
 - d. Verification that recessed fixtures to be mounted in hung ceilings are compatible with ceiling suspension system proposed.
- B. Informational Submittals: Submit the following:
- 1. Manufacturer's Instructions:
 - a. Instructions and recommendations for handling, storing, and protecting the equipment.
 - b. Installation instructions for for the equipment, including setting drawings, templates, and directions and tolerances for installing anchorage devices.
- C. Maintenance Material Submittals: Submit the following:
- 1. Spare Parts and Extra Stock Materials: Furnish spare parts for each type of unit required as indicated in Part 2 of this Section.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery:
- 1. Upon delivery, inspect equipment for evidence of water that may have entered equipment during transit.
- B. Storage:
- 1. Store lighting fixtures, controls, related materials and equipment in clean, dry location with controls for uniform temperature and humidity. Protect materials and equipment with coverings and maintain environmental controls.
 - 2. Store materials and equipment for easy access for inspection and identification. Keep materials and equipment off ground, using pallets, platforms, or other supports. Protect materials and equipment from corrosion and deterioration.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Type: Lighting fixtures required shall be in accordance with the Lighting Fixture Schedule on the Drawings. Fixtures shall be complete with supports, ballasts, lamps, and incidentals, as required.
- 1. LED fixtures shall be modular and allow for separate replacement of LED lamps and drivers. User serviceable LED lamps and drivers shall be replaceable from the room side.
 - 2. Dimmable LED fixtures shall have either a 0-10 volt, 3-wire dimming driver, or a two-step (50%-100%) line voltage, two switch controlled dimming driver, as shown on the drawings.
- B. Fixtures in hazardous locations shall be listed in accordance with UL 1598 and UL 844.

C. Lamps:

1. Fluorescent: Fluorescent lamps shall be toxic characteristic leaching procedure (TCLP) compliant for low mercury content. Linear fluorescent lamps shall be T8, energy-efficient, extended life type. Compact fluorescent lamps shall be long-life, energy-efficient type.
2. High Pressure Sodium: Shall be TCLP-compliant for low mercury content. Lamps shall be clear with high-efficacy and lumen maintenance.
3. Metal Halide: Shall be fabricated for low mercury content and be TCLP-compliant when available. Lamps shall be clear-pulse, start type with high-efficacy and lumen maintenance.
4. Incandescent: Inside-frosted.
5. LED lamps shall have a color temperature of 3500 degrees K, a CRI of 80 minimum, and a lumen maintenance L70 rating of 50,000 hours minimum.
6. Spare Parts and Extra Stock Materials: Ten percent spare lamps of each type and wattage.

D. Ballasts:

1. Fluorescent: UL 935 listed, high power factor, energy-efficient type, equipped with thermal protectors (Type "P" ballast), compatible with lamps installed. Indoor two-lamp fluorescent ballasts shall be electronic type with total harmonic distortion of less than 20 percent. Ballast factor shall be 0.85 minimum with total of less than 61 watts input. Provide cold weather type ballast where indicated in the Lighting Fixture Schedule.
2. High Intensity Discharge: UL 1029 listed, high power factor, constant wattage, stabilized autotransformer with line starting current the same or less than operating current.
3. Ballasts sound level shall be 30 decibels or less, sound rating "A".
4. Ballasts shall be Edison Testing Laboratories (ETL) listed and Certified Ballast Manufacturer Association, CMB-certified.
5. For fixtures utilizing double-ended lamps, provide fixture disconnecting means within the fixture.
6. LED drivers shall be electronic-type, labeled as compliant with radio frequency interference (RFI) requirements of FCC Title 47 Part 15, and comply with NEMA SSL 1 "Electronic Drivers for LED Devices, Arrays, or Systems". LED drivers shall have a sound rating of "A", have a minimum efficiency of 85%, and be rated for a THD of less than 20 percent at all input voltages.
7. Dimmable LED drivers shall be 0-10V type. Dimmable LED drivers shall be capable of dimming without LED strobing or flicker across their full dimming range.
8. Spare Parts and Extra Stock Materials: Ten percent spare ballasts of each type and quantity, but not less than one.

- E. Fixtures located in area identified as hazardous in Section 26 05 05, General Provisions for Electrical Systems, shall each be approved as a complete assembly, shall be clearly marked to indicate maximum wattage of lamps for which they are approved, and be protected against physical damage by suitable guards.

- F. Hardware: Provide necessary hangers, supports, conduit adaptors, reducers, hooks, brackets, and other hardware required for safe fixture mounting. Hardware shall have protective, non-corrosive finish.
- G. Outdoor Fixtures: Provide each fixture to be installed outdoors with cut-off lens to reduce the fixture's light pollution emissions.
- H. Time Switch:
 - 1. Type: Astronomic digital time switch with photocell input.
 - 2. Products and Manufacturers: Provide of one of the following:
 - a. DGLC100A-NC by Tork Time Controls, Inc.
 - b. Approved equivalent.
 - 3. Capacity: 20 amps per pole at 120-277 volts.
 - 4. Reserve Power: Power outage backup with permanent schedule retention via capacitor. 7 days of real time backup.
- I. Lighting Contactor and Controls:
 - 1. Provide a lighting contactor and control system for control of each area where shown on the Drawings.
 - 2. Product and Manufacturer: Provide products of one of the following:
 - a. Type SM03 by Square D Company.
 - b. Approved equivalent.
 - 3. System shall include:
 - a. Enclosure sized as required, complete with input control fuse and screw type terminal blocks rated 300-volt, 20-amp quantity for all circuits, unless indicated otherwise on the Drawings.
 - b. Single coil, electrically-operated, mechanically-held contactor. Contactor shall be rated 30-amp, 600-volt, with 120-volt operating coil, unless indicated otherwise on the Drawings. Number of poles shall be as shown on the Drawings. Provide multiple contactors when necessary.
 - c. Where lighting contactors are controlled by photocell, provide a 120-volt, two-pole control relay, enclosure mounted to convert the two-wire photocell control to three-wire control required by contactor. Control shall include a cover mounted on-off-auto selector switch for "manual" or "auto" selection of operation. In "auto" position, contactor shall respond to photocell.
 - d. Enclosure: As required for area classification per Section 26 05 05, General Provisions for Electrical Systems.
 - e. Identify panel in compliance with Section 26 0 53, Identification for Electrical Systems.
- J. Photocell:
 - 1. Products and Manufacturers: Provide one of the following:
 - a. 2100 Series by Tork Time Controls, Inc.
 - b. Approved equivalent.
 - 2. Cadmium sulfide hermetically-sealed cell, fully temperature compensated, with time delay of not less than 15 seconds to prevent false switching.

3. Built-in fail safe light level selector, adjustable within limits of two to 50 foot-candles and factory set at 25 foot-candles.

K. Fixture-Lowering Hanger System:

1. General:
 - a. Provide corrosion-resistant system that lowers fixtures to ground level to allow maintenance on fixtures. Provide lowering hanger system for each fixture as shown on the Drawings.
2. Products and Manufacturers: Provide one of the following:
 - a. Thompson Hangers, by Joslyn Hi-Voltage Corp.
 - b. Approved equivalent.
3. System:
 - a. Upper or fixed housing of lowering devices shall contain:
 - 1) Attached pulley.
 - 2) Single point latching mechanism.
 - 3) Guide.
 - 4) Upper or socket electrical contacts.
 - b. Lower or moveable housing of lowering devices shall contain:
 - 1) Operating line termination.
 - 2) Positioning stem and lower half of latch assembly.
 - 3) Lower electrical contacts.
 - 4) Fixture adapter.
 - c. Fixtures shall be lowered on a guide line to allow operation of system in adverse weather and with structural clearance. Angles of the guide line to the structure shall be in accordance with to lowering device manufacturer's instructions.
 - d. Operating line shall be high-strength/high-flexibility stainless steel and supplied by the lowering device manufacturer.
 - e. Each operating line shall be encased in conduit where lower than eight feet above finished floor.
 - f. Non-hanger termination shall be of enclosed and surface mounted design.
 - g. Pulleys shall be supplied by hanger manufacturer as required to prevent excessive cable sag and allow lateral offsets between fixture location and cable termination.
 - h. Provide portable manual winch.
4. Electrical:
 - a. Contact material shall be silver-impregnated/silver-plated plate copper. Contacts shall use ball and socket design for ease of alignment and to allow for residual building vibration and movement.
 - b. Contact pressure shall be supplied by springs remote from current conductors and shall not be part of current-carrying path.
 - c. Termination of wiring shall be to crimp connectors.
 - d. Provide electrical insulation of contacts by porcelain standoffs.
 - e. Lowering device shall be make-and-break rated, UL-approved, as follows:
 - 1) 250 VAC: 30 amps
 - 2) 600 VAC: 15 amps
 - 3) 250 VDC: 10 amps

- f. Lowering device shall have eight contacts rated at 120 VAC, 15 amps.
- 5. Mechanical:
 - a. System loading capacity: 200 pounds.
 - b. Manual or power winch operation.
 - c. Housing manufactured with copper-free or low copper content cast aluminum.
 - d. Operation shall be slow pull/quick release method.
 - e. Maintenance-free design.
 - f. Latching means shall be single point centered design to facilitate even wear over life of hangar.
 - g. Provide a tag line to facilitate lateral movement over inaccessible spaces. Tag line shall consist of the following parts by hanger manufacturer:
 - 1) Termination kit for wall.
 - 2) Manual winch.
 - 3) Operating cable.
 - 4) Pulley for upper mounting.

L. Motion/Occupancy Sensor:

- 1. General requirements
 - a. Dual technology, PIR/ultrasonic
 - b. 120/277 VAC compatible
 - c. White finish
- 2. Ceiling mount type sensor - provide one of the following:
 - a. Leviton OSC20-MAW
 - b. Approved equivalent.
- 3. Wall mount switch type sensor – provide one of the following:
 - a. Leviton OSSMT-GAW
 - b. Approved equivalent.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. General:
 - 1. Fixture mounting heights and locations indicated on the Drawings are approximate and are subject to revision in the field where necessary to clear conflicts and obstructions.
 - 2. Mounting Heights: Mounting heights or elevations are to bottom of fixture or to centerline of device.
 - 3. Install fixtures in accordance with Laws and Regulations, the Contract Documents, and manufacturer instructions and recommendations.

4. Mount fixtures so that sufficient access is available for ready and safe maintenance.
 5. Securely fasten equipment to walls or other surfaces on which equipment is mounted.
- B. Suspended Fixtures:
1. Pendant-mount using 1/2-inch diameter conduit stems.
 2. Ground to outlet box.
 3. Attach mounting to building structure with expansion anchors.
 4. Fixtures shall not be dependent on the outlet box cover screws for support.
- C. Surface Mounted Fixtures:
1. Attach to appropriate outlet box.
 2. Attach to surface using fasteners and sealing washers when mounting fixture in damp or wet locations.
- D. Boxes and Fixtures:
1. For units mounted against masonry or concrete walls, provide suitable 1/4-inch spacers to prevent mounting back of box directly against wall.
 2. Bolt units rigidly to building with expansion anchors, toggle bolts, hangers, or Unistrut.
 3. Do not install boxes with open conduit holes.
 4. Cable each circuit and identify with tag.
- E. Re-lamp all fluorescent fixtures provided under this Contract with new lamps following Substantial Completion.
- F. Mount photocells as shown and adjust foot-candle setting for proper dusk and dawn photo-control. Provide wiring in conduit from photocell to controls.
- G. Fixture Lowering System:
1. Hangers shall be plumb.
 2. Provide adequate clearance between operating line and structural members, pipes, ducts, and other equipment and devices to avoid interference.
 3. Conduit runs enclosing operating lines shall be straight with no offset bends.

++ END OF SECTION ++