

**SECTION 26 50 00
LUMINAIRES AND ACCESSORIES**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide luminaires and accessories in accordance with the Contract Documents.

1.02 QUALITY ASSURANCE

- A. Lamps shall be of the same manufacturer.
- B. Ballasts shall be of the same manufacturer for each lamp type.
- C. Occupancy sensors shall be certified for operation with specific ballasts utilized in controlled lighting fixtures.
- D. Equipment shall be certified for use in the State of the project and shall meet the State Energy Code and local energy ordinances.

1.03 STANDARDS

- A. Ballasts: ANSI C82.2 and C82.11, FCC CFR 47 Part 18, Public Law 100-357, and UL 935 and 1029.
- B. Cords: UL 62.
- C. Exit Signs and Emergency Luminaires: NFPA 70 and UL 101 and 924.
- D. Hazardous Locations: UL 506, 844, 1203, and 1225.
- E. Lamp Holders and Starters: UL 496, 542, and 879.
- F. Luminaires: UL 57, 676, 1570, 1571, and 1572.
- G. Metal Halide and Mercury Vapor Lamps: Federal Standard 21 CFR 1040.30.
- H. Photometric data: Independent testing laboratory certified.
- I. State Energy Regulations.
- J. Installation: NECA/IESNA-500, "Recommended Practice for Installing Indoor Commercial Lighting Systems."

1.04 SUBMITTALS

- A. Manufacturer's product data sheets for each luminaire indicating luminaire type, dimensions, ballast quantity and type, lamp quantity and type, photometric data, materials, finishes, accessories, voltage, input watts, CFM data, and photographic image of luminaire.
- B. Manufacturer's data sheets for each ballast including ballast type, power factor, input voltage, input watts, and ballast factor.
- C. Scaled and dimensioned detail plan and elevation drawings of custom and continuous row

type luminaires including joints, mounting points and type, power connection location(s), and emergency or separate switching configurations.

- D. Seismic restraint calculations.
- E. Manufacturer's product data sheets for each type of lamp specified, arranged by light source type. Include the following:
 - 1. Lamp wattage and shape
 - 2. Lamp voltage where applicable
 - 3. Rated lamp life
 - 4. Mean lumen output
 - 5. Correlated Color Temperature
 - 6. Color Rendering Index (CRI)
- F. Manufacturer's data for LED lighting systems for each luminaire type. Including:
 - 1. Luminaire dimensions
 - 2. Mounting
 - 3. Power supply type and maximum remote mounting distance
 - 4. System wiring diagram, differentiating between manufacturer-installed and field-installed wiring
 - 5. Control diagrams
- G. Dimming Ballast Compatibility Certificates: Signed by manufacturer of ballast certifying that ballasts are compatible with dimming systems and equipment with which they are used.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Lighting Luminaires: Refer to luminaire schedule on the Drawings.
- B. Drivers:
 - 1. LED 0-10V dimming drivers.
- C. Lamps: General Electric, Osram/Sylvania, Philips, or Venture Lighting.
- D. Emergency Battery Packs: Columbia Lighting, Pathway Lighting, Hubbell Lighting

2.02 LAMPS

- A. Provide a complete set of new lamps in each luminaire.
- B. Lamps shall be as follows unless otherwise noted on the luminaire schedule on the Drawings:

2.03 BALLASTS

- A. General:
 - 1. Ballasts shall be suitable for the electrical characteristics of the supply circuits to which they are to be connected, and which are suitable for operating the specified lamps.

2. Provide electronic ballasts wherever there is an electronic ballast available for any specified lamp or combination of lamps. Where electronic ballasts are not available, provide hybrid or magnetic ballasts.
3. Where installed outdoors and wherever ballasts are installed in a non heated environment (such as walk in freezers, cold food handling areas, or outside air plenums) ballasts shall be capable of lamp starting at ambient temperatures down to minimum 20 degree F.
4. Luminaires controlled by dimmers shall be provided with dimming type ballasts.
5. Single lamp ballasts for long fluorescent lamps shall be kept to a minimum, and shall only be used for the last odd lamp in a room or space.

B. LED:

1. Hybrid or Magnetic Ballasts:
2. Dimming Ballasts
 - a. Compatibility: Certified by manufacturer for use with specific dimming system indicated for use with each dimming ballast.
 - b. Ballast wiring for single lamp continuous row luminaires shall allow independent control of each continuous row of luminaires. Provide as many three lamp ballasts as possible; provide two lamp ballasts to finish a row.

2.04 MATERIALS AND FABRICATION

- A. Luminaires shall be completely factory assembled and wired, and equipped with necessary lampholders, ballasts, wiring, shielding, reflectors, channels, lenses, and other parts necessary to complete the luminaire installation.
- B. Luminaire hardware shall be concealed. Weld exposed metal at joints, fill with weld material, grind smooth, and make free from light leaks. Gasket incandescent luminaires with overlapping trim. Weld ballast support studs, socket saddle studs, and reflector support studs to luminaire body; self threading screws are not acceptable. Ventilate ballast compartments and firmly secure ballast to conducting metal surface. Luminaires shall be designed for bottom relamping, unless otherwise noted.
- C. Construct luminaires with a minimum number of joints. Unexposed joints by shall be welded, screwed or bolted; soldered joints are not acceptable. Do not use self tapping methods or rivets for fastening removable parts used to gain access to electrical components requiring service or replacement, or for fastening electrical components or their supports.
- D. Cast or extruded parts of luminaires shall be close grained and free from imperfections or discolorations, rigid, true to pattern, of ample weight and thickness, and properly fitted, filed, ground, and buffed to provide finished surfaces and joints free of imperfections.
- E. Housings for LED luminaires shall be designed to make electrical components easily accessible and replaceable, without removing the luminaire body from its mounting.

2.05 FINISHES

- A. Luminaire finishes shall provide a durable, wear resistant surface. Surfaces shall be chemically cleaned and treated with corrosion inhibiting (phosphating) material to assure positive paint adhesion. Exposed metal surfaces (brass, bronze, aluminum, etc.) and finished castings (except chromium plated or stainless steel parts) shall have an even coat

of high grade methacrylate lacquer or transparent epoxy. Anodize exposed aluminum surfaces in a 20 minute bath for corrosion resistance. Sheet steel luminaire housings, and iron and steel parts which have not received phosphating treatment, or which are to be utilized in exterior applications, shall be zinc or cadmium plated, or hot dip zinc galvanized after completion of all forming, welding, and drilling operations.

- B. Screws, bolts, nuts, and other fastening or latching hardware shall be cadmium plated.
- C. Provide luminaires with a high temperature baked enamel coating of selected color and finish, unless otherwise noted. White baked enamel finished surfaces shall have a minimum reflectance of 86%, unless otherwise noted.
- D. Color Changing LED Lighting Systems
 - 1. General: All system components and operating software shall be provided through a single manufacturer.
 - 2. Provide all components and system interconnections necessary to provide a complete operating installation as shown on plan.
 - 3. Provide Owner with software necessary to make program changes.
- E. Where the term "Custom Color" is used in the Luminaire Schedule and elsewhere in the contract documents, it indicates that the luminaire shall be factory painted to match a color chip provided by the Architect. Unless noted otherwise, each luminaire type identified as a custom color shall be considered to be a different color from other "Custom Color" luminaire types.

2.06 REFLECTORS

- A. Aluminum Reflectors:
 - 1. Reflectors and reflecting cones or baffles shall be fabricated from #12 aluminum reflector sheet, minimum 0.057 inches thick (15 gauge). Material shall be free of tooling marks, spinning lines, and marks or indentation caused by riveting or other assembly techniques. No rivets, springs, or other hardware shall be visible after installation.
 - 2. Reflectors and baffles shall be polished, buffed, and anodized (Alzak), with finish color as selected by the Architect.
 - 3. Luminaires provided with tri-phosphor type lamps shall be provided with low iridescence aluminum reflectors to eliminate rainbow effect on aluminum reflector.
- B. Painted Reflectors:
 - 1. Painted reflectors shall be formed before application of primer and paint. Reflectors and reflector bodies for luminaires with baked white enamel finish shall meet the following requirements and tests:
 - a. After 100 hours of exposure to fade-o-meter, reflectance shall be not less than 86%, and finish shall show no visible color change.
 - b. After 100 hours of exposure to 100% humidity at 100°F, (cook box test) finish shall show no blistering or other degraded effects.
 - c. After 150 hours of exposure to salt spray (20% sodium chloride) shall cause no breakdown of film.

2.07 LENSES, FACEPLATES AND TRIMS

- A. Plastic lenses shall be of virgin methyl methacrylate, unless otherwise indicated. Polystyrene lenses are not acceptable.
- B. Lenses, louvers, and other light diffusing components shall be contained in frames. Lenses shall be removable but positively held within the frames so that hinging or other motion of the frame will not cause the diffusing components to drop out.
- C. Faceplates on incandescent recessed luminaires shall open for access to the interior of the luminaire, serve as a ceiling trim, and positively held to the luminaire body by adjustable means that permit the faceplate to be drawn up to the ceiling as tight as necessary to insure complete contact of faceplate with the finished ceiling.
- D. Provide ceiling trims for rectangular recessed luminaires with mitered corners, continuously welded and smoothed before shop finishing. Lapping of trim metal is not acceptable.

2.08 LUMINAIRE WIRING

- A. Wiring channels and wireways shall be free from projections and rough or sharp edges. Provide bushings at points or edges over which conductors pass.

2.09 LAMPHOLDERS

- A. Rigidly and securely attach lampholders to the luminaire enclosure or husk.
- B. Pull chains shall be insulated joint type.
- C. Provide lampholders suitable for specified lamps, and set to position the lamps in optically correct spacing and relationship to lenses, reflectors, filters, and baffles.

2.10 EXTERIOR LUMINAIRES

- A. Exterior luminaires shall be designed and manufactured specifically for outdoor service. Components including nuts, bolts, rivets, springs, and similar parts, shall be corrosion resistant.
- B. Exterior luminaires shall be suitably and effectively gasketed to prevent entrance of moisture into luminaire. Luminaires which are directly exposed to the elements shall be labeled for wet locations. Luminaires which are exposed to dampness shall be labeled for damp locations.
- C. Metal parts of luminaires requiring painting shall be painted with suitable weather and moisture resisting paint equal to epoxy-based coatings.
- D. Aluminum parts of exterior luminaires which are not specified as requiring a painted finish shall be anodized.

2.11 ACCESSORIES

- A. Recessed incandescent luminaires shall be furnished with thermal protection in accordance with Article 410-65 of the NEC.
- B. Where utilized as raceways, luminaires shall be suitable for use as raceways. Provide feed through splice boxes where necessary.
- C. Provide installation and supporting hardware including stems, plates, plaster frames,

hangers, and similar items, for support of luminaires for the ceiling construction in which they shall be installed. Provide plaster frames made of non ferrous metal, or of steel that has been suitably rustproofed after fabrication.

- D. Air handling luminaires shall have hinged air control vanes within the side slots (bent metal vanes are not acceptable) factory set at fully open. Provide heat removal slots at luminaire ends.
- E. Interior fluorescent and HID luminaires utilizing ballast sound rating of lower than A shall be provided with acoustical mounting pads between luminaire housing and ballast to minimize vibration and noise level.
- F. Provide tempered glass lenses for metal halide luminaires.
- G. Provide fastening devices of a positive locking type, which do not require special tools to apply or remove them. Do not use tie wires in place of fastening devices.
- H. Attach reflectors to housing by means of safety chains to prevent reflectors from falling. No part of the chain shall be visible after installation.
- I. Provide a ceiling canopy for each stem. Canopy finish shall match stem finish.
- J. Luminaires installed in air plenums shall be enclosed and gasketed.
- K. Provide factory installed integral emergency battery packs in luminaires shown on the Drawings. Battery pack shall be sealed, maintenance free nickel cadmium battery capable of operating one or 4 foot long LEDs for a minimum of 90 minutes, with integral charger, pilot light and test switch.
- L. Provide additional feed points in pendant mounted luminaires connected to the emergency power system or provided with integral battery packs to accommodate the additional wiring.

PART 3 - EXECUTION

3.01 GENERAL

- A. Luminaire locations as indicated on the Drawings are general and approximate. Verify exact location of luminaires with Architect prior to installation. Verify adequacy of clearance with other equipment such as ducts, pipes, conduit, or structural elements. Bring conflicts to Architect's attention before proceeding with work.
- B. Verify ceiling construction and furnish appropriate luminaire mounting supports, hardware, trim, and accessories for each luminaire.
- C. Install luminaires in mechanical equipment rooms after ductwork and piping installation. Locate and mount luminaires as indicated on the Drawings unless mechanical equipment prohibits or makes it impractical to do so. In such cases, chain or wall mount luminaires so that serviceable equipment is illuminated.
- D. Luminaires shall be installed free of light leaks, warps, dents, or other irregularities. Light leaks are not acceptable.
- E. Install reflector cones, aperture plates, lenses, diffusers, louvers, and decorative elements of luminaires after completion of wet work, plastering, painting, and general clean up in the area of the luminaires. Provide final focusing and adjusting of lighting equipment.

Focusing and adjusting shall be performed under the Architect's supervision after normal working hours.

- F. Parabolic luminaires shall be installed with mylar cover over louvers. Cover shall be UL listed for temporary lighting. Upon completion of work, remove mylar cover with white gloves.
- G. Visible hanging devices shall be finished to match the luminaire finish, unless otherwise noted. Suspended fixtures shall hang level and aligned when installed in rows.
- H. Provide fire rated enclosures around recessed luminaires that are installed in fire rated ceilings.
- I. Provide attachment devices, brackets, plaster rings, saddle hanger and tie bars made of formed, rolled, or cast metal shapes with the requisite rigidity and strength to maintain continuous alignment and support of installed luminaires.
- J. Luminaires mounted in suspended ceilings shall be attached to the main runners of the ceiling system with appropriate mounting hardware. Provide independent 458 slack cables from corners of luminaires to structure above.
- K. Provide at least two supports for single fluorescent luminaires. Where luminaires are continuously mounted in rows, provide supports at maximum intervals of 8 feet, or closer if necessary to prevent visible deflection.
- L. Equipment requiring access for service and maintenance shall be installed so that components requiring access are readily accessible.
- M. Immediately prior to occupancy clear reflectors, reflector cones, aperture plates, lenses, trim rings, faceplates, louvers, lamps and decorative elements.
- N. Replace burnt out lamps and noisy or defective ballasts.
- O. Luminaires with emergency battery packs connected to unswitched circuits shall be permanently on and shall go into the emergency mode upon loss of power to the emergency battery pack. Luminaires with emergency battery packs connected to switched circuits shall be controlled on and off by the controlling device and shall go into the emergency mode upon loss of power to the emergency battery pack (provide switched and unswitched leads to these luminaires).
- P. Focus and adjust designated luminaire(s), after dark, at a time mutually agreeable to the Contractor, Owner and Architect/Lighting Designer. Make adjustments under the observation of the Architect/Lighting Designer. Notify Architect at least 2 weeks prior to aiming to allow Architect to make travel arrangements. Aim and adjust the luminaires after the complete installation of the project's amenities. Amenities include but are not limited to plantings, furnishings, artwork, graphics, and signage. Include in base bid provisions for lifts, scaffolding, extension ladders, and all other materials required to complete adjustments. Allow 15 minutes of labor per luminaire to complete adjustments. Lamps remaining after final aiming and adjustment will be turned over to the Owner for stock. For luminaires containing MR16 lamps, provide assortment of beamspreads and wattages so that proper lamp designation can be determined in the field. Provide at least five (5) of each wattage and beamspread across manufacturer's full line. A second aiming session may be required after initial lamping.
- Q. Operate new fluorescent and HID lamps at full intensity for 100 hours prior to scheduling

commissioning.

END OF SECTION 26 50 00