

SECTION 265000 - LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Luminaires.
2. Luminaire fittings.

B. Related Requirements:

1. Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260523 "Control-Voltage Electrical Power Cables" specifies wiring connections installed by this Section.
2. Section 260529 "Hangers and Supports for Electrical Systems" specifies channel and angle supports installed by this Section.
3. Section 260553 "Identification for Electrical Systems" specifies electrical equipment labels and warning signs installed by this Section.

1.02 DEFINITIONS

- A. BUG Rating: Backlight, uplight, and glare rating for light pollution from exterior luminaires.
- B. Correlated Color Temperature (CCT): The absolute temperature (in kelvins) of a blackbody whose chromaticity (color quality) most nearly resembles that of the light source.
- C. Color Rendering Index (CRI): The measure of the degree of color shift objects undergo when illuminated by the light source as compared with the color of those same objects when illuminated by a reference light source. The lower the CRI of a light source, the more difficult it is to identify colors and stripes on electronic components and wiring.

1.03 BUY AMERICAN REQUIREMENTS

A. Provide certificates to show that all products meet the following requirements:

1. American Iron and Steel (AIS).
2. Build America, Buy America Act.

B. See Supplementary Conditions for details.

1.04 ACTION SUBMITTALS

A. Product Data:

1. For luminaires.

- a. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.
 - 1) If listed manufacturer differs from selling manufacturer, indicate relationship between entities on submittal. Clearly indicate which entity warrants product performance and fitness for purpose.
 - 2) Listing criteria identified in approval letter must match specified listing criteria. Approval of only equipment's enclosure is not considered approval of equipment for intended application.
 - 3) Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for similar products are not acceptable.
- b. Product Certificates: Include product certificates stating compliance with standards listed below, signed by manufacturer or fabricator.
 - 1) Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with current accreditation under National Voluntary Laboratory Accreditation Program (NVLAP) for Energy Efficient Lighting Products.
- c. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- d. Include operating characteristics, electrical characteristics, and furnished accessories.
- e. Include schedule of submitted lighting products. Arrange schedule and accompanying product data in order by luminaire and lamp designations indicated on Drawings.
- f. Include battery and charger data for emergency lighting units.
- g. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
- h. Include photometric data and adjustment factors obtained from qualified laboratory tests.
- i. Include manufacturer's sample warranty language.

2. For luminaire fittings.

- a. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.
 - 1) If listed manufacturer differs from selling manufacturer, indicate relationship between entities on submittal. Clearly indicate which entity warrants product performance and fitness for purpose.

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- 2) Listing criteria identified in approval letter must match specified listing criteria. Approval of only equipment's enclosure is not considered approval of equipment for intended application.
 - 3) Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for similar products are not acceptable.
 - b. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - c. Include operating characteristics, electrical characteristics, and furnished accessories.
 - d. Include schedule of submitted lighting products. Arrange schedule and accompanying product data in order by luminaire and lamp designations indicated on Drawings.
 - e. Include manufacturer's sample warranty language.
 - B. Field quality-control reports.
- 1.05 INFORMATIONAL SUBMITTALS
- A. Manufacturers' published instructions.
 - B. Field Reports:
 - 1. Manufacturer's field reports for field quality-control support.
 - 2. Manufacturer's field reports for system startup support.
- 1.06 CLOSEOUT SUBMITTALS
- A. Warranty documentation.
- 1.07 DELIVERY, STORAGE, AND HANDLING
- A. Protect exposed surface finishes on lighting equipment by applying strippable, temporary protective covering before shipping.
- 1.08 WARRANTY FOR LUMINAIRES
- A. Special Installer Extended Warranty: Installer warrants that fabricated and installed luminaires perform in accordance with specified requirements and agrees to repair or replace products that fail to perform as specified within extended-warranty period. Warranty must convey to Owner upon acceptance of the Work.
 - 1. Extended-Warranty Period: Two years from date of Substantial Completion; full coverage for labor, materials, and equipment.

1.09 WARRANTY FOR BATTERIES

- A. Special Manufacturer Extended Warranty for Batteries: Manufacturer warrants that batteries perform in accordance with specified requirements and agrees to provide repair or replacement of batteries that fail to perform as specified within extended-warranty period.
 - 1. Initial Extended-Warranty Period for Li-ion Batteries: Three years from date of Substantial Completion; full coverage for materials only, free on board destination, freight prepaid.

PART 2 - PRODUCTS

2.01 LUMINAIRES

- A. Performance Criteria:
 - 1. Regulatory Requirements:
 - a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
 - b. See individual product types below for listing criteria.
 - c. Marked in accordance with UL CCN HYXT, including UL 1598, for compatible power supply, installation location, and environmental conditions.
- B. Source Quality Control:
 - 1. Compile and submit product data.
 - 2. Compile and submit sustainable design product data.
- C. Surface-Mounted Luminaire:
 - 1. Source Limitations: Obtain products for this luminaire type from single manufacturer.
 - 2. Product Listing Criteria, LED: UL CCN IFAM; including UL 1598.
 - 3. Product Characteristics:
 - a. Openings: Doors, frames, and access panels must operate smoothly, not leak light under operating conditions, and permit maintenance without use of tools or parts falling from enclosure.
 - b. Nominal Operating Voltage: 120 V(ac).
 - c. Nominal Luminaire Operating Power Rating: 20 to 60 W.
 - d. CRI: 80+.
 - e. Driver Location: Internal.
 - 4. Required Product Options:
 - a. Mounting Hardware: Ceiling-mounted, Pendant-mounted, or Wall-mounted; with stainless steel mounting brackets,.
 - b. Dimmable from 100 percent to zero percent of maximum light output.

- c. EMI Filters: Factory installed to suppress conducted EMI in accordance with MIL-STD-461E. Fabricate luminaires with one filter on each ballast requiring filter.
 - d. Stainless steel latches.
 - e. Integral pressure equalizer.
 - 5. Installation Markings:
 - a. All Luminaires (UL CCN HYXT):
 - 1) Marked with mounting orientation, such as "THIS END UP."
 - 2) "60 Hz" or "AC ONLY."
 - 3) Marked to identify voltage supply or type of branch circuit or both.
 - b. LED Luminaires (UL CCN IFAM):
- D. UL FTBR or FTBV - Emergency Lighting and Power Equipment:
- 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Product Listing Criteria: UL CCN FTBR or UL CCN FTBV; including UL 924, NFPA 101, and ICC IBC.
 - 3. Product Characteristics:
 - a. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
 - b. Status and Test Indication: Visible and accessible without opening luminaire or entering ceiling space.
 - 1) Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - 2) Test Push-Button: Push-to-test button in unit housing simulates loss of normal power and demonstrates unit operability.
 - c. Nominal Operating Voltage: 120 V(ac).
 - 4. Required Product Options:
 - a. Internal Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body and compatible with driver.
 - 1) Emergency Connection: Operate continuously at a minimum output of 1100 lumens each upon loss of normal power. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire driver.
 - 2) Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - 3) Test Push-Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space.

- a) Push-Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - b) Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - 4) Battery Type: Li-ion.
 - 5) Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
5. Installation Markings:
- a. All Luminaires (UL CCN HYXT):
 - 1) Marked to identify voltage supply or type of branch circuit or both.
 - b. Emergency Lighting and Power Equipment (UL CCN FTBR):

2.02 LUMINAIRE FITTINGS

A. Performance Criteria:

1. Regulatory Requirements:

- a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
- b. See individual product types below for listing criteria.

B. Source Quality Control:

- 1. Compile and submit product data.
- 2. Compile and submit sustainable design product data.
- 3. Compile and submit samples.

C. Luminaire Support Accessories:

1. Product Characteristics:

- a. Sized and rated for luminaire weight.
- b. Capable of maintaining luminaire position after cleaning and maintenance.
- c. Capable of supporting luminaire without causing deflection of ceiling or wall.
- d. Capable of supporting horizontal force equal to 100 percent of luminaire weight and vertical force equal to 400 percent of luminaire weight.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Temporary Lighting: If approved by Engineer, specified luminaires for Project may be installed for temporary lighting. Install and energize minimum quantity of luminaires necessary to meet needs of construction activities. When construction is sufficiently complete, remove, disassemble, clean, and relamp luminaires used for temporary lighting before reinstalling for Project delivery.

3.03 INSTALLATION OF LIGHTING

- A. Comply with manufacturer's published instructions.
- B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:
 - 1. Installation of Indoor Lighting Systems: NECA NEIS 500.
 - 2. Installation of Exterior Lighting Systems: NECA NEIS 501.
 - 3. Installation of Industrial Lighting Systems: NECA NEIS 502.
 - 4. Installation of Emergency Lighting and Exit Signs: ICC IBC, NFPA 101, and Parts IV and V in Article 700 of NFPA 70.
 - 5. Consult Owner for resolution of conflicting requirements.
- C. Special Installation Techniques:
 - 1. Install luminaires level, plumb, and square with finished floor or grade unless otherwise indicated.
 - 2. Install luminaires at height and aiming angle as indicated on Drawings.
 - 3. Coordinate layout and installation of luminaires with other construction.
 - 4. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

5. Exterior Corrosion Prevention:
 - a. Do not use aluminum in contact with earth or concrete. When in direct contact with dissimilar metals, protect aluminum with insulating fittings or treatment.
 - b. When embedding steel conduits in concrete, wrap conduit with 10 mil thick, pipe-wrapping plastic tape applied with a 50 percent overlap.
6. Wall-Mounted Luminaire Support:
 - a. Attached to a minimum 1/8 inch backing plate attached to wall structural members.
 - b. Do not attach luminaires directly to gypsum board.
7. Suspended Luminaire Support:
 - a. Ceiling Mount:
 - 1) Chain or aircraft cables.
8. Install wiring connections for luminaires.
9. Identification: Provide labels for luminaires and associated electrical equipment.
 - a. Identify field-installed conductors, interconnecting wiring, and components.
 - b. Provide warning signs.
 - c. Label each enclosure with engraved metal or laminated-plastic nameplate.
- D. Systems Integration: Integrate lighting control devices and equipment with electrical power connections for operation of luminaires as specified.

3.04 FIELD QUALITY CONTROL OF LIGHTING

- A. Tests and Inspections:
 1. Perform manufacturer's recommended tests and inspections.
 2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 3. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
 4. Verify operation of photoelectric controls.
 5. Exterior Illumination Tests:
 - a. Measure light intensities at night. Use photometers with calibration referenced to NIST standards.
- B. Nonconforming Work:
 1. Luminaire will be considered defective if it does not pass tests and inspections.
 2. Remove and replace defective units and retest.
- C. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

3.05 SYSTEM STARTUP

A. Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's published instructions.
2. Charge emergency power units and batteries minimum of 24 hours and conduct one-hour discharge test.

3.06 ADJUSTING

A. Luminaire Aiming Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aiming direction of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies must be manufacturer's authorized replacement parts and supplies.
3. Adjust aim of luminaires in presence of Architect.

3.07 PROTECTION

A. After installation, protect lighting equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

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