READ THIS FIRST

Notice to the Design Engineer, please refer to the Port of Seattle, Facilities and Infrastructure standards for reference before editing this specification.

This Project Spec Document may need additional modifications to suit your project. It is recommended that you proofread each section, paying attention to any “Notes” boxes such as this one--you should remove these “Notes” sections as you go. Also, do a search for all bracket characters “ [ ] “ as they are used to show you areas containing options or project specific details (you can use Microsoft Word’s Find feature {Ctrl-F} to jump to an open bracket “ [ “ character quickly). Again, these bracket characters should be removed.

It is important that every paragraph be numbered to allow for easy referencing. If you use the document’s built in styles and formatting your outline should be fine (turn on the formatting toolbar by going to View > Toolbars > Formatting). Most paragraphs will use the style “Numbered Material” and can be promoted (Shift) or demoted (Shift-Tab).

You should not have to manually enter extra spaces, carriage returns or outline characters such as A, B, C, or 1.01, 1.02; the formatting will do this for you. The entire document is 11 pt. Arial. If you paste items in, you may need to reapply the “Numbered Material” format.

1. GENERAL
   1. SUMMARY OF WORK
      1. The extent and location of “Interior Lighting” Work is shown in the Contract Documents. This section includes interior lighting fixtures, lighting fixtures mounted on exterior building surfaces, lamps, ballasts, emergency lighting units, and accessories.
   2. GOVERNING CODES, STANDARDS AND REFERENCES
      1. NFPA 70 (National Fire Protection Association) - National Electrical Code.
      2. NFPA 101 (National Fire Protection Association) - Life Safety Code.
   3. SUBMITTALS
      1. Submit materials data in accordance with of Section 01 33 00 - Submittals. Furnish manufacturers’ technical literature, standard details, product specifications, and installation instructions for all products.
      2. Submittals shall include the following:
         1. Product Data: For each type of lighting fixture indicated, arranged in order of fixture designation. Include data on features, accessories, and the following:
            1. Physical description and dimensions of fixtures.
            2. Ballast, including BF.
            3. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.

Select one of two subparagraphs below. With second subparagraph, photometric tests by manufacturer’s laboratory are acceptable.

* + - * 1. Certified results of independent laboratory tests for fixtures and lamps for electrical ratings and photometric data.
        2. Certified results of laboratory tests for fixtures and lamps for photometric performance.
        3. Emergency lighting unit battery and charger.
        4. Fluorescent and high-intensity-discharge ballasts.

Retain two subparagraphs below for projects with air-handling fixtures.

* + - * 1. Air and Thermal Performance Data: For air-handling fixtures. Furnish data required in “Submittals” Article in Section 23 37 00 - Air Outlets and Inlets.
        2. Sound Performance Data: For air-handling fixtures. Indicate sound power level and sound transmission class in test reports certified according to ADC.
        3. Types of lamps.

Delete paragraph and subparagraph below unless custom fixtures are indicated.

* + - 1. Shop Drawings: Show details of nonstandard or custom fixtures. Indicate dimensions, weights, method of field assembly, components, features, and accessories. For custom fixtures, modified fixtures, or linear fluorescent fixtures mounted in continuous rows, submit scaled drawings prepared by the manufacturer showing all details of construction, lengths of runs, pendant and power feed locations, accessories, finishes, and lists of materials. Contractors to provide the manufacturer with accurate field dimensions were required.
      2. Wiring Diagrams: For power, signal and control wiring. Detail wiring for fixtures and differentiates between manufacturer-installed and field-installed wiring.

Consider retaining paragraph below for projects with congested ceiling space and where Drawings do not include comprehensive reflected ceiling plans.

* + - 1. Coordination Drawings: Reflected ceiling plans and sections drawn to scale and coordinating fixture installation with ceiling grid, ceiling-mounted items, and other components in the vicinity. Include Work of all trades that is to be installed near lighting equipment.

Delete paragraph below if not required.

* + - 1. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, signed by manufacturers of lighting fixtures certifying that products comply with requirements.
      2. Dimming Ballast Compatibility Certificates: Signed by manufacturer of ballast certifying that ballasts are compatible with dimming systems and equipment with which they are used.

Delete paragraph below except for projects with extensive tests of emergency lighting equipment.

* + - 1. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
      2. Maintenance Data: For lighting fixtures to include in maintenance manuals specified in Division 1 General Requirements.
      3. The authorized manufacturer representative for the project area shall prepare submittals for each lighting fixture type. Along with the fixture submittals, a list is to be provided identifying the manufacturer representative for each fixture type. Provide manufacturers names, addresses, and telephone numbers. Requests for prior approval shall also include this information. Submittals or requests for prior approval without this information will be rejected.
  1. QUALITY ASSURANCE
     1. Listing and Labeling: Provide fixtures, emergency lighting units, and accessories that are Listed and Labeled as defined in NFPA 70, Article 100 and marked for intended use for the location and environment in which they are installed.
     2. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

Delete paragraph below if FM compliance is not required. Coordinate with Drawings.

* + 1. FM Compliance: Fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM.
    2. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

Delete paragraph and subparagraphs below if not required. If retaining, indicate location, type, and other details of mockups on Drawings or by inserts. Revise wording if only one mockup is required.

* + 1. Mockups: Provide lighting fixtures for room or module mockups. Install fixtures for mockups with power and control connections.
       1. Obtain Port approval of fixtures for mockups before starting installations.
       2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
       3. Remove mockups when directed. Fixtures may be reinstalled in the Work with approval of Port.

Delete subparagraph above or below. Below is applicable only if mockups are erected as part of building rather than separately.

* + - 1. Approved fixtures in mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
  1. SUBSTITUTIONS
     1. Lighting fixtures designated for this project is based on the fixture types and manufacturers specified. If substitution of fixtures other than those specified is desired product information must be submitted, and approved (prior approval) by the Engineer 10-days prior to bid time. No requests for substitution will be accepted after this date.
     2. Substitution requests shall include all information required under 1.04 SUBMITTALS of this section. Requests for approval shall be accompanied by a working fixture sample (including lamps, cord and plug). Provide the name of at least one installation where each proposed substitute has been installed for at least six months. Provide the name and telephone number of the Engineer of Record.

The use of custom and foreign products is undesirable. These products may only be used with prior approval from the Port. Delete below if not used.

* 1. CUSTOM LIGHT FIXTURES
     1. All custom light fixtures require a prototype to be submitted prior to commencement of fabrication. The purpose of the prototype will be to review construction, lamp placement within the fixture, lamp type, optical assembly, finishes, etc. Modifications may be required as a result of the prototype review. These modifications and others that do not materially affect the cost of the fixture shall be incorporated at no additional cost to the Port.
  2. COORDINATION
     1. Fixtures, Mounting Hardware, and Trim: Coordinate layout and installation of lighting fixtures with ceiling system and other construction.
     2. Coordination Meetings: Meet at least twice with the ceiling installer. Hold first meeting before submittal of shop drawings to coordinate each light fixture mounting condition with ceiling type. During second meeting, coordinate fixture layout in each area. Meet at least twice with the mechanical systems installer prior to fabrication and installation of ductwork. Coordinate depth and location of all light fixtures and ductwork in all areas.
  3. SPECIAL WARRANTY

Retain this Article when a special warranty is required for emergency lighting unit batteries or for fluorescent ballasts.

Coordinate with Section 01 78 36 - Warranties and Bonds.

* + 1. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

Delete paragraph below unless rechargeable batteries are specified for emergency lighting units.

* + 1. Special Warranty for Batteries: Written warranty, executed by manufacturer agreeing to replace rechargeable batteries that fail in materials or workmanship within specified warranty period.

Subparagraph below is an example only. Verify availability and length of warranty period with manufacturers selected.

* + 1. Special Warranty Period for Batteries: Manufacturer’s standard, but not less than 10 years from date of Substantial Completion. Full warranty shall apply for first year and prorated warranty for last nine years.

Delete paragraph and subparagraphs below unless special warranties are provided for fluorescent ballasts.

* + 1. Special Warranties for Fluorescent Ballasts: Written warranty, executed by manufacturer agreeing to replace fluorescent ballasts that fail in materials or workmanship within specified warranty period.
       1. Special Warranty Period for Electronic Ballasts: Five years from date of manufacture, but not less than four years from date of Substantial Completion.
       2. Special Warranty Period for Electromagnetic Ballasts: Manufacturers’ standard warranty, but not less than two years from date of manufacture.
  1. EXTRA MATERIALS
     1. Spare and extra parts shall be identified for all products, but not provided. Include spare parts information in Operation and Maintenance Manuals.

Include spare parts information in Operation and Maintenance Manuals.

Lamps: [10] for every [100] of each type and rating installed. Furnish at least one of each type.

Glass and Plastic Lenses, Covers, and Other Optical Parts: [1] for every [100] of each type and rating installed. Furnish at least one of each type.

Ballasts: [1] for every [100] of each type and rating installed. Furnish at least one of each type.

Globes and Guards: [1] for every [20] of each type and rating installed. Furnish at least one of each type

1. PRODUCTS

A. If only one product is acceptable (single or sole source product), obtain an approved Competition Waiver and submit to the CPO Construction, Contract Administrator. The language shall read as: “Manufacturer Name, Product # XXXXX, No Equal.” Refer to CPO-6 Competition Waiver Policy for more information.

B. If a Competition Waiver is not approved or more than one product is acceptable, this section must list a minimum of 2 products plus the language “Or Approved Equal,” along with salient characteristics. Refer to CPO Construction’s Salient Characteristics Guidelines for more information.

* 1. MANUFACTURERS
     1. Acceptable Manufacturers:
        1. Fluorescent Ballasts – Electronic:
           1. Advance; Division of Philips.
           2. Osram Sylvania.
           3. Triad; Universal Lighting Technologies.
           4. Or Approved Equal.
        2. HID Ballasts:
           1. Advance; Division of Philips.
           2. Universal Lighting Technologies.
           3. Or Approved Equal.
        3. Lamps – Fluorescent and HID:
           1. Osram Sylvania.
           2. Venture Lighting.
           3. General Electric.
           4. Or Approved Equal.
        4. Lamps – LED:
           1. Cree.
           2. Philips.
           3. EcoSmart.
           4. Or Approved Equal.
        5. LED Drivers:
           1. Cree.
           2. Philips.
           3. Lutron.
           4. Or Approved Equal.
     2. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products indicated in the Lighting Fixture Schedule located on the Drawings.
  2. FIXTURES AND FIXTURE COMPONENTS, GENERAL
     1. Provide thermal protection via a replaceable cartridge fuse and fuse holder that encloses the fuse. Comply with disconnect switch requirements integral with the fixture.
     2. Hangers for pendant fixtures shall be rigid type; with not less than five-threaded engagement turns at each end. A safety factor of 4 shall be used in sizing anchors and hangers.
     3. Provide plaster frames for recessed lighting fixtures mounted in other than T-Bar.
     4. Recessed fluorescent downlights shall have cones, which are low brightness, low iridescence, and semi-specular or specular alzak as specified and shall be self flanged type.
     5. Emergency exit lights and egress lights with battery pack shall be Dual Lite Spectron series, Lightguard OmniTest and F100/F85 models, incorporating a self-diagnostic chip, Or Approved Equal. Self diagnostic test feature shall incorporate automatic tests to ensure proper unit operation per code requirements. Automatic test feature shall verify battery voltage and lamp continuity, and shall illuminate lamps and discharge battery for minimum 3 minutes every 30 days. Exit lights with LEDs are acceptable provided they meet code requirements. Exit sign lettering shall be green.
     6. LED fixtures shall be used for artistic lighting and lighting of artwork unless conditions preclude its use. Evaluate use of LED fixtures for architectural, landscaping, and other applications on a life-cycle cost basis.
     7. Metal Parts: Steel or aluminum with 300°F baked enamel finish, brushed aluminum with baked acrylic clear lacquer finish, or stainless steel with a brushed finish. Paint shall be water based with low VOC. Free from burrs, sharp corners, and edges.
     8. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
     9. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.
     10. Reflective surfaces, which are painted, shall be baked white enamel or manufacturer standard color, two coats minimum with an average reflectance of 90% or better.
     11. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic plastic or annealed crystal glass, unless otherwise indicated.
         1. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.
         2. Lens Thickness: 0.125 inch (3 mm) minimum, unless greater thickness is indicated.

Delete paragraph below except for special applications where freedom from conducted electromagnetic interference is critical. Coordinate with Drawings.

* + 1. Electromagnetic Interference Filters: Integral to fixture assembly. Provide one filter for each ballast. Suppress conducted electromagnetic interference filters as required by MIL-STD-461.
    2. Air-Handling Fixtures: For use with plenum ceiling for air return and heat extraction and for attaching an air-diffuser boot assembly specified in Section 23 37 00 - Air Outlets and Inlets.

Indicate noise criteria and air-movement performance requirements in schedules or details.

* + - 1. Sound-Pressure Levels: Certified according to ADC.
      2. Air-Movement Performance Requirements: Certified according to ADC.

Delete subparagraphs below if not applicable.

* + - 1. Supply Units: Equip with slots in one or both side trims and join with air-diffuser boot assemblies.
      2. Heat Removal Units: An air path through lamp cavity.
      3. Dampers: Operable from outside fixture for control of return-air volume.
      4. Static Fixtures: Supply slots are blanked off, and fixture appearance matches active units.
  1. FLUORESCENT LAMP BALLASTS
     1. General Requirements: Unless otherwise indicated. Provide products with features that include the following:

If Project includes high-output lamps, indicate exceptions to requirement below in schedules or details. Conform to FCC regulations.

* + - 1. Labeling by Certified Ballast Manufacturers Association (CBM).
      2. Type: Class P, high power factor.
      3. Ballast Factor of 0.88.
      4. Multi-tap Ballast's: Use 2-, 3-, or 4-lamp ballast for multi-tap fixtures where possible.
      5. Lamp ballast connection method does not reduce normal rated life of lamp.
      6. Electronic integrated circuit, solid-state, full-light-output, energy efficient type, compatible with lamps and lamp combinations to which connected.
      7. Certifications: Underwriters Laboratories (UL) listed Class P, Certified Ballast Manufacturer (CBM), and Electrical Testing Laboratory (ETL).
      8. Operating Frequency: 20 kHz or higher.
      9. Power Factor: 98 percent, minimum.
      10. Total Harmonic Distortion Rating: Less than 10 percent.
      11. Flicker: Less than 5 percent.
      12. Lamp Current Crest Factor: Less than 1.7.
      13. Sound Rating: A.
      14. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.
      15. Transient Protection: Comply with IEEE C62.41, for Category A1 locations. Conform to IEEE C62.41.
      16. Interference: Comply with 47 CFR, Chapter 1, Part 18, and Subpart C for limitations on electromagnetic and radio-frequency interference for non-consumer equipment.
    1. Luminaires controlled by occupancy sensors and/or daylight sensors shall have programmed-start ballasts.
    2. Electronic Programmed-Start Ballasts for T8 and T5 and T5HO Lamps: Comply with ANSI C82.11 and the following:
       1. Lamp end-of-life detection and shutdown circuit for T5 diameter lamps.
       2. Automatic lamp starting after lamp replacement.
    3. Ballasts for Dimmer-Controlled Fixtures: Comply with general and fixture-related requirements above for electronic ballasts.
       1. Compatibility: Certified by manufacturer for use with specific dimming system indicated for use with each dimming ballast.
       2. Dimming Range: As required by lighting design considerations.
       3. Control: Coordinate wiring from ballast to control device to ensure that the ballast, controller, and connecting wiring are compatible.

Delete or edit paragraph and subparagraphs below to suit Project.

* + 1. Ballasts for Low-Temperature Environments shall be as follows:
       1. Temperatures 0°F (Minus 17°C) and above: Electronic or electromagnetic type rated for 0°F (minus 17°C) starting temperature.
       2. Temperatures Minus 20°F (Minus 29°C) and Above: Electromagnetic type designed for use with high-output lamps.
    2. Ballasts for Bi-Level Controlled Lighting Fixtures: Electronic type.
       1. Operating Modes: Ballast circuit and leads provide for remote control of the light output of the associated lamp between high- and low-level and off.
          1. High-Level Operation: 100 percent of rated lamp lumens.
          2. Low-Level Operation: As required by lighting design considerations.
       2. Ballast shall provide equal current to each lamp in each operating mode.
       3. Compatibility: Certified by manufacturer for use with specific bi-level control system and lamp type indicated.
  1. HIGH-INTENSITY-DISCHARGE LAMP BALLASTS

Note to designer: 277 or 480-volt ballasts are to be used whenever possible.

* + 1. General: Electromagnetic Ballast for Metal-Halide Lamps: Comply with ANSI C82.4 and UL 1029. Include the following features unless otherwise indicated.
       1. Multi-tap ballast.
       2. Type: Constant wattage autotransformer or regulating high-power-factor type, except for metal-halide lamps below 175-watts without igniters where high resistance auto transformer type is acceptable.
       3. Operating Voltage: Match system voltage.
       4. Minimum Starting Temperature: Minus 22°F (Minus 30°C) for single lamp ballasts.
       5. Normal Ambient Operating Temperature: 104°F (40°C).
       6. Open-circuit operation that will not reduce average life.
       7. Auxiliary, Instant-on, Quartz System: Automatically switches quartz lamp on when fixture is initially energized and when momentary power outages occur. Automatically turns quartz lamp off when high-intensity-discharge lamp reaches approximately 60 percent light output.
       8. Each ballast shall be individually protected by an in-line fuse in a fuseholder Littelfuse, Bussmann Or Approved Equal.
    2. Encapsulation: Manufacturer’s standard epoxy-encapsulated model designed to minimize audible fixture noise. Noise rating B or better.
    3. High-Pressure Sodium Ballasts: Equip with a solid-state igniter/starter having an average life in pulsing mode of 10,000 hours at an igniter/starter case temperature of 90°C.

Retain subparagraph below for high-pressure sodium fixtures to specify instant restrike devices where extinguishing of lamps caused by momentary power interruptions is unacceptable for safety, security, or other reasons. For other fixture types with same requirement, specify an auxiliary quartz lamp system. Coordinate subparagraph below with specific fixture descriptions in lighting fixture schedules or details.

* + - 1. Instant Restrike Device: Solid-state, potted module, mounted inside high-pressure sodium fixture and compatible with high-pressure sodium lamps, ballasts, and sockets up to 150W.
         1. Re-strike Range: 105 to 130V ac.
         2. Maximum Voltage: 250V peak or 150V ac RMS.
  1. LED DRIVERS
     1. Class 1, constant current.
     2. Power factor >90% at full load.
     3. THD <20%.
     4. Integral surge protection in accordance with ANSI C62.41.2.
     5. Minimum 5 year warranty.
  2. EXIT SIGNS
     1. General Requirements: Comply with UL 924 for sign colors, visibility, luminance, and lettering size. Comply with Authorities Having Jurisdiction.
     2. Internally Lighted Signs: As follows:
        1. Lamps for AC Operation: Green Light-emitting diodes, 50,000 hours minimum rated lamp life.

Select from paragraphs below to specify exit sign types to suit Project.

Coordinate paragraph below with “Warranty” Article in Part 1.

* + 1. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
       1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.
       2. Charger: Fully automatic, solid-state type with sealed transfer relay.
       3. Operation: Relay automatically energizes lamp from unit when circuit voltage drops to 80 percent of nominal or below. When normal voltage is restored, relay disconnects lamps, and battery is automatically recharged and floated on charger.
       4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
       5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
       6. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Automatic test feature shall verify battery voltage and lamp continuity, and shall illuminate lamps and discharge battery for minimum 3 minutes every 30 days. Test failure is annunciated by an integral audible alarm and a flashing red LED.
       7. Self-diagnostic type with test switches and indicator lights.
    2. Self-Luminous Signs: Using strontium oxide aluminate compound to store ambient light and release the stored energy when the light is removed. Provide with universal bracket for flush-ceiling, wall, or end mounting.
  1. EMERGENCY LIGHTING UNITS
     1. General Requirements: Self-contained units. Comply with UL 924. Units include the following features:

Supplement basic description below with data in lighting fixture schedules or details.

* + - 1. Battery: Sealed, maintenance-free, lead-acid type with minimum 10-year nominal life and special warranty.
      2. Charger: Fully automatic, solid-state type with sealed transfer relay.
      3. Operation: Relay automatically turns lamp on when 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, and battery is automatically recharged and floated on charger.

Select subparagraphs below or edit to suit Project.

* + - 1. Wire Guard: Where indicated, heavy-chrome-plated wire guard arranged to protect lamp heads or fixtures.
      2. Integral Time-Delay Relay: Arranged to hold unit on for fixed interval after restoring power after an outage. Provides adequate time delay to permit high-intensity-discharge lamps to restrike and develop adequate output.
      3. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
      4. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
      5. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Automatic test feature shall verify battery voltage and lamp continuity, and shall illuminate lamps and discharge battery for minimum 3 minutes every 30 days. Test failure is annunciated by an integral audible alarm and a flashing red LED.
      6. Self-diagnostic type with test switches and indicator lights.
  1. EMERGENCY FLUORESCENT POWER SUPPLY UNIT

Select one of two paragraphs below or delete both.

* + 1. Internal Type: Self-contained, modular, battery-inverter unit factory mounted within fixture body. Comply with UL 924.
       1. Test Switch and Light-Emitting Diode Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
       2. Battery: Sealed, maintenance-free, nickel-cadmium type with minimum 10-year nominal life.
       3. Charger: Fully automatic, solid-state, constant-current type.
       4. Operation: Relay automatically energizes lamp from unit when normal supply circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamp, and battery is automatically recharged and floated on charger.
       5. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Automatic test feature shall verify battery voltage and lamp continuity, and shall illuminate lamps and discharge battery for minimum 3 minutes every 30 days. Test failure is annunciated by an integral audible alarm and a flashing red LED.
    2. External Type: Self-contained, modular, battery-inverter unit. Comply with UL 924.
       1. Test Switch and Light-Emitting Diode Indicator Light: Visible and accessible without entering ceiling space.
       2. Battery: Sealed, maintenance-free, nickel-cadmium type with minimum 10-year nominal life.
       3. Charger: Fully automatic, solid-state, constant-current type.
       4. Operation: Relay automatically energizes lamp from unit when normal supply circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamp, and battery is automatically recharged and floated on charger.
       5. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Automatic test feature shall verify battery voltage and lamp continuity, and shall illuminate lamps and discharge battery for minimum 3 minutes every 30 days. Test failure is annunciated by an integral audible alarm and a flashing red LED.
       6. Housing: NEMA 250, Class 1 enclosure.
  1. LAMPS
     1. Provide products manufactured by one of the following:
        1. Osram/Sylvania.
        2. Venture.
        3. General Electric.
        4. Durotest.
        5. Philips.
        6. Or Approved Equal.
     2. Lamp each fixture with the proper quantity of lamps of the type specified in the Lighting Fixture Schedule.

Coordinate this Article with Drawings. Indicate lamp designation for each fixture in the lighting fixture schedule located on the drawings. Where color rendition or color uniformity is important and several types of fluorescent and high-intensity-discharge lamps are used, provide consistent manufacturer designations or ANSI lamp designations to define requirements.

Generally, standard fluorescent fixtures shall use T8 fluorescent lamps. Fluorescent lamps in close proximity to metal-halide or halogen lamps shall have a color temperature rating of 4100K.

Compact Fluorescent Lamps 2 pin or 4 pin, CRI 85 minimum

T5 lamps can be used with Facilities and Infrastructure approval

Edit below to suit project.

* + 1. Incandescent lamps shall be rated for 130 volts and approved by Facilities and Infrastructure for each application.
    2. Standard fluorescent fixtures shall use T8 style lamps.
    3. Comply with ANSI C78 series that is applicable to each type of lamp.
    4. Fluorescent lamps shall pass federal TCLP tests.
    5. Color:
       1. Office Areas: 4200K (i.e., cool white)
       2. Public and Tenant Areas: 3500K (i.e., warm white)
    6. Fluorescent Color Temperature and Minimum Color-Rendering Index: 3500 K and 85 CRI, unless otherwise indicated.
    7. Fluorescent Color Temperature and Minimum Color-Rendering Index: 4100 K and 85 CRI, unless otherwise indicated.
    8. Non-compact Fluorescent Lamp Life: Rated average is 20,000 hours at 3 hours per start when used on rapid-start circuits.
    9. Fluorescent Lamps provided are required to have passed Federal TCLP testing.
    10. Metal-halide lamps shall be phosphor coated and compatible with fixture specified.
    11. All fluorescent and HID lamps shall be seasoned after installation by operating the lamps for approximately 100 hours without turning off.
    12. Lighting fixtures that contain lamps which require protective shielding shall be furnished with a tempered glass lens or approved unbreakable lens, which is UL listed for the application.
    13. LED Lamps:
        1. Color temperature range from 3500K-5500K based on specific project parameters.
        2. CRI >80.
        3. Lumens per watt >50.
        4. Minimum 40,000 hour life at above 70% rated light output.
    14. HID Lamps:
        1. Pulse-Start, Metal-Halide Lamps: Minimum CRI 85, and color temperature 3500 K or 4200 K.
        2. Ceramic, Pulse-Start, Metal-Halide Lamps: Minimum CRI 85, and color temperature 3500 K or 4000 K.
  1. FIXTURE SUPPORT COMPONENTS

Delete this Article if not applicable or edit to suit Project. Coordinate with Drawings.

* + 1. Comply with Section 26 05 48 - Seismic Controls for Electrical and Communication Work for channel- and angle-iron supports and nonmetallic channel and angle supports.
    2. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture.
    3. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy arranged to mount a single fixture. Finish same as fixture.
    4. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
    5. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.
    6. Aircraft Cable Support: Use cable, anchorages, and intermediate supports recommended by fixture manufacturer.
  1. FINISHES

Coordinate below with interior lighting fixture schedules or details.

* + 1. Fixtures: Manufacturer’s standard, unless otherwise indicated.
       1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.
       2. Metallic Finish: Corrosion resistant.

1. EXECUTION
   1. INSTALLATION
      1. Fixtures: Set level, plumb, and square with ceiling and walls, and secure according to manufacturer’s written instructions and approved submittal materials. Install lamps in each fixture.
      2. Fixture installation shall comply with seismic requirements.
      3. Provide all accessories required for a complete and operational system.
         1. For recessed fixtures, other than T-Bar, provide plaster frames and flanges suitable for ceiling.
         2. Provide plates, barriers, or rings to cover any exposed ceiling material between fixture canopy or pan and outlet box
      4. Remote Mounting of Ballasts, where necessary: Distance between the ballast and fixture shall not exceed that recommended by ballast manufacturer. Verify, with ballast manufacturers, maximum distance between ballast and luminaire.
      5. Fixtures shall be supported by separate means such as wire or chains from the building structure and not from the ceiling system, ductwork, piping, or other systems, with the exception of fixture types to be installed in suspended ceilings. See NEC Article 314-23.

NFPA 70 requires minimum support for fixtures. Retain paragraphs below for more specific support requirements and for requirements exceeding code minimums. Units in seismic zones must have additional supports and restraining devices beyond those specified here.

* + 1. Support for Fixtures in or on Grid-Type Suspended Ceilings: Use grid for support.
       1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from fixture corners.
       2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with seismic clips that are UL listed for the application.
       3. Fixtures of Sizes Less Than Ceiling Grid: Arrange as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
    2. Suspended Fixture Support: As follows:
       1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
       2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.

Select from subparagraphs below and edit to suit Project. Coordinate with Drawings.

* + - 1. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
      2. Continuous Rows: Suspend from cable installed according to fixture manufacturer’s written instructions and details on Drawings.
    1. Connect wiring according to Section 26 05 19 - 600 Volt or Less Wire and Cable.
       1. Do not use fixtures as a raceway for circuit conductors except for the single branch circuit supplying the fixtures. Branch circuit wiring shall not pass through an outlet box that is an integral part of an incandescent fixture unless the fixture is identified for the purpose.
       2. Wiring within fixtures shall be neatly arranged and protected from damage.
    2. Flush and recessed fixtures without an integral outlet box shall have a tap connection conductor, with insulation rated for 90°C, run from fixture terminal connection to an outlet box at least 1-foot from the fixture.
    3. Fixture whips shall be between 4’ and 6’ long.
    4. Mount remote LED drivers in accessible ceiling space as close as possible to fixture.
       1. Where ceiling is not accessible, mount in nearest electrical closet or service space provided that manufacturer’s distance requirements are not exceeded.
    5. Mount LED fixtures to allow adequate air circulation around fixture cooling fins. Do not mount in a location where ambient temperature will exceed 40°C.
    6. Air-Handling Fixtures: Install with dampers closed.
  1. CONNECTIONS
     1. Ground equipment.
        1. Tighten electrical connectors and terminals according to manufacturer’s published torque-tightening values. If manufacturer’s torque values are not indicated, use those specified in UL 486A and UL 486B.
  2. IDENTIFICATION
     1. Comply with Section 26 05 53 - Electrical Identification.
  3. FIELD QUALITY CONTROL
     1. Inspect each installed fixture for damage. Replace damaged fixtures and components.
     2. Advance Notice: Give dates and times for field tests.
     3. Provide instruments to make and record test results.
     4. Test as follows:
        1. Verify proper operation, switching and phasing of each fixture after installation according to their listing and the requirements in NFPA 101.
        2. Emergency Lighting: Interrupt electrical supply to demonstrate proper operation. Verify normal transfer to battery source and retransfer to normal.
        3. Report results in writing.
     5. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.
     6. Corrosive Fixtures: Replace during warranty period.
  4. CLEANING AND ADJUSTING
     1. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer.
     2. Adjust aimable fixtures to provide required light intensities.
  5. INTERIOR LIGHTING FIXTURE SCHEDULE
     1. Refer to Lighting Fixture Schedule on the Drawings.

Lighting Fixture Schedule sample attached is to be placed on the drawings.

1. MEASUREMENT AND PAYMENT
   1. GENERAL
      1. No separate measurement or payment will be made for the Work required by this section. The cost for this portion of the Work will be considered incidental to, and included in the payments made for the applicable bid items in the [Schedule of Unit Prices] [Lump Sum price bid for the Project].

End of Section

Revision History:

05/01/2014 Conversion to 2004 CSI Numbering System

10/15/2014 Added Sole Source and Salient Characteristics Note to Part 2 and revisions

01/29/2015 Revised Sole Source

01/12/2025 Revised 3.01.B Seismic requirements