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BuildingName
The Description of the Project
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SPECIFICATION DIVISION 26

NUMBER SECTION DESCRIPTION

DIVISION 26 ELECTRICAL
SECTION 265100 - INTERIOR LIGHTING

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DIVISION 26 ELECTRICAL
SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections, in particular the Related Sections listed below, apply to this Section.

B. Related Sections:

1. Section 017823 - Operation and Maintenance Manual
2. Section 019100/019110 - Commissioning
3. Section 260513 - Medium, Low & Control Voltage Cables
4. Section 260526 - Grounding and Bonding for Electrical
5. Section 260533 - Electrical Materials and Methods
6. Section 260800 - Electrical Acceptance Tests

1.2 DEFINITIONS

A. Night Lights: Light fixtures that are wired to the unswitched leg of the circuit. Night lights are not to be confused with emergency lights, which have a second source of power and may be switched.

1.3 SUBMITTALS

A. Product Data: Arrange in order of luminaire designation. The submittals shall include data on features, ratings, listings, certifications, accessories, finishes, dimensions, emergency components, photometric data, and luminaire efficiency data.

B. Installation, Operation, and Maintenance Manuals.

1.4 QUALITY ASSURANCE

A. Lighting fixtures shall be of specification grade and listed or labeled by Underwriters Laboratories (UL) or an approved Nationally Recognized Testing Laboratory (NRTL).

B. LED fixtures shall comply with the following:

1. UL Standard 8750 “Light Emitting Diode Equipment for Use in Lighting Products”, IES Standard LM-79 “Electrical and Photometric Measurements of Solid-State Lighting Products”, IES Standard LM-80 “Measuring Lumen Maintenance of LED Light Sources”, and IES Standard TM-21 “Projecting Long Term Lumen Maintenance of LED Light Sources”.
2. ANSI C78.377 “Specifications for the Chromaticity of Solid State Lighting Products” with LEDs binned within a maximum three-step MacAdam Ellipse to ensure color consistency amongst luminaries of the same type.

1.5 WARRANTY

A. For non-LED lighting fixtures and components, provide a complete warranty for parts and labor for a minimum of one year from the date of Substantial Completion.

B. For LED fixtures, lamps, drivers, and components, provide a complete warranty for parts and labor for a minimum of five years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES

A. Provide lighting fixtures in accordance with the Fixture Schedule.

1. Provide only LED fixtures with a DesignLights Consortium (DLC) listing, a U.S. Department of Energy (DOE) “LED Lighting Facts” label, or a U.S. Environmental Protection Agency (EPA) ENERGY STAR label, which have demonstrated third-party testing verification.

B. Recessed lighting fixtures shall be thermally protected.

C. 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.

D. 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.

2.2 LAMPS

A. Except where T5 or T5HO lamps are shown in the Fixture Schedule, tubular fluorescent lamps shall be T8, straight tube, rapid-start, multi-phosphor type with a medium bi-pin base, average rated life of 24,000 hours minimum, 3,000 initial lumens, and 2,820 mean lumens. Fluorescent lamps shall have a correlated color temperature of 3500 degrees K and a CRI of 85 minimum. Lamps shall be designed to pass the Federal TCLP test in effect at the time of manufacture. U-tube lamps shall not be used. GE Ecolux, Osram/Sylvania Ecologic, or Philips Alto only.

B. Compact fluorescent lamps shall be 4 pin, 13 watt minimum with a color temperature of 3500 degrees K, a CRI of 80 minimum, end-of-life protection, and suitable for use with electronic ballasts. Self-ballasted compact fluorescent lamps are not acceptable except for retrofitting existing incandescent fixtures. Osram/Sylvania, GE, or Philips only.

C. Induction lamps shall have a color temperature of 3500 degrees K and a CRI of 80 minimum.

D. 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.

E. Retrofit LED lamps shall comply with NEMA SSL 4 “SSL Retrofit Lamps: Suggested Minimum Performance Requirements”.

F. High intensity discharge (H.I.D.) lamps shall conform to their applicable ANSI codes.

G. Incandescent lamps shall be rated 120 volts and shall have a life of 2,000 hours minimum. Standard “A” Type lamps shall be inside frosted.

2.3 BALLASTS AND DRIVERS

A. Except where indicated otherwise, fluorescent fixtures with multiple T8 or T5 lamps shall have two ballasts or a two-step (50%-100%) dimming ballast to accommodate dual switching. Fluorescent fixtures with multiple compact fluorescent lamps may have one ballast.

B. Fluorescent ballasts shall be of the electronic, programmed rapid-start, series-circuited, and completely solid-state. Ballasts shall be rated for the specific lamps they are supplying, shall have a maximum crest factor of 1.6, a maximum current total harmonic distortion of 10 percent, a minimum starting temperature of 0 degrees F, and a sound rating of “A”. Ballasts for T8 and T5 lamps shall be Osram/Sylvania Quicktronic Professional, Advance Optanium, or Universal Accustart only. Ballasts for compact fluorescent lamps shall be the fixture manufacturer’s standard electronic type.

C. Fluorescent dimming ballasts shall be electronic, comply with the other requirements for electronic ballasts, be capable of smoothly and consistently dimming the lamps from full output to 10 percent or less output, and maintain a cathode voltage between 3 to 4 volts. A low voltage slide switch that is compatible with the ballast shall control light level. Osram/Sylvania Quicktronic, Lightolier, or Lutron only.

D. 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.

E. 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.

F. H.I.D. ballasts shall conform to their applicable ANSI codes. H.I.D. ballasts for use indoors in finished areas shall be of the quietest type available or shall be mounted remote from the fixtures.

G. Ballasts and drivers shall be rated for the ambient temperatures in which they are located. Outdoor fixtures shall be equipped with ballasts or drivers rated for reliable starting to -20 degrees F. Indoor fixtures located in areas with direct sunlight or above normal ambient temperatures shall have ballasts or drivers rated at 65 degrees C minimum.

H. Individually fused ballasts and drivers shall have their fuses accessible from outside of the fixture chassis.

I. Induction lamp drivers shall be electronic and comply with radio frequency interference (RFI) requirements of FCC Title 47 Part 15 and be rated for a total harmonic distortion (THD) of less than 20 percent at all input voltages.

2.4 EMERGENCY LIGHTING

A. Emergency lighting shall consist of normal lighting fixtures with generator or battery-inverter system backup, emergency lighting fixtures with individual battery backup, or sealed beam emergency lighting units in accordance with the Fixture Schedule.

1. Battery-backed fluorescent emergency lighting fixtures shall consist of a fluorescent fixture with one or more lamps connected either to a battery pack and charger mounted remote from the fixture, or to an emergency power ballast mounted internal to the fixture. Minimum light output shall be 1100 lumens. The battery shall be nickel cadmium and sized for a minimum of 90 minutes of fixture operation. The charger shall be solid-state and provide overload, short circuit, brownout and low battery voltage protection. The battery and charger shall include self-diagnostic and self-exercising circuitry to exercise and test itself for 5 minutes every month and for 30 minutes every 6 months. The fixture shall include a test/monitor module with LED status indicating lights mounted so as to be visible to the public. The fixture shall not contain an audible alarm.
   a. Remote mounted battery packs and chargers: Chloride, Dual-Lite, Emergi-Lite, Exide Lightguard, Lightalarms, Lithonia or Sure-Lites.
   b. Emergency power ballasts: Bodine or Lithonia
2. Battery-backed LED emergency lighting fixtures shall consist of a normal LED fixture with some or all of the LEDs connected to a battery and charger. The battery shall be nickel cadmium and sized for a minimum of 90 minutes of fixture operation. The charger shall be solid-state and provide overload, short circuit, brownout and low battery voltage protection. The battery and charger shall include self-diagnostic and self-exercising circuitry to exercise and test itself for 5 minutes every month and for 30 minutes every 6 months. The fixture shall include a test/monitor module with LED status indicating lights mounted so as to be visible to the public. The fixture shall not contain an audible alarm.

3. Sealed beam emergency lighting units shall consist of sealed beam LED lamps connected to an internally mounted battery and charger. The battery shall be nickel cadmium and sized for a minimum of 90 minutes of battery operation. The charger shall be solid-state and provide overload, short circuit, brownout and low battery voltage protection. The unit shall be suitable for wall or ceiling mounting as required. It shall include self-diagnostic and self-exercising circuitry to exercise and test itself for 5 minutes every month and for 30 minutes every 6 months. The unit shall include a test/monitor module with LED status indicating lights mounted so as to be visible to the public. The unit shall not contain an audible alarm.

2.5 EXIT SIGNS

A. Exit signs shall be of the LED type. Fluorescent, electro luminescent light panel, or self-powered luminous signs shall not be used. Chloride, Dual-Lite, Emergi-Lite, Exide Lightguard, Lightalarms, Lithonia, LSI Industries, Morelite, Prescolite, or Sure-Lites.

1. LED’s shall be wired in parallel to prevent multi-lamp failure, and shall be concealed within the sign by a clear panel and red optical diffuser. Power consumption shall not exceed 2 watts per face.
2. Exit signs shall have white die cast aluminum or polycarbonate housings with universal mounting brackets; brushed aluminum stencil faces with red letters and multi-directional knockout arrows.
3. Exit signs shall be provided with emergency battery packs and battery chargers when required. Batteries shall be maintenance-free nickel cadmium, and shall be mounted within the signs.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. Support recessed troffers independently of the ceiling grid system by using two safety wires minimum on diagonally opposite corners of the fixtures. Support recessed downlights by using safety wires or by rigidly attaching the fixtures to the building structure or ceiling grid system. Removable T-bar clips shall not be used to attach fixtures to the ceiling grid system.

B. Install fixtures level, with no gaps between adjacent fixtures or between fixtures and surrounding surfaces. Lenses, reflectors, and trims of fixtures shall be properly and uniformly aligned.

C. Where fixtures are shown with dual switches, control all inner lamps with one switch and all outer lamps with the other switch. Where dimming or occupancy sensor-controlled fixtures are shown, control the fixtures in accordance with the appropriate wiring diagram or manufacturer's instructions.

D. Connect night light fixtures and emergency lighting fixtures to the hot (unswitched) side of lighting circuits.

E. Provide an individual feed with ground conductor from a junction box to each lighting fixture. Lighting fixtures shall not be daisy-chained.

F. Drops to recessed fixtures may be flexible metallic conduit, or manufactured wiring systems may be used where accessible. Fixtures shall be provided with sufficient length to permit removal and lowering of the fixtures 12″ below the ceiling.

G. Provide green grounding conductors back to the panel ground for lighting circuits. Raceways shall not be used as grounding conductors.

H. Fixtures shall have their exterior labels removed and shall be thoroughly cleaned. Burned out lamps shall be replaced.

I. Locate emergency lighting remote battery packs and remote test/monitor modules identically so their status indicating lights are visible to the public and they form a straight line when viewed from the end of the corridor or room. Where a suspended ceiling exists, center the status indicating lights in adjacent ceiling tiles.

J. Mount sealed beam emergency lighting units where shown and aim their lamps to light the egress path as uniformly as possible.

K. When emergency lighting fixtures contain audible alarms, disable the alarms in accordance with manufacturer's instructions.

3.2 FIELD QUALITY CONTROL

A. A visual inspection shall be performed to verify cleanliness and alignment of the fixtures. Misalignment and light leaks shall be corrected, and rattles due to ventilation system vibration shall be eliminated.

B. Perform an operational test to verify that all fixtures illuminate properly, dimming systems dim properly (i.e. no flicker), and lighting zones are switched according to the drawings.

3.3 COMMISSIONING

A. Perform Commissioning activities per Related Sections above.

3.4 TRAINING

A. Provide a qualified service technician from the Manufacturer's staff to provide training.

B. Train Owner's maintenance personnel on equipment operation, start-up and shutdown, trouble-shooting, servicing, and preventative maintenance procedures. Review the data contained in the Operating and Maintenance Manuals with Owner's personnel. Training shall occur separate from startup activities.

1. Provide 2 hours of on-site training minimum.

END OF SECTION 265100