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26 5100 – Interior Lighting

PART-1. GENERAL

1.01 Section Includes

- A. Interior luminaries
- B. Emergency lighting units
- C. Exit signs
- D. Ballasts
- E. Lamps
- F. Luminaire accessories

1.02 Reference Standards

- A. IECC – International Energy Conservation Code - 2012
- B. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; Consolidated-2002.
- C. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (R2008).
- D. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002.
- E. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- F. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; 2006.
- G. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; National Electrical Contractors Association; 2006.
- H. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Fluorescent Ballasts; National Electrical Manufacturers Association; 2004.
- I. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; National Electrical Manufacturers Association; 2006.

- J. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.
 - K. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; 2009.
 - L. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
 - M. UL 935 - Fluorescent-Lamp Ballasts; Current Edition, Including All Revisions.
 - N. UL 1598 - Luminaires; Current Edition, Including All Revisions.
 - O. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.
- 1.03 Administrative Requirements
- A. Coordination
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- 1.04 Submittals
- A. Shop Drawings
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
 - B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. Ballasts: Include wiring diagrams and list of compatible lamp configurations.

2. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.

C. Samples:

1. Provide one sample(s) of each luminaire proposed for substitution upon request.

D. Field Quality Reports

- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

- F. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

- G. Maintenance Materials: Furnish the following for NIU's use in maintenance of project.

1. Extra Lenses and Louvers: Two percent of total quantity installed for each type, but not less than one of each type.
2. Extra Lamps: Ten percent of total quantity installed for each type, but not less than two of each type.
3. Extra Ballasts: Two percent of total quantity installed for each type, but not less than one of each type.

- H. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.05 Quality Assurance

- A. Conform to requirements of NFPA 70.

- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 Delivery, Storage, and Protection

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.07 Field Conditions

- A. Maintain field conditions within manufacturers required service conditions during and after installation.

1.08 Warranty

- A. Provide five year manufacturer warranty for all linear fluorescent ballasts.
- B. Provide five year pro-rata warranty for batteries for emergency lighting units.
- C. Provide ten year pro-rata warranty for batteries for self-powered exit signs.

PART-2. PRODUCTS

2.01 Manufacturers

- A. The manufacturers shall be as indicated on lighting fixture schedule.

2.02 Luminaire Types

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.03 Luminaires

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.

2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.

H. Fluorescent Luminaires:

1. Provide ballast disconnecting means complying with NFPA 70 where required.
2. Fluorescent Luminaires Controlled by Occupancy Sensors: Provide programmed start ballasts.

I. LED Luminaires:

1. Listed and labeled as complying with UL 8750.

J. Luminaires Mounted in Continuous Rows:

1. Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.04 Emergency Lighting Units

A. In areas with high potential for intentional damage (dormitories) the preference is lighting units that are robust:

1. Preferred manufacturer:

- a. Big Beam Emergency Systems, Inc., Crystal Lake, IL.
<http://www.bigbeam.com> , industrial products.

B. In areas with lesser potential for intentional damage (classroom areas), less robust units are acceptable.

1. Preferred manufacturers:

- a. Big Beam Emergency Systems, Inc., Crystal Lake, IL.
<http://www.bigbeam.com> , commercial products
- b. EELP Life Safety and Lighting Products, <http://www.eelp.net>

C. Emergency lighting units shall comply with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

D. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

- E. Battery:
 - 1. Sealed maintenance-free nickel cadmium unless otherwise indicated.
 - 2. Size battery to supply all connected lamps, including emergency remote heads where indicated.
 - F. Diagnostic:
 - 1. Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
 - G. Provide low-voltage disconnect to prevent battery damage from deep discharge.
 - H. Provide overload and short circuit protection.
 - I. Self-Diagnostics:
 - 1. Provide units that self-monitor functionality and automatically perform testing required by NFPA 101; provide indicator light(s) to report test and diagnostic status.
 - J. Accessories:
 - 1. Provide compatible accessory mounting brackets where indicated or required to complete installation.
 - K. Warranty; Minimum warranty 5 years
- 2.05 Exit Signs
- A. In areas with high potential for intentional damage (dormitories) the preference is lighting units that are robust:
 - B. Preferred manufacturers:
 - 1. Big Beam Emergency Systems, Inc., Crystal Lake, IL. <http://www.bigbeam.com>, industrial products.
 - 2. EELP Life Safety and Lighting Products, <http://www.eelp.net/>
 - C. In areas with lesser potential for intentional damage (classroom areas), less robust units are acceptable.
 - D. All Exit Signs: Internally illuminated with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

1. Number of Faces: Single or double as indicated or as required for the installed location.
2. Directional Arrows: As indicated or as required for the installed location.

E. Self-Powered Exit Signs:

1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
2. Battery: Sealed maintenance-free nickel cadmium unless otherwise indicated.
3. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
4. Provide low-voltage disconnect to prevent battery damage from deep discharge.
5. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101; provide indicator light(s) to report test and diagnostic status.

F. Warranty; Minimum warranty 5 years

2.06 Ballasts

A. Manufacturers:

1. Where a specific manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.

B. All Ballasts:

1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

C. Fluorescent Ballasts:

1. All Fluorescent Ballasts: Unless otherwise indicated, provide high frequency electronic programmed start ballasts complying with ANSI C82.11 and listed and labeled as complying with UL 935.
 - a. Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 10 percent.
 - b. Total Harmonic Distortion: Not greater than 20 percent.
 - c. Power Factor: Not less than 0.95.

- d. Thermal Protection: Listed and labeled as UL Class P, with automatic reset for integral thermal protectors.
 - e. Sound Rating: Class A, suitable for average ambient noise level of 20 to 24 decibels.
 - f. Lamp Compatibility: Specifically designed for use with the specified lamp, with no visible flicker.
 - g. Lamp Operating Frequency: Greater than 20 kHz, except as specified below.
 - h. Lamp Current Crest Factor: Not greater than 1.7.
 - i. Lamp Wiring Method:
 - 1). Rapid Start Ballasts: Series wired.
 - j. Provide automatic restart capability to restart replaced lamp(s) without requiring resetting of power.
 - k. Surge Tolerance: Capable of withstanding characteristic surges according to IEEE C62.41.2, location category A.
 - l. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of CFR, Title 47, Part 18, for Class A, non-consumer application.
 - m. Provide high efficiency T8 lamp ballasts certified as NEMA premium where indicated.
 - n. Ballast Marking: Include wiring diagrams with lamp connections.
2. Non-Dimming Fluorescent Ballasts:
 - a. Lamp Starting Method:
 - 1). T8 Lamp Ballasts: Instant start unless otherwise indicated.
 - 2). Compact Fluorescent Lamp Ballasts: Programmed start unless otherwise indicated.
 - b. Lamp Starting Temperature: Capable of starting standard lamp(s) at a minimum of 0 degrees F, and energy saving lamp(s) at a minimum of 60 degrees F unless otherwise indicated.

2.07 Lamps

A. All Lamps:

1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.

3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
 4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp, furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect or Owner to be inconsistent in perceived color temperature.
- B. Compact Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.
1. Low Mercury Content: Provide lamps that pass the EPA Toxicity Characteristic Leaching Procedure (TCLP) test for characteristic hazardous waste.
 2. Correlated Color Temperature (CCT): 3,500 K unless otherwise indicated.
 3. Color Rendering Index (CRI): Not less than 80.
 4. Average Rated Life: Not less than 10,000 hours for an operating cycle of three hours per start.
- C. Linear Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.
1. Low Mercury Content: Provide lamps that pass the EPA Toxicity Characteristic Leaching Procedure (TCLP) test for characteristic hazardous waste.
 2. T8 Linear Fluorescent Lamps:
 - a. Correlated Color Temperature (CCT): 3,500 K unless otherwise indicated.
 - b. Color Rendering Index (CRI): Not less than 80.
 - c. Average Rated Life: Not less than 20,000 hours for an operating cycle of three hours per start.

PART-3. EXECUTION

3.01 Examination

- A. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- B. Verify that suitable support frames are installed where required.
- C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 Installation

- A. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of luminaires provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).
- D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- E. Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members, or to building structure.
 - 4. Secure pendant-mounted luminaires to building structure.
 - 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
- F. Suspended Luminaires:
 - 1. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
- G. Install accessories furnished with each luminaire.
- H. Bond products and metal accessories to branch circuit equipment grounding conductor.
- I. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to un-switched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
 - 2. Install lock-on device on branch circuit breaker serving units.
- J. Exit Signs:
 - 1. Install lock-on device on branch circuit breaker serving exit sign units.
- K. Install lamps in each luminaire.

- L. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.
- 3.03 Field Quality Control
- A. Inspect each product for damage and defects.
 - B. Operate each luminaire after installation and connection to verify proper operation.
 - C. Test self-powered exit signs and emergency lighting units to verify proper operation upon loss of normal power supply.
 - D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by the Architect or Owner's representative.
- 3.04 Adjusting
- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect or Owner's representative. Secure locking fittings in place.
 - B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by authority having jurisdiction.
 - C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by or authority having jurisdiction.
- 3.05 Cleaning
- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
- 3.06 Closeout Activities
- A. Just prior to Substantial Completion, replace all lamps that have failed.
- 3.07 Protection
- A. Protect installed luminaires from subsequent construction operations.

End of Division 26 5100

This section of the NIU Design and Construction Standards establishes minimum requirements only. It should not be used as a complete specification.