

~~~~~ **PROJECT NOTE** ~~~~~

ARCHITECT OF RECORD/ENGINEER OF RECORD IS RESPONSIBLE FOR REVIEWING THIS SPECIFICATION SECTION IN DETAIL FOR COORDINATION WITH THE PROJECT SCOPE OF WORK.

ALL "PROJECT NOTE" TEXT IS TO BE REMOVED FOLLOWING REVIEW OF THE CONTENT OF EACH NOTE BY THE ARCHITECT OF RECORD/ENGINEER OF RECORD.

EDIT THE DOCUMENT FOOTER TO INCLUDE THE PROJECT NAME AND NUMBER.

EDIT THE DOCUMENT HEADER TO INDICATE THE ARCHITECT OF RECORD PROJECT ISSUE" DATE. THE "CPS CONTROL" DATE SHOULD NOT BE EDITED.

ANY MODIFICATIONS TO THE TECHNICAL STANDARDS IN THIS SECTION - INCLUDING THE REMOVAL OR ADDITION OF MANUFACTURERS - MUST BE APPROVED BY CPS. REQUESTS FOR MODIFICATION ARE TO BE SUBMITTED TO THE DESIGN MANAGER DURING THE DESIGN PHASE FOR REVIEW AND APPROVAL.

~~~ **END OF PROJECT NOTE** ~~~

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 GENERAL

~~~~~ **PROJECT NOTE** ~~~~~

FIXTURE TYPES AND REQUIREMENTS FOR SCOPE OF PROJECT TO BE SELECTED. COORDINATE CONTROLS TECHNOLOGY WITH STANDARD LUMINAIRES. EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL WORK SHOULD BE LED.

~~~ **END OF PROJECT NOTE** ~~~

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Drivers.

~~~~~ **PROJECT NOTE** ~~~~~

TYPICALLY DELETE 'LAMPS' BELOW. INCLUDE ONLY IF SCREW-IN LAMPS ARE INCLUDED IN PROJECT AS A DEVIATION FROM STANDARD FIXTURE SCHEDULE

~~~ **END OF PROJECT NOTE** ~~~

- E. Lamps.
- F. Accessories.

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1.02 REFERENCE STANDARDS

- A. ANSI C78.379 - Electric Lamps - Classification of the Beam Patterns of Reflector Lamps; 2006, with Supplement (2020).
- B. ANSI C82.1 - American National Standard for Lamp Ballasts - Line Frequency Fluorescent Lamp Ballasts; 2004, with Supplement (2020).
- C. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts; 2023.
- D. ANSI C82.77 - Harmonic Emission Limits - Related Power Quality Requirements for Lighting Equipment; 2002.
- E. ANSI C82.SSL1 - SSL Drivers; Current.
- F. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019.
- G. ASTM D788 - Standard Classification System for Poly(Methyl Methacrylate) (PMMA) Molding and Extrusion Compounds; 2016.
- H. Chicago Electrical Code - Municipal Code of the City of Chicago, Building/Electrical Code Requirements; 2018.
- I. City of Chicago Building Code - Chicago Construction Codes, Title 14B; Current Edition.
- J. City of Chicago Electrical Code - Chicago Construction Codes, Title 14E, based on the National Electrical Code with amendments; Current Edition.
- K. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information; 2019.
- L. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.
- M. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.
- N. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- O. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems; 2006.
- P. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- Q. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2023.
- R. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2023.
- S. NEMA LE 5 - Procedure for Determining Luminaire Efficacy Ratings for Fluorescent Luminaires; 2001.
- T. NEMA LE 5A - Procedure for Determining Luminaire Efficacy Ratings for Commercial, Non-Residential Downlight Luminaires; 1999.
- U. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- V. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- W. UL 844 - Luminaires for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.
- X. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- Y. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- Z. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

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1.03 SYSTEM DESCRIPTION

- A. The interior lighting system shall include all lighting fixtures, LED modules, switches, mounting, wiring, control equipment, and accessories required for complete system, whether or not they are indicated or specified, as indicated in the Drawings and as specified.
- B. The luminaire schedules in the Drawings indicate manufacturer, fixture design, appearance and performance desired.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Provide separate submittal product data/shop drawings for each fixture type clearly indicating the fixture type designation used in the Drawings and all pertinent options and accessories. Do not group similar fixture types together on a single cut sheet. Submittals that do not indicate option data where multiple selections exist will be returned without being reviewed.
- C. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

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INCLUDE ONLY IF CUSTOM OR CONTINUOUS ROW FIXTURES ARE REQUIRED FOR PROJECT.

~~~ **END OF PROJECT NOTE** ~~~

- 2. For custom, non-standard, and continuous row / length luminaires. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.

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PRODUCT DATA INCLUDES LED LAMPING. INCLUDE ADDITIONAL LAMPING TYPES AS REQUIRED FOR SCOPE OF PROJECT.

~~~ **END OF PROJECT NOTE** ~~~

- D. 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.

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EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL WORK SHOULD BE LED.

~~~ **END OF PROJECT NOTE** ~~~

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1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - b. Include IES LM-79 test report upon request.
2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.

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~~~ **END OF PROJECT NOTE** ~~~

3. LED Drivers: Include information as to input watts. Indicate mounting distance limitation and standard wire sizes for remote drivers, indicate dimming type and range.
4. LED modules: per luminaire tag, including life, lumen output, correlated color temperature (CC), color rendering index (CRI) and energy-efficiency data.

~~~~~ **PROJECT NOTE** ~~~~~

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~~~ **END OF PROJECT NOTE** ~~~

5. Screw-in type LED Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
6. Battery and charger information for emergency lighting units.
7. Remote Drivers: Indicate mounting distance limitation and standard wire sizes for remote drivers/transformers.
8. Efficiency Data: Provide both lumen performance efficiency and luminaire efficiency rating (LER).
9. Special Warranty: Provide documentation of compliance with special warranties as part of the product data.

~~~~~ **PROJECT NOTE** ~~~~~

EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL WORK SHOULD BE LED.

~~~ **END OF PROJECT NOTE** ~~~

- E. Certification of Compatibility: Submit a written statement, signed by the Contractor, Installer, and Controls Manufacturers, certifying the power supplies and drivers, automatic lighting control devices, including occupancy sensors and daylight harvesting controls, and related components being supplied for the Project are compatible equipment. Statement shall include

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that system components do not compromise the proper operation, or the design criterion, of the supplied power supplies, drivers, and automatic control devices.

- F. Sustainable Design Documentation: Submit manufacturer's product data on lamp mercury content and rated lamp life, showing compliance with specified requirements.
 - 1. Include DOE "Lighting Facts" Information
 - 2. Include DLC listing status.
 - 3. Include Efficacy information.
- G. Field quality control reports (by contractor).
- H. 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.
- I. Operation and Maintenance Manuals: Provide a collection of manufacturer recommended maintenance practices for each lighting fixture type. Including the following:
 - 1. Tools required.
 - 2. Acceptable cleaners and recommended cleaning practices.
 - 3. Replacement parts list.
 - 4. Dates of installation.
 - 5. Replacement parts order information.
 - 6. LED module and driver re-ordering information and replacement schedule.
 - 7. Contact information for manufacturer's service department or qualified service agencies.
 - 8. Submittal data.
 - 9. Operation data.
 - 10. Intended operation narrative.
 - 11. Disposal information.
- J. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components within thirty (30) days of date of Preliminary Acceptance.
- K. Re-Commissioning Data: Submit manual containing all information required for re-commissioning of the installations.
 - 1. Submit two (2) copies of manual within thirty (30) days of date of Preliminary Acceptance.
 - 2. Submit re-commissioning manuals in heavy-duty, 3-ring binders. Submit manuals in accordance with Section 01 78 00 - Closeout Submittals.

1.05 QUALITY ASSURANCE

- A. Comply with City of Chicago Building Code.
- B. Comply with EPA, State of Illinois, and City of Chicago regulations for proper recycling or disposal of existing lamps and ballasts removed from the Site.
- C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the ANSI/IEEE 802.7 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- F. Commissioning: When required for the Project, Contractor shall assign representative(s) with expertise and authority to act on its behalf. The representative(s) shall perform commissioning activities including, but not limited to, the following:

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1. Review submittals relative to interior lighting systems being commissioned.
- G. Sample Installations: Before installing lighting fixtures, install sample installations for each type of light fixture indicated or required by Architect/Engineer of Record or Board's Representative. Sample installations shall be used to verify selections made on submittals and to demonstrate aesthetic affects and qualities of materials and workmanship. Install sample installations to comply with the following requirements, using materials indicated for the completed work:
 1. Each sample installation shall include not less than two (2) light fixtures.
 - a. Where light fixtures are indicated to be installed in a continuous row, sample installation shall include all fixtures in the row.
 2. Install each sample installation in the location indicated or as directed by Architect/Engineer of Record.
 3. Each sample installation shall include all accessories and components necessary for a complete installation.
 4. Obtain Architect/Engineer of Record's approval of sample installations before proceeding with installation of lighting fixtures.
 5. Maintain sample installations during installation in an undisturbed condition as a standard for judging the completed work.
 6. Approved sample installations may become part of the completed work if undisturbed at time of Preliminary Acceptance.

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.
- C. Protect luminaires, lamps, and accessories during transit, delivery, storage, and handling to prevent damage.
- D. Deliver luminaires to the Site factory-assembled and wired to the greatest extent possible and in accordance with approved submittals.
- E. Store luminaires and accessories in accordance with manufacturer's instructions in a clean, dry location, protected from weather and away from dust generating construction activities. As required, cover materials with tarpaulin or polyethylene sheeting in a manner that allows air circulation and prevents condensation beneath the covering.
- F. Keep handling on site to a minimum. Exercise particular care to avoid damage to exposed finishes and materials.

1.07 COORDINATION

- A. Verify locations of light fixtures indicated in Drawings and coordinate with other reference data and materials as required prior to installation to ensure locations will not interfere with other work. Verify space above luminaires and confirm non-interference with other equipment, such as ducts, pipes, conduit and cabling, and openings. Alert Architect/Engineer of Record and Board's Representative in writing to non-standard modifications required for compliance with the Contract Documents and for installation to coordinate with ceiling system before proceeding with the work.
- B. Verify dimensions. Where discrepancies are found within the Contract Documents, or additional information is required, immediately contact Architect/Engineer of Record for clarifications and additional information.

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- C. Coordinate installation of lighting system with other trades to prevent delays in the work and to ensure the lighting fixtures and supports will not be damaged by subsequent construction operations
- D. 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.
- E. Coordinate the placement of luminaires (and luminaire suspensions systems) with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
- F. Coordinate the placement of exit signs with soffits, changes in ceiling heights, furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.

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REMOVE IF CONTINUOUS LIGHTING IS NOT REQUIRED.

~~~ **END OF PROJECT NOTE** ~~~

- G. Coordinate installation of lighting fixtures indicated to extend in continuous, wall to wall installation. Provide field, or established, dimensions to luminaire manufacturer in sufficient time so not to cause delays in the work.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 EXTRA MATERIALS:

- A. See Section 01 60 00 - Product Requirements, for additional provisions.
- B. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Provide a manifest of all extra materials provided.
- C. Extra Lenses and Louvers: Ten (10) percent of total quantity installed for each type, but not less than one (1) of each type.
 - 1. Extra LED Modules: One (1) for every hundred (100) of each type and rating installed. Furnish as least two (2) of each type.

~~~~~ **PROJECT NOTE** ~~~~~

INCLUDE ONLY IF SCREW-IN LED LAMPS ARE INCLUDED IN PROJECT AS A DEVIATION FROM STANDARD FIXTURE SCHEDULE

~~~ **END OF PROJECT NOTE** ~~~

- 2. Extra Lamps: Ten (10) percent of total quantity installed for each type, but not less than two (2) of each type.
- 3. Extra Drivers: One (1) percent of total quantity installed for each type, but not less than one (1) of each type.

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4. Battery and Charger Data: One (1) for each emergency lighting unit.
5. Globes and Guards: One (1) for every twenty (20) (5 percent) of each type and rating installed, but not less than one (1) of each type.

1.10 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Special Warranty: Submit a written warranty, beginning from date of Preliminary Acceptance, and executed by the Contractor, manufacturer, and Installer agreeing to repair or replace products or components that fail in materials or workmanship within the specified warranty period. Failures shall include, but not be limited to, deterioration of metal finishes, failure of LED modules, or failure of LED drivers. Warranty shall include all materials and components, as well as labor and equipment required to remove existing and install new materials and components. The first year of warranty labor shall be provided by the contractor. The second through fifth (2-5) years of warranty labor shall be covered by the manufacturer

~~~~~ PROJECT NOTE ~~~~~

EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL WORK SHOULD BE LED.

~~~ END OF PROJECT NOTE ~~~

1. Warranty Period for LED Luminaires, including LED modules, LED boards, chips, and drivers:: Five (5) years from date of Preliminary Acceptance.

~~~~~ PROJECT NOTE ~~~~~

TYPICALLY DELETE ARTICLE BELOW. INCLUDE ONLY IF SCREW-IN LAMPS ARE INCLUDED IN PROJECT AS A DEVIATION FROM STANDARD FIXTURE SCHEDULE

~~~ END OF PROJECT NOTE ~~~

2. Warranty Period for Screw-in type LED Lamps: Three (3) years from date of Preliminary Acceptance.
3. Warranty Period for Metal Finishes: Five (5) years from date of Preliminary Acceptance.
- C. Special Warranty for Emergency Lighting Batteries: Submit a written warranty, beginning from date of Preliminary Acceptance, and executed by the Contractor, manufacturer, and Installer agreeing to repair or replace products or components that fail in materials or workmanship within the specified warranty period. Warranty shall include all materials and components, as well as labor and equipment required to remove existing and install new materials and components. The first year of warranty labor shall be provided by the contractor. The second through fifth (2-5) years of warranty labor shall be covered by the manufacturer.
 1. Warranty Period for Emergency Lighting Unit Batteries: Five (5) years from date of Preliminary Acceptance. Full warranty shall apply for first year, and prorated warranty for the remaining four (4) years.
 2. Warranty Period for internal batteries of Exit and Area of Rescue Signs: Five (5) years from date of Preliminary Acceptance. Full warranty shall apply for first year, and prorated warranty for the remaining four (4) years.

1.11 ENVIRONMENTAL REQUIREMENTS

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- A. Provide for proper recycling or disposal of existing lamps and ballasts removed from the site in accordance with EPA and State of Illinois regulations in accordance with Section 02 86 13 Hazardous and Universal Waste Management.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Manufacturers - Accessories: Subject to compliance with requirements, provide products by one of the manufacturers listed within the luminaire schedule included on the drawings.

~~~~~ PROJECT NOTE ~~~~~

PRODUCTS AND ACCESSORIES TO BE USED IN PROJECT SCOPE TO BE MODIFIED.

~~~ END OF PROJECT NOTE ~~~

2.02 LUMINAIRES

- A. Product Description: Provide complete luminaire assemblies with features, options and accessories as scheduled and required for complete assembly, whether specified or not.
- B. Provide fixtures constructed, wired, and installed in compliance with appropriate UL standards and applicable codes. Provide fixtures that are listed by UL for the applications and locations where they are shown. Provide all products with UL label.
 - 1. Provide products that are listed and labeled as complying with UL 1598, where applicable. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
- C. Verify and provide luminaires that are appropriate for the mounting conditions and in accordance with the City of Chicago Electrical Code.
- D. All fixture components must operate within the temperature limits of their design.

~~~~~ PROJECT NOTE ~~~~~

EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL NEW WORK SHOULD BE LED.

~~~ END OF PROJECT NOTE ~~~

- E. Provide products that are listed and labeled as complying with UL 1598, where applicable. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
- F. Provide products listed, classified, and labeled as suitable for the purpose intended.
- G. Provide products complying with Federal Energy Management Program (FEMP) requirements.
- H. All light fixtures shall be listed as qualified DLC products, where applicable.
- I. Unless otherwise indicated, provide complete luminaires including LED modules, LED boards, drivers, reflectors, lenses, housings and other components required to position, energize and protect the light source and distribute the light.
- J. 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.
- K. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

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- L. Provide specification grade products only.
- M. Luminaire Coatings and Finishes:
 - 1. Luminaire surfaces, components, trim, and housing shall be factory pre-treated, rustproof, primed and otherwise prepared to inhibit rust and corrosion. Exposed luminaire surfaces shall be factory pre-treated, primed and finish coated with a suitable rust and corrosion inhibiting product.
 - 2. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
 - a. White Surfaces: 85 percent.
 - b. Specular Surfaces: 83 percent.
 - c. Diffusing Specular Surfaces: 75 percent.
 - d. Laminated Silver Metallized Film: 90 percent.
 - 3. Luminaries shall receive manufacturer's standard finish, unless otherwise indicated. Color shall be as indicated or, if not indicated, as selected by Architect/Engineer of Record from manufacturer's standard range.
 - 4. Exposed finish shall be free of streaks, runs, holidays, stains, blisters, and similar defects.
 - 5. Metal Parts: Free of burrs and sharp corners and edges.
 - 6. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- N. Diffusers and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125 inch minimum unless otherwise is indicated.
 - b. UV stabilized.
 - 2. Glass globes, diffusers and lenses shall be fabricated from annealed crystal glass, or tempered glass, unless otherwise indicated.
 - 3. Destaticize all panels at the factory prior to shipping.
- O. Louvers:
 - 1. Provide louvers or baffles fabricated from aluminum reflector sheet free of marks including mars and indentations caused by fabrication and assembly techniques. No rivets, springs, or other hardware shall be visible after installation. Plastic louvers are not permitted.
 - 2. Provide non-iridescent type louvers for fixtures.
 - 3. Provide louvers and baffles that are polished, buffed, and anodized.
- P. Reflectors and Trims:
 - 1. Attach non-permanently affixed reflectors to housing by means of safety chains or spring clips, to prevent reflectors from falling. No part of the clip or chain shall be visible after installation, when viewed from any angle up to 45 degrees from horizontal.
 - 2. Aluminum Reflectors:
 - a. Provide reflectors and reflecting cones fabricated from aluminum reflector sheet free of marks including spinning lines, mars, and indentations caused by fabrication and assembly techniques. No rivets, springs, or other hardware shall be visible after installation. Provide only reflectors free from blemishes, scratches, or indentations.
 - b. Provide reflectors that are polished, buffed, and anodized.
 - c. Provide non-iridescent type louvers for fixtures.

- d. Provide polished self-flanged trim cones, color finish shall match that of the cone.
- 3. Painted Reflectors: Completely formed before application of primer and paint. Minimum of 87 percent reflectance white.
- Q. 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.
 - 3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.

~~~~~ **PROJECT NOTE** ~~~~~

HAZARDOUS LOCATION LIGHT FIXTURES NOT TYPICAL. ONLY INCLUDE IF USED WITHIN SCOPE OF PROJECT.

~~~ **END OF PROJECT NOTE** ~~~

- R. Hazardous (Classified) Location Luminaires: Listed and labeled as complying with UL 844 for the classification of the installed location.

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EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL NEW WORK SHOULD BE LED.

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- S. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
 - 4. Shall be provided with a U.S. Department of Energy (DOE) "Lighting Facts "label indicating their specific performance characteristics, tested and reported in accordance with the requirements of the most current version of IES LM-79.
 - 5. Chromaticity ranges for "white light" products, with various correlated color temperatures, shall be provided in accordance with ANSI/NEMA -C78.377.
 - 6. LEDs shall be binned within a maximum 3-step MacAdam Ellipse.
 - 7. Drivers and power supplies shall be provided in accordance with the requirements of ANSI/NEMA-C82.SSL1 and their maximum allowable harmonic emission limits shall be in accordance with ANSI/NEMA-C82.77.
- T. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.
- U. Fixture Support Components: Comply with Section 26 05 29 - Hangers and Supports for Electrical Systems.
 - 1. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fitting and ceiling canopy. Finish shall be the same as the fixture.

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2. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy arranged to mount a single fixture. Finish shall be the same as the fixture.
 3. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
 4. Hook Hanger: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord and locking-type plug.
- V. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit maintenance. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during maintenance and when secured in operating position.
- W. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging. Free of burrs and sharp corners and edges.

2.03 EMERGENCY LIGHTING UNITS

- A. Description: Emergency lighting units complying with NFPA 101 and the Chicago Electrical Code, and listed and labeled as complying with UL 924.
- B. 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.
- C. Battery:
1. Sealed maintenance-free nickel cadmium unless otherwise indicated.
 2. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- D. Charger: Fully automatic, solid-state type with sealed transfer relay.
- E. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- F. Provide low-voltage disconnect to prevent battery damage from deep discharge.
- G. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.
- H. Provide units with integral time delay to maintain emergency illumination for 15 minutes after restoration of normal power source.
- I. Accessories:
1. Provide compatible accessory mounting brackets where indicated or required to complete installation.
 2. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
 3. Provide compatible accessory wire guards.
 - a. Heavy-chrome-plated wire guard protects lamp heads or fixtures.
 - b. Provide wire guard at gymnasium, gym/cafeteria/assembly area, cafeteria, locker rooms, weight rooms, and in other locations as indicated.
 4. Where indicated, provide emergency remote heads that are compatible with the emergency lighting unit they are connected to and suitable for the installed location.

2.04 EXIT SIGNS

- A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and the Chicago Electrical Code for sign colors, visibility, luminance, and lettering size, and listed and labeled as complying with UL 924.

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| NAME OF SCHOOL
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1. Number of Faces: Single- or double-face as indicated or as required for installed location.
 2. Directional Arrows: As indicated or as required for installed location.
 3. AOR Face: Provide Area of Rescue style face where required per plans.
 4. Colors: red letters on white background.
- B. 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. Charger: Fully automatic, solid-state, constant current type with integral sealed transfer relay.
 4. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
 5. Provide low-voltage disconnect to prevent battery damage from deep discharge.
 6. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.
 7. Low Battery Disconnect: Provide a device and/or related circuitry that shall automatically disconnect the battery and protect it from deep/over discharge.
 8. Shall consume 5 watts of AC power, or less, per face under normal operating conditions.
- C. AC-Powered Exit Signs
1. Lamps for AC Operation: LED's, 70,000 hours minimum rated lamp life.
 2. Shall consume 5 watts of AC power, or less, per face under normal operating conditions.
- D. Accessories:
1. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
 2. Provide compatible accessory wire guards where indicated.
- E. Accessories:
1. Provide compatible accessory high-impact polycarbonate vandal shields where indicated.
 2. Provide compatible accessory wire guards where indicated.

~~~~~ **PROJECT NOTE** ~~~~~

TYPICAL LED TECHNOLOGY USED WITHIN ALL PROJECTS.

~~~ **END OF PROJECT NOTE** ~~~~

2.05 DRIVERS

~~~~~ **PROJECT NOTE** ~~~~~

EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL NEW WORK SHOULD BE LED.

~~~ **END OF PROJECT NOTE** ~~~~

A. Manufacturers:

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| NAME OF SCHOOL
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1. Advance
2. Cree
3. EldoLED
4. Enlighted
5. General Electric Company/GE Lighting: www.gelighting.com
6. Lutron Electronics Company, Inc; www.lutron.com
7. OSRAM Sylvania, Inc: www.osram.us/ds
8. Philips Lighting North America Corporation; www.usa.lighting.philips.com
9. Thomas Research Products
10. Manufacturer Limitations: Where possible, for each type of luminaire provide drivers produced by a single manufacturer.
11. Where a specific manufacturer or model of driver is indicated elsewhere, such as in the luminaire schedule or on the drawings, substitutions for that specific driver are not permitted unless explicitly indicated.

~~~~~ **PROJECT NOTE** ~~~~~

EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL NEW WORK SHOULD BE LED.

~~~ **END OF PROJECT NOTE** ~~~

B. Drivers - General Requirements:

1. Electronic Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.
2. Drivers and power supplies shall be provided in accordance with the requirements of ANSI C82.SSL1 and their maximum allowable harmonic emission limits shall be in accordance with ANSI C82.77-.
3. Drivers shall have internal surge protection to protect each fixture. Each fixture shall be capable of being readily disconnected from the circuit.
4. Provide UL listed and labeled drivers. Provide drivers with temperature ratings appropriate to the installation.
5. Fixtures intended to be dimmed shall have dimming capable drivers and be compatible with the specified dimmer controls.

C. LED Drivers - Specific Requirements:

1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
2. Control Compatibility: Fixtures intended to be dimmed shall have dimming driver fully compatible with the dimming controls to be installed.
3. LED drivers shall be factory provided by the respective luminaire manufacturers, and shall be suitable for their intended use, to operate the designated LED modules listed in the Luminaire Schedule, and as specified herein, to their full light output.
4. Comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR Part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).
5. Provide identical drivers within each luminaire type.

6. Provide complete connection to LED type luminaires through both integrally installed and remote electronic drivers.
7. Drivers shall be totally enclosed within a metallic enclosure, and shall be provided with integral leads color coded per ANSI Standards or with poke-in style wire retaining connectors.
8. Surge Tolerance: Capable of withstanding characteristic surges, 10,000 aic minimum.
9. Remote Drivers:
 - a. Remote drivers are specifically not shown on the drawings. Contractor shall install remote drivers in a readily accessible, dry, indoor, concealed location, in accordance with the manufacturer's instructions.
 - b. Provide ventilated metal enclosures for remote drivers furnished as loose equipment. All wiring to/from remote drivers and their associated LED luminaires shall be installed in conduit.

~~~~~ **PROJECT NOTE** ~~~~~

EDIT REQUIREMENTS TO COORDINATE WITH PROJECT CONDITIONS. PLENUM RETURNS ARE NOT STANDARD.

~~~ **END OF PROJECT NOTE** ~~~

- c. Metal Enclosures shall be Chicago Plenum Rated
- d. Verify and comply with remote distance limitations specified by the luminaire/driver manufacturer.

~~~~~ **PROJECT NOTE** ~~~~~

EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL WORK SHOULD BE LED. INCLUDE ONLY IF SCREW-IN LED LAMPS ARE INCLUDED IN PROJECT AS A DEVIATION FROM STANDARD FIXTURE SCHEDULE – THIS SECTION DOES NOT PERMIT LED REPLACEMENT TUBES – LED REPLACEMENT TUBES ARE NOT ALLOWED UNDER ANY CIRCUMSTANCES

~~~ **END OF PROJECT NOTE** ~~~

2.06 SCREW-IN TYPE LED LAMPS

- A. Manufacturers:
 1. Cree, Inc.
 2. General Electric Company/GE Lighting: www.gelighting.com/#sle.
 3. Osram Sylvania: www.sylvania.com/#sle.
 4. Philips Lighting North America Corporation; www.usa.lighting.philips.com/#sle.
 5. Sora
 6. Where a specific manufacturer or model is indicated elsewhere, such as in the luminaire schedule or on the drawings, substitutions for that specific driver are not permitted unless explicitly indicated.
 7. Obtain each type of lamp from single source from single manufacturer.
- B. Lamps - General Requirements:

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~~~~~ **PROJECT NOTE** ~~~~~

EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL NEW WORK SHOULD BE LED. INCLUDE ONLY IF SCREW-IN LED LAMPS ARE INCLUDED IN PROJECT AS A DEVIATION FROM STANDARD FIXTURE SCHEDULE

~~~ **END OF PROJECT NOTE** ~~~

1. Provide new, compatible, operable lamps where called for on plans.
 2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps as recommended by fixture manufacturer from list of optional lamp manufacturers above.
 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 AOR/EOR to be inconsistent in perceived color temperature.
 5. Color Rendering Consistency: All lamps shall have a minimum CRI of 80.
 6. Low-Mercury Lamps: Comply with EPA's Toxicity Characteristic Leaching Procedure (TCLP) criteria; lamps shall yield less than 0.2 mg of soluble mercury per liter when tested according to ANSI/NEMA C78.LL 1256.
 7. Reflector Lamp Beam Pattern: ANSI C78.379.
- C. Lamps - Sustainable Design Requirements:

~~~~~ **PROJECT NOTE** ~~~~~

EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL NEW WORK SHOULD BE LED. INCLUDE ONLY IF SCREW-IN LED LAMPS ARE INCLUDED IN PROJECT AS A DEVIATION FROM STANDARD FIXTURE SCHEDULE.

~~~ **END OF PROJECT NOTE** ~~~

1. Minimum Rated Lamp Life:
 - a. LED screw-in lamps shall have a minimum expected life (as a whole system, including internal driver) of 20,000 hours.

~~~~~ **PROJECT NOTE** ~~~~~

USE FOR EXISTING CONSTRUCTION TO BE RENOVATED ONLY. DELETE FOR NEW CONSTRUCTION (USE LED ONLY FOR NEW CONSTRUCTION).

~~~ **END OF PROJECT NOTE** ~~~

2.07 RETROFIT KITS FOR FLUORESCENT LIGHTING FIXTURES FROM T12 LAMPS TO T8 LAMPS

- A. General: Comply with UL 1598 listing requirements.
- B. Reflector Kit: UL 1598, Type I. Suitable for two- to four-lamp, surface-mounted or recessed lighting fixtures by improving reflectivity of fixture surfaces.

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- C. Ballast and Lamp Change Kit: UL 1598, Type II. Suitable for changing existing ballast, lamps, and sockets.

~~~~~ **PROJECT NOTE** ~~~~~

USE FOR EXISTING CONSTRUCTION TO BE RENOVATED ONLY. DELETE FOR NEW CONSTRUCTION (USE LED ONLY FOR NEW CONSTRUCTION).

~~~ **END OF PROJECT NOTE** ~~~

2.08 LED RETROFIT KITS FOR RETROFITTING FLUORESCENT LIGHTING FIXTURES.

- A. General: Comply with UL 1598 listing requirements.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section shall be with minimum three years documented experience.
- C. All retrofitted recessed troffers shall maintain Chicago Plenum rating for existing fixtures, and confirm the following requirements with proposed manufacturer:
 - 1. All electrical connections to the fixture shall be sealed.
 - 2. Retrofit kit installation shall not disturb this rating.
- D. All retrofit type light fixtures shall be listed as qualified DLC products, where applicable.
- E. All components utilized for the retrofit kit, to create a complete luminaire, shall come from the same manufacturer.
- F. Retrofit LED downlights shall consist of LED module/reflector and LED drivers. LED drivers shall be able to fit within the fixture access opening, shall be easily accessible, and not be in conflict with other components.
- G. Comply with EPA, State of Illinois, and City of Chicago regulations for proper recycling or disposal of existing lamps and ballasts removed from the site.
- H. Contractor to apply new fixture sticker confirming that the fixture has been modified from original state.
- I. Sample of the retrofit kits for troffers (recessed or surface mount) are required for mock-up purposes to ensure the compatibility and proper installation within the existing housing.
- J. Sample Installations:
 - 1. Install sample for each type of light fixture indicated or required by Architect/Engineer of Record or Board's Representative. Sample installations shall be used to verify selections made on submittals and to demonstrate aesthetic affects and qualities of materials and workmanship. Install sample installations to comply with the following requirements, using materials indicated for the completed work:
 - 2. Each sample installation shall include not less than two (2) light fixtures.
 - a. Where light fixtures are indicated to be installed in a continuous row, sample installation shall include all fixtures in the row.
 - 3. Install each sample installation in the location indicated or as directed by Architect/Engineer of Record.
 - 4. Each sample installation shall include all accessories and components necessary for a complete installation.
 - 5. Obtain Architect/Engineer of Record's approval of sample installations before proceeding with installation of lighting fixtures.

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6. Maintain sample installations during installation in an undisturbed condition as a standard for judging the completed work.
7. Approved sample installations may become part of the completed work if undisturbed at time of Preliminary Acceptance.

~~~~~ **PROJECT NOTE** ~~~~~

USE FOR EXISTING CONSTRUCTION TO BE RENOVATED ONLY. DELETE FOR NEW CONSTRUCTION (LED ONLY).

~~~ **END OF PROJECT NOTE** ~~~

2.09 ACCESSORIES

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2 inch size, factory finished to match luminaire or field-painted as directed.
- B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4 inch size, field-painted as directed.
- C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

~~~~~ **PROJECT NOTE** ~~~~~

EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL NEW WORK SHOULD BE LED.

~~~ **END OF PROJECT NOTE** ~~~

- D. Lenses:
 1. Source Limitations: Fixture lenses shall be provided by the light fixture manufacturer.
 2. Construct acrylic lenses, diffusers, covers, and globes of 100 percent virgin acrylic injection-molded plastic complying with ASTM D788. Polystyrene lenses are not acceptable.
 3. All plastic shall be highly resistant to yellowing and other changes due to aging, exposure to heat and ultraviolet radiation.
 4. Destaticize all panels at the factory prior to shipping.
 5. Lens Patterns:
 - a. Pattern 12 Lens: Pattern 12 lens shall be not less than 0.125-inch thick (overall panel thickness), with inverted conical prisms, in straight flat-sided prism shape, configured on 45-degree axis layout across the entire panel.
 - b. Pattern 19 Lens: Pattern 19 lens shall be not less than 0.156-inch thick (overall panel thickness), with inverted conical prisms, in straight flat-sided prism shape, configured on parallel/perpendicular 90-degree axis layout across the entire panel. Provide pattern 19 lenses in kitchens, serveries, locker rooms, and toilet rooms.

2.10 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Section 26 05 29 - Hangers and Supports for Electrical Systems for channel-supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

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- C. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 0.0808-inch (12 gage) minimum diameter.
- D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that lighting fixture back-boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with City of Chicago Electrical Code.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring lighting fixture back-boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from lighting fixture back-boxes.
- C. Removal of Existing Luminaires: Disconnect and remove abandoned luminaires, including lamps and accessories, and luminaires indicated to be removed. Remove abandoned wiring in accordance with requirements of authorities having jurisdiction.
- D. Removal and Reinstallation of Existing Luminaires: Carefully remove luminaires from existing locations and store as required for new luminaires. Reinstall luminaires as indicated and as specified.
 - 1. Prior to reinstallation, luminaires shall be cleaned and repaired, including installation of new wiring, ballast(s) and lamps; replacement of broken, damaged, or faulty lamp sockets; replacement of broken or damaged lenses; replacement of faulty or nonfunctioning lamps; and damp cleaning of lens and interior of luminaires.
- E. Existing Luminaires to Remain: Clean existing luminaires, lamps and accessories, indicated to remain. Make repairs to existing luminaires as required to make fully functional, including installation of new wiring, ballast(s) and lamps, and to aesthetically match newly installed luminaires of same type in same space, if any.
- F. Extend existing installation using materials and methods specified.

3.03 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 - Boxes for Electrical Systems as required for installation of luminaires provided under this section.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install products in accordance with manufacturer's instructions.
- D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- G. Set level, plumb, and square with ceilings and walls. Install lamps in each luminaire.

~~~~~ PROJECT NOTE ~~~~~

MODIFY FOR INSTALLATION TYPES TO BE INCLUDED IN SCOPE OF PROJECT.

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| NAME OF SCHOOL
PROJECT NUMBER | 26 51 00 - 19 | INTERIOR LIGHTING |
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~~~ **END OF PROJECT NOTE** ~~~~

- H. 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.
  6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gauge, connected from opposing corners of each recessed luminaire to building structure.
  7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- I. Recessed Luminaires:
1. Install trims tight to mounting surface with no visible light leakage.
  2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
  3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
  4. Support for Luminaires in Lay-in/Accessible Ceilings: Use grid as a support element.
    - a. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6-inches from lighting fixture corners.
    - b. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
    - c. Fixtures of Sizes Less Than Ceiling Grid: Install 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.
    - d. Install at least two (2) independent support rods or wires from structure above to the light fixture housing. Supports shall be installed on opposite (diagonal) corners. Wires or rods shall be capable of supporting, without failure, a load equal to three times the weight of the light fixture.
- J. Suspended Luminaires:
1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
  2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
  3. Install canopies tight to mounting surface.
  4. Suspended Lighting Fixture Support:
    - a. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
    - b. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
    - c. 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.

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- K. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- L. Install accessories furnished with each luminaire.
- M. Bond products and metal accessories to branch circuit equipment grounding conductor.
- N. Emergency Lighting Units:
  - 1. Unless otherwise indicated, connect unit to unswitched 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.
- O. Exit Signs:
  - 1. Unless otherwise indicated, connect unit to unswitched 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.

~~~~~ **PROJECT NOTE** ~~~~~

EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL NEW WORK SHOULD BE LED.

~~~ **END OF PROJECT NOTE** ~~~

- P. Remote Drivers: Install in accessible location as indicated or as required to complete installation, using conductors per manufacturer's recommendations not exceeding manufacturer's recommended maximum conductor length to luminaire.
- Q. Identify luminaires connected to emergency power system and install labels with panel and circuit numbers on concealed junction and outlet boxes in accordance with Section 26 05 53 - Identification for Electrical Systems.

~~~~~ **PROJECT NOTE** ~~~~~

INCLUDE ONLY IF SCREW-IN LED LAMPS ARE INCLUDED IN PROJECT AS A DEVIATION FROM STANDARD FIXTURE SCHEDULE

~~~ **END OF PROJECT NOTE** ~~~

- R. Install lamps in each luminaire.
  - 1. Provide all lamps needed for all fixtures, including replacements for extinguished or defective lamps, until Final Acceptance. Replace lamps used in fixtures during construction prior to Final Acceptance.
  - 2. Install lamps according to manufacturer's instructions.
- S. Adjust aimable lighting fixtures as required to provide required light intensities.
- T. Adjust aimable heads of emergency lighting units as required to provide required light intensities along egress paths.
- U. Connections:
  - 1. Connect wiring according to Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.

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| NAME OF SCHOOL<br>PROJECT NUMBER | 26 51 00 - 21 | INTERIOR LIGHTING |
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2. Ground lighting units. Tighten electrical connectors and terminals, including grounding connections, according to their manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- V. Lenses, Louvers and Reflectors:
1. Exercise particular care when installing fixtures and lamps in fixtures with specular reflector material to prevent smudging or damaging the reflector surface. Wear clean gloves as recommended by the fixture manufacturer.
  2. Do not install removable reflectors, louvers, diffusers, and decorative elements of lighting fixtures until completion of wet work, plastering, painting and general cleanup in the area of the fixtures, but not more than three days before date scheduled for inspections that establish date of Preliminary Acceptance.
- W. Accessibility: Install equipment such as junction and pull boxes, fixture housings, transformers, remote drivers, switches and controls, and other apparatus that requires occasional maintenance to be accessible and appropriate for mounting and ceiling conditions.
- X. Install fixtures in mechanical areas after ductwork and piping installation. Locate and mount fixtures as indicated on Drawings unless mechanical equipment prohibits or makes it impractical to do so. In such cases, chain or wall mount fixtures so that serviceable equipment is illuminated.
- Y. Locate recessed ceiling luminaires as indicated on Drawings. Mount fixtures at heights and locations indicated. Where heights are not indicated or conflicts exist, coordinate final locations with Architect/Engineer of Record.
- Z. In mechanical fan housings, locate fixtures so as not to interfere with belts, filters, and similar items.
- 3.04 FIELD QUALITY CONTROL
- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
  - B. Inspect each product for damage and defects.
  - C. Operate each luminaire after installation and connection to verify proper operation.

~~~~ **PROJECT NOTE** ~~~~~

EDIT COMPONENT TYPES TO COORDINATE WITH LUMINAIRES SPECIFIED. ALL NEW WORK SHOULD BE LED.

~~~ **END OF PROJECT NOTE** ~~~~

- D. Test self-powered exit signs and emergency lighting units to verify proper operation upon loss of normal power supply. Verify transfer from normal power to emergency power and retransfer to normal. Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly. Note and record the following:
  1. Duration of supply.
  2. Low battery voltage shutdown.
  3. Normal transfer to battery source and retransfer to normal.
  4. Low supply voltage transfer.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy drivers as determined by Architect/Engineer of Record.

3.05 IDENTIFICATION

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| NAME OF SCHOOL<br>PROJECT NUMBER | 26 51 00 - 22 | INTERIOR LIGHTING |
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- A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 26 05 53 - Identification for Electrical Systems.

#### 3.06 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect/Engineer of Record. 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 Architect/Engineer of Record or 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 Architect/Engineer of Record or authority having jurisdiction.
- D. After system checkout and adjustment, operate the system for the review of the Board and Architect/Engineer of Record. Make adjustments or modifications as required by the Board or Architect/Engineer of Record.

#### 3.07 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.

#### 3.08 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. See Section 01 79 00 - Demonstration, Training and Commissioning, for additional requirements.
- C. Training: Perform on-site training of Board's personnel on operation, adjustment, and maintenance of interior lighting. Training shall last a minimum of 4 hours and at the end of the session, the Board's maintenance personnel shall be thoroughly instructed in the proper operation of the system.
- D. Demonstration: Demonstrate proper operation of luminaires to Architect/Engineer of Record, and correct deficiencies or make adjustments as directed.
- E. Just prior to Preliminary Acceptance, replace all lamps that have failed.

#### 3.09 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

#### END OF SECTION

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| NAME OF SCHOOL<br>PROJECT NUMBER | 26 51 00 - 23 | INTERIOR LIGHTING |
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