

SECTION 16511
FLUORESCENT LUMINAIRES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

- A. This section includes the following lighting fixtures
 1. Fluorescent luminaires.
 2. Luminaire Accessories.
 3. Ballasts.
 4. Lamps.
- B. RELATED SECTIONS: The following sections contain requirements that relate to this section.
 1. Section 16120, "Building Wire and Cable, 600 V and Below."
 2. Division 16145, "Lighting Control Devices."

1.3 REFERENCES

- A. American national Standards Institute (ANSI)
 1. ANSI C62.41-91, IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
 2. ANSI C82.11-93, High Frequency Fluorescent Lamp Ballasts.
- B. National Fire Protection Association (NFPA)
 1. NFPA 70-1999, National Electrical Code.
- C. Underwriter Laboratories, Inc. (UL)
 1. UL Electrical Construction Materials Directories, Latest Editions.

1.4 SUBMITTALS

- A. General: Submit each item in this section according to the conditions of the Contract and supplementary conditions.
 1. Products furnished from listed manufacturers are pre-approved but still require submittal.
 2. Submit proposed substitutions for approval in accordance with General Conditions.

1.5 QUALITY ASSURANCE

- A. UL Listing: Furnish fixtures, ballasts, trim, and accessories listed by UL and classified as suitable for the purpose specified.
- B. Coordination: Coordinate layout and modify fixture locations and installation of light fixtures with mechanical, plumbing, architectural and structural elements to provide an unobstructed lighting system.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment as a factory assembled module with protective shipping containers, crating, and packaging.
- B. Store equipment in clean and dry storage, out of the elements and not exposed to condensing humidity
- C. Handle the fixtures carefully while in the original shipping cartons. When ready to install the fixtures handle so as to prevent degradation of the reflecting surfaces and exposed surfaces of the fixtures with dirt or grease.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate locations for lighting fixture supports with other overhead systems.

PART 2 - PRODUCTS

2.1 COMMERCIAL-ENCLOSED LUMINAIRES

- A. Acceptable Manufacturers:
 - 1. Daybrite, Dayline Series.
 - 2. Miller, Indigo 2 Series.
 - 3. Wright Light, JWA Series.
 - 4. Metalux, Corona "WS" Series.
 - 5. And as listed on the drawings.
- B. Description: Fully assembled, commercial-type fluorescent luminaire for surface or pendant mounting; UL listed for mounting on combustible low-density ceilings; utilizes rapid-start lamps.
- C. Construction:
 - 1. Housing: 20-gage (min), cold-rolled steel; provide continuous, unobstructed, enclosed wiring compartment containing electrical components accessible for replacement without removing fixture.
 - 2. Wireway Cover: 22-gage (min) steel; removable from below fixture without use of hand tools.
 - 3. Socket Plates: 20-gage (min) steel.
 - 4. End Plates: 20-gage (min) steel or aluminum.
- D. Lens: 100% clear virgin acrylic prismatic, 0.10 in. min thickness unless otherwise noted; hinged from either side of fixture and removable by lift-and-shift action.
 - 1. Sides of Enclosure: Linear prisms.
 - 2. Bottom: Pyramidal prisms for low brightness control.
 - 3. Fixture: free of light leaks around the enclosure ends.
- E. Diffuser: Parabolic type Diffuser using aluminum substrate with Specular Diffusing surface or as shown on the Schedules.
- F. Finish (Fixture Housing, End Plates, Socket Plates, and Wiring Cover): Hot-bonded, baked, white enamel.
- G. Reflecting Surfaces: 85% (min) reflectance.

2.2 TROFFER-TYPE ENCLOSED LUMINAIRES

- A. Acceptable Manufacturers:
1. Daybrite, Designer Series.
 2. Miller, Versaline Series.
 3. Wright Light, R9 Series.
 4. Metalux, Flanged Futura (Grid Galaxy) Series.
 5. And as listed on the drawings.
- B. Description: Fully assembled, fluorescent luminaire for recessed mounting in grid-type suspended ceilings; utilizes rapid-start lamps.
- C. Construction:
1. Housing: Die-formed, 22-gage (min), cold-rolled steel; provide continuous, unobstructed, enclosed wiring compartment containing all electrical components accessible for replacement without removing fixture from ceiling.
 2. Wireway Cover: 22-gage (min) steel; removable from below ceiling line without use of hand tools.
 3. Overall Depth of Fixture: 6 in. (max), 4 3/8 in. (min).
 4. Socket Plates: 20-gage (min) steel.
 5. End Plates: 22-gage (min) steel or aluminum; removable to permit continuous row installation.
 6. Furnish 18-gage (min), die-formed steel enclosure frame consisting of four rails: two end rails, a hinge rail with two separate "T" hinges, and a latch rail with two latches to securely fasten enclosure to fixture.
 7. Fixture: Completely free from light leaks around enclosure frame.
- D. Lens: 100% clear virgin acrylic prismatic lens, 0.10 in. min thickness unless otherwise noted.
- E. Diffuser: Parabolic type Diffuser using Aluminum Substrate with Specular Diffusing surface or as shown on the schedules.
- F. Finish (Fixture Housing, End Plates, Socket Plates, and Wiring Cover): Hot-bonded, baked, white enamel.
- G. Reflecting Surfaces: 85% (min) reflectance.
- H. Mounting: "G"-grid-type (inverted-"T") ceilings unless otherwise noted.

2.3 INDUSTRIAL OPEN-TYPE LUMINAIRES

- A. Acceptable Manufacturers
1. Daybrite, CFI Series.
 2. LSI/Midwest Industrial Series
 3. Lithonia
 4. Metalux, Series.
- And as listed on the drawings.
- B. Description: Fully assembled, industrial-type fluorescent luminaire, 4-ft length; for surface or rigid pendant mounting individually or in continuous rows; utilizes rapid-start lamps.
- C. Construction:
1. Channel: Die-formed, 20-gage (min), cold-rolled steel; accommodate stem hangers or pipe hangers.

2. Furnish V-shaped center to provide crosswise shielding.
 3. Reflector: One-piece, die-formed, 22-gage (min) steel; embossed apertures for uplighting; lateral ribs and longitudinal breaks for rigidity.
 4. End Plates: Die-formed, 22-gage (min) steel.
 5. Socket Plates: Die-formed, 18-gage (min), cold-rolled steel; securely fastened to channel; removable.
 6. Couplings: Die-formed, 20-gage (min), cold-rolled steel; furnished when required.
 7. Wiring Channel Cover: Removable with fixture mounted in place and without use of hand tools.
- D. Finish:
1. Channel, Socket Plates, Couplings, and End Plates: Pretreated with protective coating of zinc phosphate and final finish of baked enamel.
 2. Inside and Outside Surfaces of Reflector: Fired, white porcelain enamel; 85% (min) reflectance.
 3. Brackets, Screws, and Nuts: Bright protective plating.
- E. Louver: Constructed from 22-gage (min), cold-rolled steel; nominal length of 4 ft; two assemblies required for 8-ft fixture.
1. Louver Assembly: Two hinges and latches made of cold-rolled steel.
 2. Hinge Latch Rails: 18-gage (min), cold-rolled steel with breaks to provide rigidity.
 3. Finish: Hot-bonded, baked, white enamel.
 4. All Other Parts: Bright protective plating.

2.4 CLEANROOM SURFACE "TEARDROP" TYPE LUMINAIRE

- A. Acceptable Manufacturer
1. Guth (or approved equal)
- B. DESCRIPTION: Fully assembled and sealed fixture specifically designed to fit onto a 2" wide cleanroom ceiling grid system. The units shall be 4' long and shall not interfere with ceiling components beyond the width of the grid. The fixtures shall be designed with integral ballast and shall support end to end wiring as well as thru-the-grid wiring.
- C. CONSTRUCTION: Die-formed or extruded channel, reflector, and end pieces.
- D. Finish as shown.
- E. LENS: 100% virgin acrylic with smooth outside surface.

2.5 ELECTRICAL

- A. Lamp Sockets: UL approved, spring-loaded tombstone type, 660 W, 600 V; rigidly mounted to socket plates; positioned to permit centerline of lamps, when mounted in place, to be 1-1/4-in. (min) from reflector.
- B. Fixture Wiring: Wired with conductors of at least same AWG size as leads furnished with ballast and possess equivalent insulating and heat-resistance characteristics.
- C. Electrical Components: Individually replaceable without removing or lowering fixture from its mounting.

2.6 BALLASTS

- A. Acceptable Manufacturers:

1. OSRAM Sylvania, Quicktronic.
 2. Universal Magnetek, Triad.
 3. Motorola Electronic.
- B. Compliance: ANSI C82.11; ANSI C62.41, Category A; FCC Part 18C, Class A; UL listed; Certified Ballast Manufacturers (CBM) certified.
- C. Description: Non-PCB insulating medium; full-light output, rapid start, electronic-type ballast, or electromagnetic type ballast for tunnel fixtures only.
- D. Protection: Built-in Class P thermally actuated, automatic-reclosing device; protect against shorted output leads or lamp rectification.
- E. Performance:
1. Power Factor: Greater than 97%.
 2. Ballast Factor: 85% or greater.
 3. Lamp Current Crest Factor: 1.7 (max).
 4. Electronic only, Operating Frequency: 20 to 27 kHz, with no detectable lamp flicker.
 5. Total Harmonic Distortion: 10% (max). (Electronic only).
 6. Circuit Voltage Rating: 120 V.
 7. Minimum open circuit starting voltage: 625 V (4-lamp ballast), 600 V (2 and 3-lamp ballasts), and 580 V (1-lamp ballast).
 8. Sound Rating: Class A.
- F. Starting Sequence: Consistent with lamp manufacturers' recommendations; provide full rated lamp life.
- G. Power Rating: Based on lamp size and quantity.
- H. Mounting: Back surface of ballast in complete contact with fixture channel surface; Fasten ballast to channel with captive bolts to permit easy removal.

2.7 LAMPS

- A. Acceptable Manufacturers: Philips, Alto Series.
- B. 4 foot length: 32 nominal watts, T-8, medium bi-pin base; operated by electronic rapid start ballast designed for parallel operation of 265 ma T-8 lamps.
1. Color Temperature: 4100K (white as shown).
 2. Color Rendering Index (CRI): 75 (min).
 3. Average rated life: 20,000 hours based on 3 hours per start operated on electronic rapid start ballasts.
 4. Yellow Filtered Lamps: Special lamps with integral coating or supplemental filtering sleeve applied to the lamps shall be used. Lamp output shall not radiate below 530 nm. Provide these lamps in areas as shown.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine structure and supporting grids for luminaires to determine suitability for installation to be free from potential damage from construction activities.

3.2 INSTALLATION

- A. Install luminaires in accordance with manufacturers instructions and in compliance with Article 410 of NFPA 70.
- B. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- C. Install 2 X 4 troffer-type luminaires directly into ceiling.
- D. Install recessed luminaires to permit removal from below.
- E. Install clips to secure recessed grid-supported luminaires in place.
- F. Install suspended luminaires using pendants supported from swivel hangers; provide pendant length required to suspend luminaire at indicated height.
- G. Support all luminaires in lay-in ceilings independent of ceiling framing.
- H. Install surface-mounted luminaires plumb; adjust to align with building lines and with each other; secure to prohibit movement.
- I. Exposed Grid Ceilings: Support surface-mounted luminaires on grid ceiling directly from building structure.
- J. Install wall-mounted luminaires at height as indicated on drawings.
- K. Install accessories furnished with each luminaire.
- L. Connect luminaires to branch circuits specified.
- M. Bond products and metal accessories to branch circuit equipment grounding conductor.
- N. Install specified lamps in each luminaire.

3.3 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection; verify proper connection and operation.
- B. Verify proper operation of all local switching equipment.
- C. Verify branch circuit conductors connecting inside of fixtures are type specified.
- D. Re-lamp luminaires which have failed lamps, at completion of job.

3.4 ADJUSTING

- A. Verify that all fixture doors and seating in T-Grids are tight and secure.
- B. Adjust Pendant fixtures for overall horizontal alignment and height above finished floors.

3.5 CLEANING

- A. Clean electrical parts to remove conductive and deleterious materials.

- B. Remove dirt and debris from enclosure.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

3.6 DEMONSTRATION

- A. Provide 2-hour (min) demonstration of luminaire operation.

END OF SECTION 16511