

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Interior lighting fixtures, lamps, and ballasts.
- B. Lighting fixture supports.

1.2 REFERENCES

- A. Section 26 05 50.16 – Lighting Fixture Schedule

1.3 DEFINITIONS

- A. BF: Ballast factor.
- B. CRI: Color-rendering index.
- C. CU: Coefficient of utilization.
- D. LER: Luminaire efficacy rating.
- E. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.4 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
  - 1. Physical description of lighting fixture including dimensions.
  - 2. Ballast.
  - 3. Energy-efficiency data.
- B. Operation and Maintenance Data: For lighting equipment.
- C. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.7 WARRANTY

- A. Special Warranty for Ballasts: Manufacturer's standard form in which ballast manufacturer agrees to repair or replace ballasts that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period for Electronic Ballasts: Five years from date of Substantial Completion.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Lamps: 10 of each type and rating installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Luminaires:
  - 1. Provide products as specified in Interior Lighting Fixture Schedule.
- B. Electronic Fluorescent Ballasts for T5 and T8 Lamps
  - 1. 1-Lamp non-dimming T5 ballasts
    - a. *Sylvania* QTP 1x28T5/UNV PSN Series
    - b. Substitutions: Equivalent ballasts by *Advance* or *Universal*.
  - 2. 4-Lamp non-dimming T8 ballasts:
    - a. *Sylvania* QTP 4x32T8/UNV PSN-TC Series
    - b. Substitutions: Equivalent ballasts by *Advance* or *Universal*.
  - 3. 3-Lamp non-dimming T8 ballasts:
    - a. *Sylvania* QTP 3x32T8/UNV PSN-TC Series
    - b. Substitutions: Equivalent ballasts by *Advance* or *Universal*.
  - 4. 2-Lamp non-dimming T8 ballasts:
    - a. *Sylvania* QTP 2x32T8/UNV PSN-TC Series
    - b. Substitutions: Equivalent ballasts by *Advance* or *Universal*.
  - 5. 1-Lamp non-dimming T8 ballasts:
    - a. *Sylvania* QTP 1x32T8/UNV PSN-TC Series
    - b. Substitutions: Equivalent ballasts by *Advance* or *Universal*.
  - 6. 2-Lamp dimming T8 ballasts:
    - a. *Sylvania* QTP 2x32T8/UNV TC Series
    - b. Substitutions: Equivalent ballasts by *Advance* or *Lutron*.
- C. Electronic Compact Fluorescent Ballasts
  - 1. Non-dimming ballasts
    - a. *Sylvania* QTP 1/2xCF/UNV (single 26 watt)
    - b. *Sylvania* QTP 2x26/32/42CF/UNV (two-lamp 26 watt)
    - c. *Advance* ICN-2S54 (two-lamp 36 watt)
    - d. *Sylvania* QTP 2x26/32/42CF/UNV (two-lamp 42 watt)
    - e. Substitutions: Equivalent ballasts by *Advance* or *Universal*.
- D. Lamps:
  - 1. *Osram Sylvania*
  - 2. *General Electric*
  - 3. *Philips*

4. Substitutions: None Permitted.

## 2.2 STANDARD NON-DIMMING BALLASTS FOR LINEAR FLUORESCENT LAMPS

- A. Electronic Ballasts: Comply with ANSIC82.11; programmed-start type, unless otherwise indicated, and designed for type and quantity of lamps served. Ballasts shall be designed for full light output.
- B. T5 Fluorescent Lamps
  1. Starting Method: Programmed Start
  2. Ballast Factor: 1.00 (minimum)
  3. Circuit Type: Series
  4. Lamp Frequency: > 40 kHz
  5. Lamp CCF: < 1.6
  6. Starting Temperature: 0 F (minimum)
  7. Input Frequency: 60 Hz
  8. Total Harmonic Distortion (THD): <10%
  9. Power Factor: >98%
  10. Voltage: Universal 120-277 volts
  11. Maximum Input Wattage:
    - a. Single Lamp, T5, 28-Watt: 32 Watts at 120V
- C. T8 Fluorescent Lamps
  1. Starting Method: Programmed Start
  2. Ballast Factor: 0.88 (minimum)
  3. Circuit Type: Series
  4. Lamp Frequency: > 40 kHz
  5. Lamp CCF: < 1.6
  6. Starting Temperature: 60 F
  7. Input Frequency: 60 Hz
  8. Total Harmonic Distortion (THD): <10%
  9. Power Factor: >98%
  10. Voltage: Universal 120-277 volts
  11. Maximum Input Wattage:
    - a. Two Lamp T8, 17-Watt: 32 Watts at 120V
    - b. Single Lamp, T8, 28-Watt: 27 Watts at 120V
    - c. Two Lamp T8, 28-Watt: 53 Watts at 120V
    - d. Three Lamp T8, 28-Watt: 77 Watts at 120V
    - e. Four Lamp T8, 28-Watt: 104 Watts at 120V

## 2.3 0-10V DIMMING BALLASTS FOR LINEAR FLUORESCENT LAMPS

- A. Electronic Ballasts: Comply with ANSIC62.41; programmed-start type, unless otherwise indicated, and designed for type and quantity of lamps served. Ballasts shall provide dimming range of 100% - 5%.
- B. T8 Fluorescent Lamps
  1. Starting Method: Programmed Start
  2. Ballast Factor: 0.88 minimum @ 100%
  3. Circuit Type: Series
  4. Lamp Frequency: > 40 kHz
  5. Lamp CCF: < 1.7

6. Starting Temperature: 50 F
7. Input Frequency: 60 Hz
8. Total Harmonic Distortion (THD): <10%
9. Power Factor: >98% at 100% output
10. Voltage: 120
11. Maximum Input Wattage:
  - a. Two Lamp T8, 28-Watt: 89 Watts (full output)
  - b. Three Lamp T8, 28-Watt: 91 Watts (full output)

#### 2.4 BALLASTS FOR COMPACT FLUORESCENT LAMPS

- A. Description: Electronic programmed rapid-start type, complying with ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output unless dimmer or bi-level control is indicated:
  1. Starting Method: Programmed Rapid-Start (quad and triple-tube lamps); Instant Start (PL lamps)
  2. Ballast Factor: 0.96 (minimum)
  3. Circuit Type: Series (quad and triple-tube lamps); Parallel (PL lamps)
  4. Lamp Frequency: > 40 kHz
  5. Lamp CCF: < 1.7
  6. Starting Temperature: 5 F (-20 C)
  7. Input Frequency: 60 Hz
  8. Total Harmonic Distortion (THD): <10%
  9. Power Factor: >97%
  10. Voltage: Universal 120-277 volts
  11. Maximum Input Wattage:
    - a. Single Quad-Tube Lamp T4, 26-Watt: 28 Watts
    - b. Two Quad-Tube Lamp T4, 26-Watt: 54 Watts
    - c. Two PL Lamp, 36-Watt: 89 Watts
    - d. Two Triple-Tube T4 Lamp 42-Watt: 94 Watts

#### 2.5 FLUORESCENT AND COMPACT FLUORESCENT LAMPS

- A. Low-Mercury Lamps: Comply with EPA's toxicity characteristic leaching procedure test; shall yield less than 0.2 mg of mercury per liter when tested according to NEMA LL 1.
- B. 17-Watt, T8 Fluorescent Lamps:
  1. Base: Medium Bi-Pin
  2. Initial Lumens: 1375 (minimum)
  3. Mean Lumens: 1305 (minimum)
  4. CCT: 3500K
  5. CRI: 85 (minimum)
  6. Life: 24000 hours (3 hours/start)
- C. 28-Watt, T8 Fluorescent Lamps:
  1. Base: Medium Bi-Pin
  2. Initial Lumens: 3100 (minimum)
  3. Mean Lumens: 2945 (minimum)
  4. CCT: 3000K
  5. CRI: 85 (minimum)
  6. Life: 24000 hours (3 hours/start)

- D. 28-Watt, T5 Fluorescent Lamps:
  - 1. Base: Mini Bi-Pin
  - 2. Initial Lumens: 2600 (minimum)
  - 3. Mean Lumens: 2418 (minimum)
  - 4. CCT: 3500K
  - 5. CRI: 82 (minimum)
  - 6. Life: 20000 hours (3 hours/start)
  
- E. 26-Watt, T4 Quad Tube Lamps:
  - 1. Base: 4-pin, GX24q-3
  - 2. Initial Lumens: 1800
  - 3. Mean Lumens: 1548
  - 4. CCT: 2700K
  - 5. CRI: 82
  - 6. Life: 12000 hours (3 hours/start)
  
- F. 36-Watt, PL Lamps:
  - 1. Base: 2G11
  - 2. Initial Lumens: 2900
  - 3. Mean Lumens: 2494
  - 4. CCT: 3500K
  - 5. CRI: 82
  - 6. Life: 12000 hours (3 hours/start)
  
- G. 42-Watt, T4 Triple Tube Lamps:
  - 1. Base: 4-pin, GX24q-4
  - 2. Initial Lumens: 3200
  - 3. Mean Lumens: 2752
  - 4. CCT: 3500K
  - 5. CRI: 82
  - 6. Life: 12000 hours (3 hours/start)

## 2.6 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Section 26 05 29 "Supporting Devices" for channel- and angle-iron supports and nonmetallic channel and angle supports.
  
- B. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gauge.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
  
- B. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Do not use grid as a sole support element.
  - 1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from lighting fixture corners.
  - 2. 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.

3. 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 (20-mm) metal channels spanning and secured to ceiling tees.
  4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- C. Suspended Lighting Fixture Support:
1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
  2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
  3. 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.
- D. Aim adjustable accent lighting fixtures as directed by the Engineer.
- E. Install fixtures in full conformance with manufacturers' instructions.

END OF SECTION 26 51 00