

SECTION 16500 - LIGHTING

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1.0 SCOPE

This section covers standards for lighting that are applicable for all electrical design, construction and installation for the City of Portland (COP), Bureau of Environmental Services (BES), Wastewater Group (WG), including the Columbia Blvd. Wastewater Treatment Plant, Tryon Creek Wastewater Treatment Plant and the Wastewater Pump Stations maintained by Group.

The requirements of the following sections shall be considered as part of the requirements of this section. If the requirements of those sections contradict the requirements of this section, the requirements of this section shall be followed when doing work on materials and equipment covered by this section.

SECTION 16010 - ELECTRICAL

SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

SECTION 16400 - SERVICE AND DISTRIBUTION

2.0 MATERIALS PROVIDED

2.1 LAMPS GENERAL

Provide lamps of the types and sizes indicated for each luminary.

2.2 FLUORESCENT LIGHTING

2.2.1 F32T8 FLUORESCENT LAMP SPECIFICATION FOR USE WITH ELECTRONIC BALLASTS

- Lamps shall have a Color Rendering Index (CRI) of 80 or greater.
- Initial Lumens rated at 2900 or greater.
- Average lamp life of 20,000 hours.
- Lamps to have a CCT (K) of 4100 or 5000¹.
- Acceptable lamp manufacturers are: Sylvania, Phillips, G.E.

¹ Rev. 2003

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2.2.2 ELECTRONIC BALLAST SPECIFICATIONS FOR USE WITH 265 mA F32T-8 LAMPS

Provide ballasts that meet the requirements of UL 935 and shall bear the appropriate UL label. Use of the ballast shall not void the original UL rating of the fixture. All ballasts must come from the same manufacturer and bear a manufacture date no more than six months prior to delivery.

2.2.3 WARRANTY

The electronic ballast shall be warranted against defects in materials and workmanship for three years. The warranty shall include complete replacement including labor by an agent of the manufacturer, or complete replacement and at least \$10 labor allowance.

2.2.4 MECHANICAL CONSTRUCTION

Ballasts shall have the same physical dimensions and mounting arrangements as those of standard core and coil counterparts.

2.2.5 ELECTRICAL CHARACTERISTICS

Ballasts shall meet the following specifications:

- Ballasts shall be either discrete electronic or integrated circuit, and designed to operate 265 mA lamps at a frequency of 20 KHz or greater from an input frequency of 60 Hz.
- Lamp flicker shall not be visible.
- Ballasts shall withstand power line transients as defined in ANSI C62.41. The ballasts shall tolerate a line voltage variation of (+/-) 10 percent.
- The power factor rating shall be 95 percent or higher.
- The lamp crest factor shall measure 1.7 or less.
- Total harmonic distortion (THD) of the input current to the integrated circuit ballast shall not exceed 20 percent of the input current.
- The average Ballast Factor (BF) shall be a minimum of 88 percent under ANSI C82.2 conditions. This BF establishes the maintenance of minimum lighting level standards using F32T-8 lamps.
- The electronic ballasts shall be Class "A" sound rated and UL Class "P" thermally protected.
- Wiring may be parallel or series connection.
- The ballast shall comply with FCC rules and regulations Part 18 concerning the generation of both EMS (electromagnetic interference) and RFI (radio frequency interference).
- Ballasts shall be marked with manufacturer's name, part number, supply voltage and range, sound rating power factor, open circuit voltage, current draw for each type lamp, UL listing, and for National Energy Law compliance (where appropriate).

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- Performance Characteristics.
- The ANSI rated input watts shall be 63 or less using two, 2900 lumen F32T-8 lamps.
- Ballasts shall be programmed² start, providing 20,000 hour rated lamp life as stated by the manufacturer, based on a cycle of three hours on, 20 minutes off.
- The ballasts shall start and operate F32T-8 lamps at 50 degrees F. Ballast case temperatures shall not exceed 25 degree rise above a 40 degree C ambient.
- The ballast shall be compatible with other electrical equipment including, infrared and ultrasonic occupancy control devices, energy management systems, variable frequency motor controls and personal computers.

2.2.6 APPROVALS

Each ballast/lamp combination will be considered separately. Blanket approval of manufacturer's ballasts will **not** be given. All evaluations will be based upon independent testing laboratory, test data.

2.3.0 EMERGENCY STANDBY LIGHTING UNITS

Emergency standby battery operated lighting units shall be provided as shown on the Drawings and shall provide emergency illumination automatically and instantaneously upon failure or interruption of normal electric power.

2.3.1 HAZARDOUS LOCATIONS

In hazardous locations provide lighting fixtures that are explosion proof, that are wired to a remote power supply battery/charger located in a non-hazardous location.

2.3.2 VOLTAGE RATING

Emergency standby lighting units shall be connected to and rated for use on an unswitched, 120-volt AC, 60 Hz, single-phase circuit, and the connection shall be made permanent.

2.3.3 LIGHTING ENCLOSURES

The enclosures shall be NEMA 12 unless otherwise indicated. The enclosures shall be divided so that the charger and controls are separate from the battery.

Directionally-adjustable lamp assemblies shall be mounted on the enclosures where indicated on Drawings. The lamps shall be both horizontally and vertically adjustable.

2.3.4 ILLUMINATION TIME

² Rev. 2003

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The illumination time in hours of light for a two-lamp load shall be 1-1/2 hours minimum. In addition to lamps shown for each unit type (fixture type numbers 6 and 7), provide two lamps of each size and type for spares.

2.3.5 EMERGENCY LIGHTING BATTERY

The unit shall contain a 6-volt, sealed nickel cadmium battery. The battery shall be encased in a high-impact, heat-resistant, translucent plastic container with permanently sealed cover to prevent leakage of electrolyte. The battery shall operate entirely unattended and require no additional maintenance for a period of 10 years or longer under normal operating conditions. Battery shall be unconditionally guaranteed for 5 years with an additional 7 years prorated. Life expectancy shall be 15 years.

2.3.6 LOAD RELAY/RATE CHARGER

The unit shall contain a hermetically sealed, load relay which automatically and instantaneously connects the lamp load to the battery upon failure of the AC supply and disconnects the lamp from the battery when normal power (AC) is restored. The unit shall incorporate a completely automatic, solid-state, two-rate charger of sufficient capacity to restore the battery to full charge within 12 hours following a discharge of not more than 2 hours with 100 percent of a two-lamp load connected. The charger shall also continuously monitor the battery voltage and return to hi-rate, as required by the battery. Solid-state components shall operate at less than 50 percent of rating. Entire unit shall also meet UL 924.

2.3.7 SWITCHES AND INDICATORS

The unit shall have a push-to-test switch for quick testing of lamps and battery, an amber light which glows when the unit is in the ready state, and a red light to indicate that the unit is on the high rate of charge.

2.3.8 TIME DELAY

Provide units with time delay relay which keeps units energized for 10 minutes after normal lighting is restored.

2.3.9 MANUFACTURERS

Emerzi-Light Series KSC, or equal.

2.4 HIGH INTENSITY DISCHARGE (HID) LIGHTING

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All interior HID lighting will be Metal Halide. Sodium lighting is for exterior lighting only.

Where safety (consider all aspects) and conditions permit, all interior lighting will be controlled by occupancy sensors. All interior Metal Halide will have bi-level ballasts for use with occupancy sensors or timer switches. All such units that are on 24-hour a day, will have an automatic sweep-off system to cycle the lights. The system will be set up with a timer to turn the lights off for fifteen minutes, once a week and be set to occur on Sunday at noon. The system needs to be similar to the ones already installed at the Columbia Blvd. Wastewater Treatment Plant (Digester, Sludge, and Blower Buildings).

If timer switches are specified for bi-level HID lighting in place of occupancy sensors, the timers will be of four-hour duration, marked in one-hour intervals. One four hour timer in each lighting circuit will have a 'hold' feature incorporated to override the timer.

Manufacturer: Intermatic Model #'s FF34HH and FF34H or equal.

All lighting fixtures will be visibly and legibly marked inside with the circuit breaker and lighting panel numbers and location. A permanent marker will be used to label the fixture.

2.5.0 OUTSIDE LIGHTING

Provide an outside lighting control system performing all the functions shown on Drawings. Provide luminaries installed outdoors with **SUITABLE FOR WET LOCATIONS** label and a removable pre-wired ballast. Unless otherwise specific, all exterior lighting circuits will be fitted with photo cell control, set to turn lights on at dusk and off at dawn.

3.0 INSTALLATION REQUIREMENTS

4.0 REQUIRED DOCUMENTATION

4.1 SUBMITTALS

Provide manufacturers' data for each type of electronic ballast bid. Also provide nationally recognized independent laboratory test data verifying compliance with specifications herein.