SECTION 16145

LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section

1.2 SUMMARY

A. This Section includes the following lighting control devices:

1. Time switches
2. Outdoor photoelectric switches
3. Indoor occupancy sensors
4. Lighting contactors

B. Related Sections include the following:

1. Section 16140 for wall-box dimmers, wall-switch occupancy sensors, and manual light switches

C. SPST: Single-pole, single-throw

D. DPDT: Double-pole, double-throw

1.3 DEFINITIONS

A. LED: Light-emitting diode

B. PIR: Passive infrared

1.4 SUBMITTALS

A. Product Data: For each type of product indicated in accordance with Section 01340

B. Operation and Maintenance Data: For each type of product to include installation, operation, and maintenance manuals

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

1.6 COORDINATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression system, and partition assemblies

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1. Intermatic, Inc.
2. Paragon Electric Co.; Invensys Climate Controls
3. TORK

B. Electronic Time Switches: Electronic, solid-state programmable units with alphanumeric display; complying with UL 917

1. Contact configuration: DPDT
2. Contact rating: 30-A inductive or resistive, 240-V ac
3. Program: 8 on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays
4. Program: 2 on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays
5. Programs: 4 channels; each channel shall be individually programmable with 2 on-off set points on a 24-hour schedule, allowing different set points for each day of the week
6. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program
7. Astronomic time: All channels
8. Battery backup: For schedules and time clock

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1. Intermatic, Inc.
2. Paragon Electric Co.; Invensys Climate Controls
3. TORK

B. Description: Solid state, with SPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A

1. Light-level monitoring range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of photocell to

prevent fixed light sources from causing turn-off
2. Time delay: 15-second minimum, to prevent false operation
3. Surge protection: Metal-oxide varistor, complying with IEEE C62.41.1, IEEE C62.41.2, and IEEE 62.45 for Category A1 locations
4. Mounting: Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure

2.3 INDOOR OCCUPANCY SENSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1. Hubbell Lighting
2. Leviton Mfg. Company Inc.
3. Lithonia Lighting; Acuity Lighting Group, Inc.
4. Novitas, Inc.
5. Sensor Switch, Inc.
6. Watt Stopper (The)

B. General Description: Wall mounting, solid-state self-contained

1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes
2. Sensor output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit
3. Relay unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70
4. Mounting:
   a. Sensor: Suitable for wall mounting on a standard outlet box
   b. Time-delay and sensitivity adjustments: Recessed and concealed behind cover plate
5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor
6. Bypass wwitch: Override the on function in case of sensor failure
7. Automatic light-level sensor: Adjustable from 2 to 200 fc; keep lighting off when selected lighting level is present

2.4 LIGHTING CONTACTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1. Allen-Bradley/Rockwell Automation
2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
3. Eaton Electrical Inc.; Cutler-Hammer Products
4. GE Industrial Systems; Total Lighting Control
5. Square D; Schneider Electric

B. Description: Electrically operated and mechanically held, complying with NEMA ICS 2 and UL 508

1. Current rating for switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current)
2. Fault current withstand rating: Equal to or exceeding the available fault current at the point of installation
3. Enclosure: Comply with NEMA 250
4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure

2.5 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 16120

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 16120

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions

3.2 CONTACTOR INSTALLATION

A. Mount electrically held lighting contactors with elastomeric isolator pads, to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators

3.3 WIRING INSTALLATION

A. Wiring Method: Comply with Section 16120. Minimum conduit size shall be ¾ inch

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions

C. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures

3.4 IDENTIFICATION

A. Identify components and power and control wiring according to Section 16075

1. Identify controlled circuits in lighting contactors
2. Identify circuits or luminaries controlled by photoelectric and occupancy sensors at each sensor

B. Label time switches and contactors with a unique designation

3.5 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports

1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements
2. Operational Test: Verify operation of each lighting control device, and adjust time delays

B. Lighting control devices that fail tests and inspections are defective work and shall be replaced with new materials and retested until acceptable results are obtained

END OF SECTION