

~~~~~ **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 09 36
MODULAR DIMMING CONTROLS

PART 1 GENERAL

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

EDIT SECTION TO INCLUDE / EXCLUDE SYSTEM CONTROL ELEMENTS, UTILIZATION (DIMMING AND SWITCHING), AND TYPE OF HARDWARE. SELECT SYSTEMS AND COMPONENTS TO BE INCLUDED WITHIN THE SCOPE OF PROJECT. COORDINATE WITH LIGHTING SELECTED, DESIGN INTENT OF CONTROLS, BOARD, AND ARCHITECTURAL SPECIFICATIONS.

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

1.01 SECTION INCLUDES

- A. Standalone lighting control systems and associated components:
 - 1. Room Controllers
 - 2. Zone Controllers
 - 3. Emergency Lighting Bypass Devices
 - 4. Network Bridges
 - 5. Network Control Unit

1.02 DEFINITIONS

- A. Fade Rate: The time it takes each zone to arrive at the next scene, dependent on the degree of change in lighting level.
- B. Low Voltage: As defined in the Chicago Electrical Code for circuits and equipment operating at less than 50 V or for remote-control, signaling and power-limited circuits.
- C. Scene: The lighting effect created by adjusting several zones of lighting to the desired intensity.
- D. SCR: Silicon-controlled rectifier.

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- E. Zone: A fixture or group of fixtures controlled simultaneously as a single entity. Also known as a "channel."

1.03 REFERENCE STANDARDS

- A. Chicago Electrical Code - Municipal Code of the City of Chicago, Building/Electrical Code Requirements; 2018.
- B. Chicago Energy Conservation Code - Chicago Energy Transformation Code, based on the International Energy Conservation Code, with amendments; Current Edition.
- C. City of Chicago Building Code - Chicago Construction Codes, Title 14B; Current Edition.
- D. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test; 2025.
- E. ISO 9001 - Quality Management Systems — Requirements; 2015, with Amendment (2024).
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
- G. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- H. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 508 - Industrial Control Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

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REMOVE MOTORIZED SHADES IF NOT INCLUDED IN SCOPE OF WORK. MOTORIZED SHADES NOT TYPICAL.

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

- A. Coordination:
 - 1. Coordinate the placement of sensors and wall controls with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate the placement of wall controls with actual installed door swings.
 - 3. Coordinate the placement of daylight sensors with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
 - 4. Where motorized window treatments are to be controlled by the lighting control system provided under this section, coordinate the work with other trades to provide compatible products.
 - 5. Coordinate the work to provide luminaires and lamps compatible with the lighting controls to be installed.
 - 6. Notify Architect/Engineer of Record of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- B. Pre-Wire Meeting: Conduct on-site meeting with lighting control system manufacturer prior to commencing work as part of manufacturer's standard startup services. Manufacturer to review with installer:
 - 1. Low voltage wiring requirements.
 - 2. Separation of power and low voltage/data wiring.
 - 3. Wire labeling.
 - 4. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROL SYSTEM - GENERAL REQUIREMENTS", sensor locations to be reviewed in accordance with layout provided by Lighting Control

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Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated.

5. Control locations.
 6. Load circuit wiring.
 7. Connections to other equipment.
 8. Installer responsibilities.
- C. Sequencing:
1. Do not install sensors and wall controls until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Design Documents: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROL SYSTEM - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide plans indicating occupancy/vacancy and/or daylight sensor locations and coverage.
- C. Shop Drawings:
 1. Provide schematic system riser diagram indicating component interconnections. Include requirements for interface with other systems.
- D. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. System Performance-Verification Documentation: Include as part of the base bid additional costs for manufacturer's enhanced documentation detailing start-up performance-verification procedures and functional tests performed along with test results.
- F. Project Record Documents: Record actual installed locations and settings for lighting control system components.
- G. Qualification Data: For Installer and manufacturer.
- H. Operation and Maintenance Data: Include detailed information on lighting control system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
- I. Warranty: Submit sample of manufacturer's Warranty or Enhanced Warranty as specified in Part 1 under "WARRANTY". Submit documentation of final execution completed in Board's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the Chicago Electrical Code by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Manufacturer Qualifications:
 1. Company with not less than ten years of experience manufacturing lighting control systems of similar complexity to specified system.
 2. Registered to ISO 9001, including in-house engineering for product design activities.
 3. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.
- D. Maintenance Contractor Qualifications: Manufacturer's authorized service representative.
- E. Conform to requirements of NFPA 101.
- F. Complying with the City of Chicago Building Code, the Chicago Electrical Code and the Chicago Energy Conservation Code.

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1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment in fully enclosed vehicles after specified environmental conditions have been permanently established in spaces where equipment is to be placed.
- B. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 COORDINATION

- A. Coordinate features of devices specified in this Section with systems and components specified in other Sections to form an integrated system of compatible components. Match components and interconnections for optimum performance of specified functions. Include coordination with the following:
 - 1. Section 26 09 23 - Lighting Control Devices
 - 2. Section 26 09 33 - Central Dimming Controls
 - 3. Section 26 09 43 - Lighting Controls

1.09 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.
 - 1. System Requirements, Unless Otherwise Indicated:
 - a. Ambient Temperature:
 - 1) Lighting Control System Components: Between 32 and 104 degrees F.
 - b. Relative Humidity: Less than 90 percent, non-condensing.

1.10 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Dimmers: Full-size units equal to three percent of amount installed for each size indicated, but no fewer than two units.
 - 2. Fuses: Equal to three percent of amount installed for each size installed, but no fewer than three.

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MANUFACTURER START-UP OF SYSTEM TO BE INCLUDED WITH MANUFACTURER'S STANDARD WARRANTY.

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

1.11 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer's Standard Warranty; with Manufacturer Start Up.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Acuity Brands Lighting, Inc: <https://www.acuitybrands.com>
 - 2. Cooper Lighting Solutions, Inc: <https://www.cooperlighting.com>
 - 3. Current NX: www.currentlighting.com/controls-sensors
 - 4. ETC Company; <https://www.etcconnect.com>
 - 5. Leviton Manufacturing Company, Inc: www.leviton.com
 - 6. Lutron Electronics Company, Inc: www.lutron.com
 - 7. WattStopper: www.wattstopper.com

- B. Source Limitations: For all controls within a single lighting control system. Furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 LIGHTING CONTROL SYSTEM - GENERAL REQUIREMENTS

- A. Compatibility: Dimming control components shall be compatible with other elements of lighting fixtures, drivers, transformers, and lighting controls.
- B. Dimmers and Dimmer Modules: Comply with UL 508.
 - 1. Audible Noise and Radio-Frequency Interference Suppression: Solid-state dimmers shall operate smoothly over their operating ranges without audible lamp or dimmer noise or radio-frequency interference. Modules shall include integral or external filters to suppress audible noise and radio-frequency interference.

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INDICATE RATINGS FOR DIMMERS AND DIMMER MODULES ON DRAWINGS.

~~~ END OF PROJECT NOTE ~~~

- 2. Dimmer or Dimmer-Module Rating: Not less than 125 percent of connected load unless otherwise indicated.
- C. Sensor Layout and Tuning: Include as part of the base bid additional costs for Lighting Control Manufacturer's Sensor Layout and Tuning service:
 - 1. Lighting Control Manufacturer to take full responsibility for wired or wireless sensor layout and performance for sensors provided by Lighting Control Manufacturer.
 - 2. Lighting Control Manufacturer to analyze the reflected ceiling plans, via supplied electronic AutoCAD format, and design a detailed sensor layout that provides adequate occupancy sensor coverage and ensures occupancy and daylight sensor performance per agreed upon sequence of operations. Contractor to utilize the layouts for sensor placement.
 - 3. During startup, Lighting Control Manufacturer to direct Contractor regarding sensor relocation, as required, should conditions require a deviation from locations specified in the drawings.
 - 4. Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits, within one calendar year from date of Preliminary Acceptance to fine-tune sensor calibration per the agreed upon sequence of operations.
- D. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) as suitable for the purpose indicated.
- E. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the control intent indicated.
- F. Design lighting control equipment for ten (10) year operational life while operating continually at any temperature in an ambient temperature range of 32 degrees F to 104 degrees F and 90 percent non-condensing relative humidity.
- G. Electrostatic Discharge Tolerance: Design and test equipment to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.

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EXCLUDE INTEGRATION INTO BUILDING AUTOMATION SYSTEM IF NOT REQUIRED FOR PROJECT SCOPE OF WORK.

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H. Interface with building automation system.

2.03 ROOM CONTROLLERS

- A. Description: Individually addressable, solid state, electronic, relay-based devices that provide ON/OFF, step and continuous dimming types of control to room connected luminaires and devices, in response to control commands of connected lighting control devices.
- B. Quantity of Relays/Controllers to meet drawing control intent.
- C. Scene Control Operation: Automatically change variable dimmer settings of control zones simultaneously from one preset scene to another when a push button is operated.
- D. Dimming Station Control Operation: Turn lighting zone ON upon push button operation. Raise and lower dimmer settings of individual zones when RAISE/LOWER push buttons are operated.
- E. Multiple Wall Control Locations: Room controller shall accept commands from multiple wall control locations.

2.04 PARTITION SENSORS: INTERFACE WALL CONTACT CLOSURES TO ROOM CONTROLLER.

- A. Functions and Features:
- B. Automatically combine and separate lighting and accessory function controls as spaces are configured with movable partitions; with controls for adjustment of the lighting level for each scene of each dimmer, and adjustment of fade-rate setting for each scene change from one preset scene to another.
  - 1. Master controls shall accommodate partitioning the space into five adjacent rooms.
  - 2. Manual controls to set up a minimum of six scenes for each room. Include wall stations in each room to control scenes.
  - 3. Master channel to raise and lower the lighting level of all zones.
  - 4. Emergency-control pushbutton to bypass all controls, turning all dimmers to full bright and turning on non-dim channel contactors.

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INDICATE NUMBER OF ZONES TO BE CONTROLLED IN A SCENE ON DRAWINGS

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

- C. Each manual modular multiscene dimming controller shall include a master control and remote controls.
- D. Each zone shall be configurable to control the following:

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

EDIT THIS LIST PER PROJECT REQUIREMENTS.

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

- 1. LED luminaires.
- 2. Non-dimmed loads.

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

REMOVE ITEMS IF NOT APPLICABLE.

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

3. Fluorescent lamps with electronic or magnetic ballasts.
  4. Plug loads.
  - E. Memory: Retain preset scenes through power failures for at least seven days.
  - F. Device Plates: Style, material, and color shall comply with Section "26 27 26 - Wiring Devices. Coordinate with Section " 26 09 23 – Lighting Control Devices".
- 2.05 ZONE CONTROLLERS
- A. Description: Individually addressable, solid state, electronic, relay-based devices that provide ON/OFF, step and continuous dimming types of control to corridor connected luminaires and devices, in response to control commands of connected lighting control devices and time clock.
  - B. Quantity of Relays/Controllers to meet drawing control intent.
  - C. Operation: Coordinate with Section " 26 09 43 – Lighting Control System".
- 2.06 EMERGENCY LIGHTING BYPASS DEVICE
- A. Description: UL 924 listed and labeled solid state, electronic, relay-based device providing for luminaires connected to an emergency lighting branch circuit to be controlled, under "normal" operating conditions, and, upon loss of "normal" AC power, bypass all connected control functions and settings, forcing the connected emergency luminaires on to full brightness.
  - B. Remote Testing: Provides for a remote test input from a remote test switch, or fire alarm/security system alarm interface device.
  - C. Visual Feedback: LEDs provide indication of which AC power source (normal or emergency) is presently serving the connected load.
- 2.07 NETWORK BRIDGES
- A. Description: Solid state, electronic device that provides a networked communications interface between zone controllers, room controllers and other area lighting control equipment devices, and provides for the expansion of the system/network.
  - B. Provides for small standalone room control devices to be interconnected into a building/area wide network.
  - C. Control voltage, class 2 (24VDC) operating devices powered by and from remote adjacent networked devices or from a dedicated, remote, 120vac power supply.
- 2.08 NETWORK CONTROL UNIT
- A. Description: Solid state, microprocessor based, electronic device that provides for, and stores, real time-based scheduling and programming of devices connected to the network, as well as providing an interface to the building LAN, BAS, or remote PC.
  - B. Provides a gateway for loading and retrieving system software to and from remote LAN, BAS, or PCs for the purpose of programming, monitoring, and performing diagnostic and troubleshooting functions of the lighting control system/network devices and components.
  - C. Control Voltage, Class 2 (15-28VDC) operating device.
  - D. Enclosure: Surface wall sheet metal enclosure for field installation of network control modules. Provide integral 120VAC to 15-28VDC power supply to power network devices. Provide integral 120VAC duplex receptacle.
- 2.09 POWER SUPPLY UNITS FOR LOW VOLTAGE CONTROL DEVICES
- A. Description: Self-Contained transformer/rectifier/relay devices consisting of:
    1. Transformer/rectifier to transform and rectify input primary voltage (120/277VAC) to 24VDC secondary voltage for connection to low voltage sensors, and to relay holding circuit.
    2. Single pole, nominal 20A, switching type relay with 24VDC holding circuit and output contacts rated as follows:

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3. Fluorescent Ballasted Loads – 20A
    - a. Incandescent Type Loads – 20A
    - b. Motor Loads – 1HP @ 120V AC.
  4. Shall provide vacancy sensing mode operation of connected sensors and switches.
  - B. Relay: Where an isolated relay is not provided integral to an automatic sensor, the power supply shall provide the relay.
    1. Relay shall be 1PDT, rated not less than 1A @ 30VDC.
- 2.10 CONDUCTORS AND CABLES
- A. Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 26 27 26 - Wiring Devices.
  - B. Network Interconnect Cable: For field interconnection of the lighting control equipment's peripheral networked devices, automatic sensors, switches, dimmers, etc..
    1. Provide manufacturer specific, multi-conductor jacketed cable with copper conductors as directed by the equipment manufacturer.
    2. Provide pre-terminated and unterminated cables as directed by the equipment manufacturer.
    3. Provide a full conduit system for the lighting control cabling.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that ratings and configurations of system components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive system components.
- D. Verify that conditions are satisfactory for installation prior to starting work.

#### 3.02 INSTALLATION

### ~~~~~ PROJECT NOTE ~~~~~

INDICATE WIRING METHOD ON DRAWINGS.

### ~~~ END OF PROJECT NOTE ~~~

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, except for mounting heights specified in those standards.
  - B. Install products in accordance with manufacturer's instructions.
  - C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
  - D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
  - E. Define each dimmer/relay load type, assign each load to a zone, and set control functions.
  - F. LED Light Engine/Array Lead Length: Do not exceed 100 feet.
  - G. Identify system components in accordance with Section 26 05 53 - Identification for Electrical Systems.
    1. Label each dimmer module with a unique designation.
    2. Label each scene control button with approved scene description.
- 3.03 FIELD QUALITY CONTROL
- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

- B. Contractor shall inspect, test, and adjust components, assemblies, and equipment installations, including connections and report results in writing.
  - C. Tests and Inspections:
    - 1. Continuity tests of circuits.
    - 2. Operational Test: Set and operate controls to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.
      - a. Include testing of modular dimming control equipment under conditions that simulate actual operational conditions. Record control settings, operations, cues, and functional observations.
  - D. Remove and replace malfunctioning modular dimming control components and retest as specified above.
  - E. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible agency and representative.
  - F. Reports: Written reports of tests and observations. Record defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.
- 3.04 CLEANING
- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.
- 3.05 COMMISSIONING AND DEMONSTRATION
- A. See Section 01 91 13 - General Commissioning Requirements for commissioning requirements.
  - B. After system checkout and adjustment, the contractor shall operate the system for the review of the owner and architect. Necessary adjustments or modifications shall be made as required by the owner or architect.
- 3.06 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. Contractor shall prepare and submit a complete set of record drawings, test reports, operation and maintenance data and certificates as outlined in this Section.
  - D. Training: Train Board's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
    - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
    - 2. Provide minimum of (2) sessions of four hours of training. Provide recording of one of the sessions for future use.
    - 3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.
    - 4. Location: At project site.
- 3.07 PROTECTION
- A. Protect installed products from subsequent construction operations.

**END OF SECTION**