

Division 26

26 09 43 Network Lighting Controls

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

A. Unified Lighting Control System shall consist of BACnet native lighting controllers, Centralized Panels and/or Distributed Controllers, which reside on the BACnet MS/TP network of the Building Automation System (BAS). The Unified Lighting Control System shall be an integral part of the BAS such that the operator experiences one unified system of controlling, monitoring, scheduling, trending, alarming, etc.

1. Systems that require option card, gateway or protocol translator are not acceptable.
 - a. BACnet MSTP/IP Routers are acceptable when detailed on the drawings.
2. Systems that require separate master controller, server, or front-end computer are not acceptable.
3. Systems that require client or server licensing are not acceptable.
4. Systems that have an actuation time greater than 100 milliseconds are not acceptable. Actuation time is measured from an occupant signal (via low voltage field device; addressable stations, occupancy sensors, wall switches, etc.) to the first relay actuation. Succeeding relays may be delayed to minimize peak demand.

B. Unified Lighting Control System shall also consist of, as detailed on the drawings, Satellites and low voltage field devices such as; Stations, occupancy sensors, wall switches, and light level sensors.

1. Systems utilizing pre-manufactured cables or proprietary wire to connect low voltage field devices to Centralized Panels, Distributed Controllers, or Satellites are not acceptable.

C. Unified Lighting Control System shall directly control the lighting as specified in this Section 3.6 – Sequence of Operations for Unified Lighting Controls.

1.2 SCOPE OF WORK

A. The BAS Controls Contractor shall furnish all components of the Unified Lighting Control System as detailed on the drawings and specifications. These components shall consist of Centralized Panels, Distributed Controllers, Satellites, and low voltage field devices such as Stations, occupancy sensors, wall switches, and light level sensors. The BAS Controls Contractor shall provide the Electrical Contractor all necessary documents, including approved submittal package, riser diagrams and termination schematics required to provide a complete and correct installation.

B. The Electrical Contractor under Division 26 shall furnish all labor to install the Unified Lighting Control System furnished by the BAS Controls Contractor.

The Electrical Contractor shall receive the Unified Lighting Control System components from the BAS Controls Contractor and store them in a secure and dry location. The Electrical Contractor shall provide all of the required materials (conduit, raceways, wire, etc.) and make all of the line and low voltage wiring terminations for the furnished equipment to ensure the Unified Lighting Control System functions properly and in accordance with the specifications and drawings. The Electrical Contractor shall provide installation as-built drawings to the BAS Controls Contractor.

1.3 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are part of this specification and shall be used in conjunction with this section as part of the contract documents.

B. The following sections constitute related work:

1. Section 23 09 23 – Direct Digital Control System for HVAC
2. Section 25 00 00 – Integrated Automation
3. Section 25 56 00 - Integrated Automation Control of Electrical Systems
4. Section 26 05 00 - Common Work Results for Electrical
5. Section 26 06 00 - Schedules for Electrical
6. Section 26 09 23 – Wiring Devices
7. Section 26 09 43 – Network Lighting Controls

1.4 QUALITY ASSURANCE

A.

1.5 CODES AND STANDARDS

A. Work, materials, and equipment shall comply with the most restrictive of local, state, and federal authorities' codes and ordinances or these plans and specifications. As a minimum, the installation shall comply with current editions in effect 30 days prior to receipt of bids of the following codes:

1. National Electric Code (NEC)
2. International Building Code (IBC)
3. International Energy Conservation Code (IECC)
4. National Electrical Manufacturer Association (NEMA)
5. ANSI/ASHRAE 135-2010 Rev 12: Data Communication Protocol for Building Automation and Control Systems (BACNET)
6. Underwriters Laboratory (UL) – UL916 Energy Management, UL508A Industrial Control Panels, and UL924 Emergency Lighting and Power Equipment.

1.6 CONTRACTOR PROVIDED SUBMITTALS

A. The Electrical Contractor shall provide complete and accurate as-built drawings to BAS Controls Contractor prior to Unified Lighting Control System Check-out and Testing.

- B. The Electrical Contractor shall provide as-built drawings that document all wiring termination information necessary to configure, troubleshoot and complete the Unified Lighting Control System, including but not limited to:
1. Low voltage network wiring information;
 - a. Type and quantity wires
 - b. Distance and route of each wire run
 - c. Terminations performed at each device
 - d. Junctions performed between devices, if any
 2. Low voltage wiring for low voltage field devices;
 - a. Type and quantity wires
 - b. Distance and route of each wire run
 - c. Terminations performed at each device
 - d. Junctions performed between devices, if any
 3. Line voltage wiring for Centralized Panels, Distributed Controllers, and Satellites;
 - a. Circuit identifications and load designation for each relay / line voltage output
 - b. Circuit identification for feed to each control power transformer or power source.

1.7 Warranty

- A. Electrical Contractor shall provide twelve (12) month warranty on the installation of the Unified Lighting Control System. Warranty shall include all labor and materials furnished (including but not limited to; pipe, wire conduit, fasteners, junction boxes, switch boxes, raceways, and face plates) and all line and low voltage wiring terminations. If within twelve (12) months from the date of acceptance of the Unified Lighting Control System, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the Electrical Contractor.

PART 2 PRODUCTS

1.1 APPROVED PRODUCTS AND SUPPLIERS

- A. Basis of design is Unified Lighting Control System by Blue Ridge Technologies, Marietta GA (800-241-9173) furnished by the BAS Controls Contractor listed below:

B. Approved Manufacturer and BAS Controls Contractor:

Manufacturer	BAS Controls Contractor
Blue Ridge Technologies	<Automated Logic Dealer or Branch>
Blue Ridge Technologies	<Johnson Controls>
Blue Ridge Technologies	<Siemens Industry>
Competitor a	<BAS Controls Contractor X>
Competitor b	<BAS Controls Contractor Y>
Competitor c	<BAS Controls Contractor Z>

C. All proposed Manufacturer and BAS Controls Contractor substitutions must be submitted in writing for approval by the design professional (electrical or mechanical) a minimum of ten (10) working days prior to the bid date. Proposed substitutions must be accompanied by a review of the specification noting compliance on a line-by-line basis.

D. BAS Controls Contractors using pre-approved substitutions accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring. In addition, the BAS Controls Contractor shall provide complete engineered shop drawings including power and control wiring with deviations from the original design highlighted in an alternate color to the engineer for review and approval prior to rough-in.

1.2 CENTRALIZED PANELS

A. The Electrical Contractor shall install Centralized Panels as detailed on drawings.

1. The BAS Controls Contractor under Division 25 shall furnish Centralized Panels as detailed on drawings.

1.3 DISTRIBUTED CONTROLLERS

A. The Electrical Contractor shall install Distributed Controllers as detailed on drawings.

1. The BAS Controls Contractor under Division 25 shall furnish Distributed Controllers as detailed on drawings.

1.4 SATELLITES

A. The Electrical Contractor shall install Satellites as detailed on drawings.

1. The BAS Controls Contractor under Division 25 shall furnish Satellites as detailed on drawings.

1.5 LOW VOLTAGE WALL SWITCHES

A. The Electrical Contractor shall install low voltage wall switches as detailed on drawings.

1. The BAS Controls Contractor under Division 25 shall furnish Low Voltage Wall Switches as detailed on drawings.
2. The Electrical Contractor shall furnish and install all face plates with labels or engraving as required. The BAS Controls Contractor under Division 25 shall provide the text for labeling of all faceplates.
3. Line voltage wall switches that are not part of the Unified Lighting Control System shall be furnished and installed by the Electrical Contractor, under Division 26
4. Low voltage switches shall be gang-able with other low voltage decorator style devices under a common face plate.

1.6 LOW VOLTAGE STATIONS

A. The Electrical Contractor shall install low voltage stations and shall set the station address as detailed on drawings.

1. The BAS Controls Contractor under Division 25 shall furnish low voltage stations as detailed on drawings.
2. The Electrical Contractor shall furnish and install all face plates with labels or engraving as required. The BAS Controls Contractor under Division 25 shall provide the text for labeling of all faceplates.
3. Low voltage stations shall be gang-able with other low voltage decorator style devices under a common face plate.

1.7 LOW VOLTAGE LIGHT LEVEL SENSORS

A. The Electrical Contractor shall install low voltage light level sensors as detailed on drawings.

1. The BAS Controls Contractor under Division 25 shall furnish low voltage light level sensors as detailed on drawings.
2. Refer to approved BAS Controls Contractor documents for location.

1.8 LOW VOLTAGE OCCUPANCY SENSORS

A. The Electrical Contractor shall install low voltage occupancy sensors and shall set the time-out value as detailed on drawings.

1. The BAS Controls Contractor under Division 25 shall furnish low voltage occupancy sensors as detailed on drawings.
2. Line voltage occupancy sensors that are not part of the Unified Lighting Control System shall be furnished and installed by the Electrical Contractor, under Division 26.
3. All low voltage occupancy sensor timers shall be set to the minimum setting, 1 minute or less, by the installer.
4. All low voltage occupancy sensor adjustments for sensing area / coverage shall be set by the installer. Installer shall be responsible for any fine tuning of settings to provide proper operation.

- 1.9 LINE VOLTAGE OCCUPANCY
- A. BAS Controls Contractor shall provide line voltage occupancy sensors that are directly connected to the Unified Lighting Control System.
1. Electrical Contractor under Division 26 shall install all line voltage occupancy sensors as detailed on the drawings and in accordance with the manufacturer's recommendation.
- B. Line voltage occupancy sensors that are not part of the Unified Lighting Control System shall be furnished and installed by the Electrical Contractor, under Division 26.

- 1.10 LINE VOLTAGE SWITCHES
- A. All line voltage switches shall be furnished and installed by the Electrical Contractor, under Division 26.

PART 3 EXECUTION

1.1 Installation

- A. Install and wire all Unified Lighting Control System equipment furnished by the BAS Controls Contractor. All work, materials and equipment shall comply with the most restrictive of local, state, and federal authorities' codes and ordinances or these plans and specifications. As a minimum, the installation shall comply with current editions in effect 30 days prior to receipt of bids of the following codes:
1. National Electric Code (NEC)
 2. International Building Code (IBC)
 3. International Energy Conservation Code (IECC)
 4. ANSI/ASHRAE 135-2004: Data Communication Protocol for Building Automation and Control Systems (BACNET)
 5. Underwriters Laboratory (UL) – UL 916 Energy Management, UL 508 Industrial Control Equipment, and UL 924 Emergency Lighting and Power Equipment.
- B. Installation shall include all low voltage wiring and terminations in accordance with the drawings and submittals provided by the BAS Controls Contractor, including wiring and terminations;
1. between Centralized Panels Distributed Controllers, & Satellites and low voltage field devices (including but not limited to low voltage switches, low voltage stations, low voltage occupancy sensors, and low voltage light level sensors).
 2. between Centralized Panels, Distributed Controllers, & Satellites and the 0-10Vdc dimming ballast(s). Applies to 0-10V DC dimming ballasts control leads (violet & grey) that are wired as CL2.
- C. Installation shall include all line voltage wiring and terminations in accordance with the drawings and submittals provided by the BAS Controls Contractor, including wiring and terminations;

1. between Centralized Panels, Distributed Controllers, & Satellites and line voltage loads.
 2. between Centralized Panels, Distributed Controllers & Satellites and the 0-10Vdc dimming ballast(s). Applies to 0-10VDC dimming ballasts control leads (violet & grey) that are wired as CL1.
- D. Installation shall include all low voltage network wiring and terminations in accordance with the drawings and submittals provided by the BAS Controls Contractor, including wiring and terminations;
1. The BACnet network
 2. Addressable station and satellite controller network.
- 1.2 Programming
- A. All programming of the Unified Lighting Control System as specified shall be furnished by the BAS Controls Contractor under Division 25.
- B. The Electrical Contractor shall provide complete and accurate as-built drawings to BAS Controls Contractor upon completion of installation.
- 1.3 System Checkout and Testing
- A. Prior to system check-out and testing by the BAS Controls Contractor, the Electrical Contractor shall verify that all line and low voltage wiring is properly connected and free of shorts and ground faults. Verify that terminations are tight.
- B. Prior to system check-out and testing by the BAS Controls Contractor and prior to final termination of control leads at Centralized Panel, Distributed Controllers, & Satellites the Electrical Contractor shall demonstrate to BAS Controls Contractor that all 0-10Vdc dimming ballasts operate as follows:
1. Open 0-10Vdc control leads to demonstrate that all 0-10Vdc dimming ballasts connected achieve full (100%) light output.
 2. Short 0-10Vdc control leads to each other to demonstrate that all 0-10Vdc dimming ballasts connected achieve minimum (typically 5%) light output.
 3. Lamp flicker, tiger tails, or irregularities with the 0-10Vdc dimming ballasts are not acceptable. Replace, re-wire, or repair 0-10Vdc dimming ballast as required.
 4. Lamps shall be operated at full output for 100 continuous hours prior to system check-out and testing.
- 1.4 Control System Demonstration and Acceptance
- 1.5 After tests described in this specification are performed by the BAS Controls Contractor to the satisfaction of the Engineer, Engineer will accept control system as meeting completion requirements. Engineer may exempt tests from completion requirements that cannot be performed due to circumstances beyond Contractor's control. Engineer will provide written statement of each exempted test.
- 1.6 System shall not be accepted until completed demonstration forms and checklists are submitted and approved.

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