

**SECTION 26 09 63**

**THEATRICAL LIGHTING CONTROLS INSTALLATION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. The work of this Section includes all labor, materials, equipment and services necessary to install the electrical work associated with the Theatrical Lighting Controls, as described in Section 260961 and shown on the Drawings.
- B. Related sections include the following:
  - 1. Theatrical Lighting Controls
  - 2. Common Work Results for Electrical
  - 3. Architectural Lighting Fixtures
  - 4. Rigging Systems and Controls
  - 5. Catwalks

**1.3 QUALITY ASSURANCE AND STANDARDS**

- A. References to code, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies will refer to the latest edition of such publications adopted and published prior to submittal of the bid. All such codes and standards will be considered a part of this specification as if they were fully included herein.
- B. Work and materials shall comply with the rules and recommendations of:
  - 1. Prevailing national, state and local building codes.
  - 2. UL, ETL, cUL, CSA and CE Labels – where materials and equipment are available under the continuing inspection and labeling service of applicable independent product testing and certification services, provide such labels, materials, and equipment.
  - 3. National Fire Protection Associate (NFPA) Publication: National Electrical Code, NFPA70 as applicable to installation and construction of stage lighting and control equipment.
  - 4. NEMA Compliance pertaining to components of stage lighting equipment.

5. United States Institute for Theatre Technology, Inc. (USITT) DMX512/1990 (ANSI E1.11-2004).
6. ANSI/PLASA Remote Device Management (ANSI/PLASA E1.20 RDM) and Architecture for Control Networks (ANSI E1.17-2006, E1.31) standards.
7. Institute of Electrical and Electronics Engineers, Inc. (IEEE) 802.3af and 802.11n.
8. BSR/ASHRAE Standard 135 (ISO 16484-5) BACnet protocol.

#### 1.4 **CERTIFICATIONS**

- A. The Contractor shall submit (as part of the Owner's Manual) certificates from the manufacturer stating that the installed system is operating properly and complies with the manufacturer's recommendations. This information shall be incorporated in the Owner's Manual, as described in 260961
- B. The Contractor shall submit a certificate that the Ethernet system has been tested and complies with all IEEE 802.3, ISO/IEC 8802-3 and PLASA standards. This information shall be incorporated as an appendix to the Owner's Manual, as described in Theatrical Lighting Controls.

#### 1.5 **WARRANTY**

- A. In addition to the stage lighting controls manufacturer's warranty, provide warranty of the systems and equipment to be free of faulty workmanship or improper adjustment for a period of one year from the date of Owner's acceptance.
- B. Replace items showing evidence of defective materials or workmanship within thirty days after notification. Make repairs without any cost to the Owner.
- C. Resolve any conditions that might present a serious hazard to human life within 24 hours of notification by Owner.

### **PART 2 - PRODUCTS**

#### 2.1 **MATERIALS**

- A. Materials as specified under Division 26.

### **PART 3 - EXECUTION**

#### 3.1 **PROTECTION OF EQUIPMENT**

- A. Protect the equipment in this and Related Sections from damage and deterioration during all phases of the work, from the time of manufacture to the acceptance of the completed installation.
- B. The Theatrical Lighting Controls equipment furnished under Section 260961 will become responsibility of the installer until Owner's final acceptance.

### 3.2 INSTALLATION

- A. Install stage lighting controls system as located on the drawings. Installation shall be in accordance with manufacturer's written instructions, recognized industry practice, and applicable requirements of the National Electrical Code and UL standards.
- B. All load circuit conductors and data wiring for these systems shall be installed in metallic conduit, metal wireways, surface metal raceways, or other approved cable containment. All conduits for these systems shall be 1" minimum. Heavy wall, rigid, galvanized steel conduit shall be installed where exposed or where required by Code. Electrical Metallic Tubing (EMT) may be installed concealed in hung ceilings or walls. Flexible conduit shall be only used for short lengths. Use of armored cable shall not be accepted without prior approval. Aluminum conduit and wire shall not be used.
- C. Voltage separation shall be maintained between line voltage, low voltage and data wiring.
- D. All load circuit conductors shall be continuous from the dimmer room to the outlet devices or architectural fixture.
- E. All dimmer rack load circuits must have individual neutral conductors. Neutral conductors must be routed directly adjacent to the live conductors of each circuit.
- F. All data wiring shall be continuous from termination point to termination point; no splices or inline connectors shall be allowed.
- G. Field terminations in these systems shall be as follows:
  - 1. Main feed wires shall terminate in pressure lugs on buss bars.
  - 2. Branch load wires shall terminate on screw terminals on barrier terminal blocks, circuit breakers and switches.
  - 3. Control wires shall terminate on screw terminals on barrier terminal blocks and switches, or as noted.
  - 4. Ethernet cables shall be installed and tested in compliance with all IEEE 802.3.ISO/IEC 8802-3 and ETSA standards.
- H. Wire nuts and field soldered connections, except where noted, are not acceptable in these systems.
- I. These systems shall be grounded, as shown on drawings and in accordance with applicable codes and regulations and/or at the advice of the Manufacturer.
- J. Network Cabling
  - 1. Theatrical lighting control system data cabling shown in Drawings to convey design intent only. Final quantities, types, and topologies shall be per the Manufacturer's approved shop drawings.
  - 2. Provide Fiber Optic Cable as required for all runs greater than 90 meters (300') or as specifically shown in the Drawings.
    - a. Confirm all cable routing distances to determine appropriate use of fiber runs.

- b. Cable shall be 62.5/125 $\mu$ m fiber optic cable as required to support network components.
  - c. Cable shall exceed the IEEE802.3z Gigabit Ethernet Fiber specification for 62.5/125 $\mu$ m fiber.
  - d. Cable shall exceed the TIA/EIA 568B Fiber specification.
3. Provide UTP Cable as required for all runs under 90 meters (300') unless specifically shown as Fiber Optic Cable in the Drawings.
- a. Copper cabling and connecting hardware shall fully comply with TIA/EIA 568B standards and with the standard installation of Category 5E products.

### 3.3 COMMISSIONING

- A. Prior to energization of the system, perform the following tests and inspections following the instructions of the equipment Manufacturer's on-site engineering representative. Correct deficiencies and retest deficient items.
1. Inspect each outlet, faceplate, device and loose equipment for defects, finish failure, corrosion, physical damage, correct labeling, and nameplate.
  2. Perform operational tests on mechanical parts and operable devices according to manufacturer's instructions or routine functional operation.
  3. Check tightness of electrical connections with torque wrench calibrated within the previous six (6) months using Manufacturer's recommended torque values.
  4. Perform continuity testing of each branch load circuit receptacle, determining correct polarity of wiring and correspondence between circuit numbers and labeling. Continuity Test Report shall be available upon request. Any problem(s), i.e. open circuit, short circuit, wrong termination, etc. shall be rectified in a timely manner and re-tested.
  5. Test and certify Ethernet network for compliance with all IEEE 802.3, ISO/IEC 8802-3 and ANSI/PLASA standards. Network Compliance Test Report shall be available upon request. Any problem(s), i.e. cable length exceeding standards, open circuit, short circuit, wrong termination, etc. shall be rectified in a timely manner and re-tested. Submit final test report data and letter of certification for inclusion as an appendix to the Manufacturer's Instruction and Maintenance Manual.
- B. Energization of the system shall only commence following written approval of the Manufacturer, and shall take place in the presence of the Manufacturer's on-site engineering representative.
- C. In conjunction with the Manufacturer's engineering representative, measure and adjust the full dimmer output voltage at each stage lighting receptacle. Typical voltage shall be uniform at each receptacle regardless of branch wiring length. Specific voltage requirements shall be determined by the Theatre Consultant or Electrical Engineer.

### 3.4 DEMONSTRATION AND ACCEPTANCE

- A. The Architect and its representative shall witness a full demonstration of each feature of each piece of equipment in the system.

1. Contractor shall provide all necessary personnel and equipment to demonstrate fully the system's compliance to the specifications.
  2. Contractor's project representative shall be present during testing as required.
  3. Full and uninterrupted access to all areas shall be provided as necessary for complete testing and demonstration.
  4. All loose equipment provided under this and Related Sections shall be on site and available for testing.
  5. All architectural lighting fixtures circuited to the dimming system shall be installed and lamped.
- B. Subject to the on-site demonstration being satisfactory, the owner's representative shall accept the equipment on behalf of the Owner.
- C. Should the demonstration prove unsatisfactory, the Theatre Consultant and the Architect will inform the Contractor in writing, and the Contractor shall rectify the problems. Problems should be rectified in the shortest time possible. During this period of remedial work, the Owner shall have beneficial use of the equipment. The Warranty period shall commence upon final acceptance by the Owner.