

## **SECTION 26 51 13**

### **INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS**

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#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Electronic Dimmable Ballasts.
    - a. DALI Ballast
  
- B. Related Information:
  - 1. Division 26 "Network Lighting Controls" for network-connected light dimming control panels.
  - 2. Division 26 "Network Power Switching Controls" for network-connected light control panels.
  - 3. Division 26 Section "Common Work Results For Electrical".
  - 4. Division 26 Section "Lighting Control Devices" for occupancy sensors, photoelectric sensors.
  - 5. Division 12 Section "Window Treatments" for window treatments controlled by network microprocessor controllers.
  - 6. Division 27 Section "Communications Horizontal Cabling" for communications cabling requirements for network devices.

##### **1.2 REFERENCES**

- A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)
  - 1. C62.41-1991 – Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
  
- B. Underwriters Laboratories, Inc. (UL):
  - 1. UL935, Class P, Type CC, Type HL, Type 1 outdoor
  
- C. Canadian Standards Association (CSA):
  - 1. C22.2 No. 74-96 Equipment for Use With Electric Discharge Lamps
  
- D. Federal Communications Commission (FCC):
  - 1. FCC Title 47 Telecommunications CFR Part 18, Non-consumer for EMI/RFI

- E. California Energy Commission (CEC):
  - 1. CEC CCR Title 24, Part 6: California Energy Efficiency Standards for Residential and Nonresidential Buildings, California's Appliance Efficiency Program: Listed lighting control devices.
- F. End of Life Protection (EOL):
  - 1. EOL

### **1.3 DEFINITIONS**

- A. Daylight Harvesting: The dimming of electric lighting sources when natural daylight is available.
- B. DALI: Digital addressable lighting interface.
- C. Load Shedding: Intentional reduction of power consumption to avoid total power disruption due to overloading the circuits or reduction of power consumption to avoid crossing an agreed on threshold of power usage. Load shedding lighting ballasts reduce the light level in response to a signal on the power line.
- D. Monitor: Acquisition and presentation of status or operating condition of microprocessors or electrical devices in the network of the monitoring device or program.
- E. Scene: Predetermined position of shades and light levels.
- F. Scene Selection: Grouping of lighting and window shade controls into groups that will respond to a single scene command.
- G. Transmission Control Protocol/Internet Protocol (TCP/IP): Networking protocols for exchanging data over the World Wide Web and Local Area Networks.

### **1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product required for complete electronic dimmable ballast system, demonstrating compliance with requirements.
- B. Shop Drawings: Indicate the following:
  - 1. Schematic diagram showing complete electronic dimmable ballast system and integrated control equipment and accessories.
  - 2. Describe Circuits and emergency circuits with capacity and phase, control zones, load type and voltage per circuit.

### **1.5 INFORMATIONAL SUBMITTALS**

- A. Sample of manufacturer's warranty.

### **1.6 CLOSEOUT SUBMITTALS**

- A. Operating and maintenance instructions.
- B. Record drawings of electronic dimmable ballast system.

- C. Provide copy of warranty.

## **1.7 QUALITY ASSURANCE**

- A. **Manufacturer Qualification:** Manufacturer of DALI-compliant network lighting ballasts with minimum 10 years record of satisfactory manufacturing and support of lighting and control components.
- B. **Source Requirements:** Provide DALI-compliant ballasts through a single source from a single manufacturer.

## **1.8 COORDINATION**

- A. Coordinate electronic dimmable ballast system with systems and components specified in the following sections:
  - 1. Division 26 Section "Network Lighting Controls".
  - 2. Division 11 Section "Audio-Visual Equipment".
  - 3. Division 12 Section "Window Treatments".
  - 4. Division 23 Section "Instrumentation and Control for HVAC".
  - 5. Division 25 Section "Integrated Automation Control of Electrical Systems".
  - 6. Division 26 Section "Network Lighting Controls".
  - 7. Division 26 Section "Panelboards".
  - 8. Division 26 Section "Wiring Devices".
  - 9. Division 26 Section "Lighting Devices".
  - 10. Division 26 Section "Interior Lighting".
  - 11. Division 27 Section "Communications Horizontal Cabling".
  - 12. Division 28 Section "Electronic Access Control and Intrusion Detection".

## **1.9 PROJECT CONDITIONS**

- A. **Environmental Conditions Range:**
  - 1. Temperature: 32 – 104 deg F (0 - 40 deg C).
  - 2. Relative Humidity: 10 – 90 percent, noncondensing.

## **1.10 WARRANTY**

- A. **Special Warranty:** Manufacturer's standard form in which manufacturer agrees to repair or replace ballast units that fail in materials or workmanship within the specified warranty period following substantial completion.
  - 1. **Warranty Period:** Ballast unit, 5 years.
- B. **Manufacturer's Basic Support Service:** Telephone support: Unlimited period.
- C. **Manufacturer's Extended Support and Maintenance Program:** Provide proposal to Owner for manufacturer's annually-renewable extended support and maintenance program to consist of the following:

1. Parts and labor required for system maintenance.
2. Technical hotline support.
3. Remote diagnostics and programming support.
4. Annual on-site maintenance visit to provide preventive maintenance, staff training, and limited re-programming.
5. Response time for on-site system maintenance: [24 hour] [72 hour].

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products of **Crestron Electronics, Inc., Rockleigh, NJ 07647**, Phone (800)237-2041, Fax: (201)767-1903, [www.crestron.com](http://www.crestron.com) with the following components and characteristics.

### **2.2 DALI BALLAST**

- A. Single Lamp DALI Ballast:
  1. T5 Lamp:
    - a. Lamp power: 14W, 21W, 28W, and 35W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T5-114/35**
  2. T8 Lamp:
    - a. Lamp power: 17W, 28W, and 32W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T8-117/32**
  3. T5HO Lamp:
    - a. Lamp power: 24W and 39W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T5HO-118/40**
  4. T5HO Lamp:
    - a. Lamp power: 54W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T5HO-154/58**
- B. Single Lamp DALI Ballasts with built in power monitoring:
  1. T5 Lamp:
    - a. Lamp power: 14W, 21W, 28W, and 35W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T5-114/35-PM**
  2. T8 Lamp:
    - a. Lamp power: 17W, 28W, and 32W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T8-117/32-PM**
  3. T5HO Lamp:
    - a. Lamp power: 24W and 39W

- b. Basis of Design Product: **Crestron, GLB-DALI-T5HO-118/40-PM**
    - 4. T5HO Lamp:
      - a. Lamp power: 54W
      - b. Basis of Design Product: **Crestron, GLB-DALI-T5HO-154/58-PM**
- C. Dual Lamp Ballasts:
  - 1. T5 Lamp:
    - a. Lamp power: 14W, 21W, 28W, and 35W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T5-214/35**
  - 2. T8 Lamp:
    - a. Lamp power: 17W, 28W, and 32W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T8-217/32**
  - 3. T5HO Lamp:
    - a. Lamp power: 24W and 39W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T5HO-218/40**
  - 4. T5HO Lamp:
    - a. Lamp power: 54W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T5HO-254/58**
- D. Dual Lamp Ballasts with built in power monitoring:
  - 1. T5 Lamp:
    - a. Lamp power: 14W, 21W, 28W, and 35W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T5-214/35-PM**
  - 2. T8 Lamp:
    - a. Lamp power: 17W, 28W, and 32W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T8-217/32-PM**
  - 3. T5HO Lamp:
    - a. Lamp power: 24W and 39W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T5HO-218/40-PM**
  - 4. T5HO Lamp:
    - a. Lamp power: 54W
    - b. Basis of Design Product: **Crestron, GLB-DALI-T5HO-254/58-PM**
- E. General:
  - 1. Ballast shall be controlled by a low voltage DALI controller.
  - 2. Ballast average service life while operating at 60 degrees Celsius ambient, shall be 50,000 hours.

3. Ballast failure rate per 1000 hours operating at 60 degrees Celsius ambient, shall be 0.2 percent or less.
4. Ballast housing shall be constructed of painted metal with no sharp edges.
5. Ballast unit shall be plenum rated.
6. Wiring termination: push button terminal block with angled wire entry.
7. Ballast remote mounting: up to 36 inches.
8. Internal soldering shall be lead free RoHS compliant.
9. Ballast shall be physically interchangeable with standard dimming ballasts.
10. Ballast shall start lamp at any dimming position.
11. Ballast start time shall be 1.0 second or less.
12. Ballast shall be Programmed Rapid Start type.
13. Ballast shall automatically shutdown in case of lamp failure condition.
14. Ballast shall be provided with mis-wire protection circuitry.
15. Ballast shall be provided with short circuit and open circuit protection circuitry.
16. Ballast shall contain automatic restart circuitry in order to restart lamps after lamp replacement.
17. Ballast input source:
  - a. Frequency: 50-60 Hz
  - b. Rated Voltage: 120V through 277V
  - c. Input Voltage Range: 108V through 305V
18. Ballast operating within rated voltage and frequency shall tolerate voltage and frequency variations of plus or minus 10% percent without damage to ballast or lamps.
19. Ballast shall be high frequency electronic type with a minimum lamp operating frequency of 42KHz.
20. Ballast Power Factor at full light output shall be greater than 0.98.
21. Ballast Power Factor across dimming range shall be greater than 0.90.
22. Ballast shall have a minimum ballast factor of 1.0 at maximum light output.
23. Ballast shall have a minimum ballast factor of 0.03 at minimum light output.
24. Ballast shall provide a Lamp Current Crest Factor of 1.7
25. Ballast input current shall have Total Harmonic Distortion of less than 10 percent when operated in full light output.
26. Ballast shall have a Class A sound rating.
27. Minimum operating ambient temperature: 10 degrees Celsius
28. Maximum operating ambient temperature: 50 degrees Celsius
29. Ballast shall provide Lamp End of Life protection.
30. Ballast shall provide a dimming range of 1 percent to 100 percent.
31. Ballast power consumption in standby mode shall be 0.25 watts or less.

32. Control
  - a. Ballast shall connect directly to a standard DALI control interface.
  - b. Ballast shall communicate with DALI compatible devices.
  - c. Ballast shall support standard DALI protocol.
  - d. Ballast shall communicate with control processor through DALI to control network interface.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Prior to installation, examine work area to verify measurements, and that commencing installation complies with manufacturer's requirements.

#### **3.2 PREINSTALLATION MEETING**

- A. Installer of Electronic Ballast Lighting System to coordinate a meeting of the mechanical and electrical engineer, mechanical and electrical contractor, lighting, window shade and HVAC equipment manufacturers. Include any designers and contractors for any other direct digital control system designed to interact with product of this Section.
  1. Discuss interconnection and interoperability of other equipment with Electronic Ballast Lighting System.

#### **3.3 INSTALLATION**

- A. Comply with requirements of Division 26 Sections "Common Work Results for Electrical."
- B. Install Electronic Ballast in accordance with manufacturer's instructions.
- C. Grounding: Provide electrical grounding in accordance with NFPA 70.

#### **3.4 SYSTEM STARTUP**

- A. Provide manufacturer's system startup and adjustment.
- B. Switch each load on and off. Test dimming features. Test system integration to the satisfaction of engineer. Provide a written report of test and outcomes.
- C. Perform operational testing to verify compliance with Specifications. Adjust as required.

#### **3.5 ADJUSTING**

- A. Within 12 months of the date of Substantial Completion provide onsite service to adjust the system to account for actual occupied conditions.

#### **3.6 DEMONSTRATION**

- A. Factory authorized service representative to instruct owner's staff to adjust, operate and maintain electronic dimmable ballast systems; and provide instruction using the system software.

### **3.7 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Services: Qualified manufacturer's field representative to perform on-site system inspection, startup, and owner demonstration and training.
  - 1. Participation in Preinstallation Conference and pre-wire inspection.
  - 2. Owner programming conference.
  - 3. Owner demonstration and training.

### **3.8 CLOSEOUT ACTIVITIES**

- A. Demonstration: Schedule demonstration with Owner.
- B. Training:
  - 1. Furnish set of approved submittals and record drawings of actual installation for Owner's personnel in attendance at training session.

**END OF SECTION 26 51 13**