

THE UNIVERSITY OF ALABAMA IN HUNTSVILLE
LIGHTING SYSTEMS AND CONTROLS SPECIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires and accessories.
- B. Exterior luminaires and accessories.
- C. Emergency lighting units.
- D. Exit signs.

1.02 REFERENCES

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; latest version.
- B. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; latest version.
- C. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low Pressure Sodium Lamps (Multiple-Supply Type); latest version.
- D. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; latest version.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; latest version.
- F. NECA 90 - Standard for Commissioning Building Electrical Systems; National Electrical Contractors Association; latest version.
- G. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; latest version.
- H. NECA/IESNA 501 – Standard for Installing Exterior Lighting Systems; National Electrical Contractors Association; latest version.
- I. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; National Electrical Contractors Association; latest version.
- J. NECA/IESNA 503 - Standard for Installing Fiber Optic Lighting Systems; National Electrical Contractors Association; latest version.
- K. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; latest version.
- L. NFPA 70 - National Electrical Code; National Fire Protection Association; latest version.
- M. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; latest version.
- N. ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings; latest version.

1.03 LIGHTING LEVELS

- A. Interior (light level shall be measured at the designed working level)
 - a. Classroom areas, conference rooms, work/copier areas, fitness areas, computer rooms, electrical/mechanical/communication/audio/visual rooms and offices – 30 foot-candles and 50 foot-candles maximum

- b. Break rooms, restrooms, locker rooms, storage, janitorial areas, hallways, atrium, lobby and stairwells – 10 foot-candles minimum and 25 foot-candles maximum
 - c. Laboratory areas and kitchen areas – 50 foot-candles minimum and 70 foot-candles maximum
 - d. All other areas not designated shall be coordinated with the Director of Energy Management.
- B. Exterior
- a. Parking Lots – .5 foot-candles minimum with a maximum to minimum ratio of 15:1 or less.
 - b. Walkways – 2 foot-candles minimum with a maximum to minimum ratio of 20:1 or less.
 - c. Crosswalks – 5 foot-candles minimum with a maximum to minimum ratio of 10:1 or less.
 - d. All other areas not designated shall be coordinated with the Director of Energy Management.
- C. Accent Lighting
- a. Façade Lighting – Meet the requirements of ASHRAE 90.1
 - b. Landscape Lighting - Meet the requirements of ASHRAE 90.1
 - c. Building Entrance - Meet the requirements of ASHRAE 90.1
 - d. Sign Lighting - Meet the requirements of ASHRAE 90.1
- D. Emergency Lighting
- a. Emergency lighting shall be provided to meet the requirements of NFPA 101.
 - b. Invertor systems or generator power shall be used.
- E. Exit Signs
- a. Exit signs shall be LED type with self-diagnostics.
 - b. Directional arrows shall be installed as needed to meet the requirements of NFPA 101.

1.04 QUALITY ASSURANCE

- A. Conform to the requirements of NFPA 70 and NFPA 101.
- B. Conform to the requirements of ASHRAE 90.1 and provide a COMCheck analysis of all lighting included within the project.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 LUMINAIRES

- A. Florescent fixtures shall have premium efficiency program start ballasts.
- B. LED fixtures shall meet F90 requirements.
- C. No incandescent fixtures are allowed without written consent of the Director of Energy Management.

2.02 CONTROLS

- A. Passive Infrared units shall be installed in switch locations and used for:
 - a. Personal Restrooms (1 occupant).
 - b. Small Storage Rooms.
 - c. Janitors Closets.
 - d. Equipment Chases.
- B. Dual sensing technology units shall be installed in the ceiling space and used for:
 - a. Break Rooms.
 - b. Small Private Offices.
 - c. Copier Areas.
- C. Ultrasonic technology units with either dual switching or controlled dimming shall be installed in the ceiling space and used for:
 - a. Open Office Areas.
 - b. Large Restrooms (2 or more occupants).
 - c. Stairwells.
 - d. Corridors.
 - e. Computer Rooms.
- D. Manual switches shall be utilized for all mechanical and electrical rooms.
- E. Laboratory areas shall be analyzed to determine the most coverage and least amount of area needed for operations. This shall drive the switching arrangement to minimize the amount of needed lighting to be on at any given time. Exception: If safety is an issue in the reduction of light to the area due to switching, this must be coordinated and approved in writing from the Director of Energy Management.
- F. Daylight harvesting shall be utilized for large open atrium areas that meet the minimum requirements for NFPA 101 illumination of the path of egress.
- G. All other areas not designed above shall be coordinated with the Director of Energy Management.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install fixtures securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Controls shall be installed per manufacturer's instructions.
- C. All low voltage wiring shall be plenum rated and all junctions shall be installed in junction boxes. Power supplies, relays, and other control devices shall be installed in junction boxes.
- D. All low voltage wiring shall be supported at intervals not less than five feet and within six inches of a turn. Teflon coated "J" hooks with tie-wraps or other approved mechanical supports shall be utilized.
- E. The rooms shall be setup for a manual ON and an automatic OFF to maximize the energy savings. Exception: Hallways, restrooms, public access areas, reception areas, and information areas.
- F. All system programming shall clearly define the space name and room number for ease in troubleshooting and maintenance.
- G. All EnergiSavr Nodes shall be installed within mechanical rooms to allow ease of maintenance.
- H. Coordinate installation of equipment with manufacturer's one-line submittal.

- I. Provide and install an 11"x17" laminated floor plan showing the devices, controls, and lights with serial numbers and names.

3.02 FIELD QUALITY CONTROL

- A. The contractor shall maintain a quality control plan to maintain the integrity of the products before, during and after the installation.
- B. The control plan shall be submitted and approved by the UAH Director of Energy Management.

3.03 ADJUSTING AND PLACEMENT

- A. Denote the aiming and adjustments required for each type of luminaire.
- B. Lighting controls shall be adjusted for efficient coverage of the area.
- C. Lighting controls shall be placed as to maximize the coverage area while minimizing unwanted operation of lights for the area. (Example: Placing a corner mounted sensor at the main entrance to the room rather than placing a ceiling mounted sensor in the center of the room will reduce the likelihood of picking up incidental corridor traffic.)
- D. Placement of sensors shall be reviewed prior to installation to reduce impact from vibration and debris.
- E. Denote time settings for each type of control module to indicate the time delay settings as follows.
 - a. Interior area time delay shall be 10 minutes. (Except for locker rooms and restrooms)
 - b. Locker room and restroom time delay shall be 20 minutes.
 - c. Exterior area time delay shall be 15 minutes.
- F. Hallways and stairwells shall be set for bi-level illumination. The minimum level shall be as described within NFPA 101 for emergency egress during unoccupied use and shall increase to normal illumination when occupants are present. All fixtures shall have equal light intensity at each state of use (unoccupied and occupied).
- G. Each space shall be verified using a light meter to determine the illumination low end and high end trim is set in accordance with this specification.

3.04 CLEANING

- A. Clean electrical parts to remove conductive and deleterious materials.
- B. Remove dirt and debris from enclosures.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

3.05 DEMONSTRATION AND INSTRUCTIONS

- A. A full demonstration of the controls systems shall be provided to the engineer and UAH personnel. This shall include, but not limited to, normal use and operation of fixtures, control system programming, general maintenance and troubleshooting.
- B. Instructional material for each type of fixture and control device. The material shall be bound in a three ring binder and sub-divided by type and use. One CD copy of all materials in PDF format shall be included with the binder.

- C. A detail list of spare parts and suggested replacement parts in accordance with manufacturer's information. This material shall be included in the binder and on the CD listed above.

3.06 WIRELESS CONROLS

- A. Sensors shall be wireless and utilize a band to reduce interference with other frequencies.
- B. Batteries for each wireless sensor shall be a minimum of five year life expectance from final commissioning of the project and NOT after installation of sensor.
- C. The naming convention for the EnergiSavr Node System shall be Room#_ESN – last four digits of the serial number. The Room #_ESN shall be the room number where the ESN is located.
- D. The naming convention for the QSM shall be Room#_QSM – last four digits of the serial number. The Room#_QSM shall be the room number of the room that is located closest to the device.
- E. The naming convention for the Occupancy Sensor shall be Room#_Occ. The Room# shall be the room number of the room they are installed. If multiple sensors are installed, name the sensor Room#_LOcc, Room#_ROcc and Room#_COcc. This represents “left,” “right,” and “center” based off of you facing the room as you enter the classroom. For other types of rooms with multiple sensors, coordinate with the Director of Energy Management prior to naming.
- F. EnergiSavr Nodes shall be labeled with the number of LED drivers that are on the device and state “Maximum of 64 Drivers.”
- G. All devices shall be labeled on the plans with the last four digits of the EnergiSavr Node serial number at the time of installation and turned over to the commissioning agent for programming.
- H. The naming convention for PICO controls shall be Room#_A, Room#_B and so forth. The A, B and C lettering shall correspond to the orientation in the room. Starting at one entrance into the room, name each device in a clockwise orientation of the room from that point.

3.07 SYSTEMS

- A. The Lutron Quantum EnergiSavr Node shall be used for all new construction, unless specifically designated in writing from the UAH Director of Energy Management.
- B. The EnergiSavr Node System shall be used for large renovation projects or as directed by the UAH Director of Energy Management.
- C. The Lutron PowPak system shall be used for all retrofit and small applications, unless specifically designated in writing from the UAH Director of Energy Management.

PART 4 MATERIALS

- A. The standard lighting components shall be as follows:
 - a. Light/Emergency Luminaire
 - i. CCT – 40K
 - ii. CRI – 80 (min)
 - iii. Efficacy – 90 LPW (min)
 - iv. Minimum Life Rating – 50,000 hours at L₇₀
 - v. Driver – Lutron EcoSystem

- vi. Warranty – minimum of 5 years (includes board and driver)
- vii. Architectural fixture design to be approved by Campus Architect
- b. Lighting Wall Controller – Lutron Wireless Pico Series PJ2-3BRL-GXX-L01.
- c. Occupancy Sensor – Lutron LRF2-OCR2B-P-XX (ceiling mounted), Lutron LRF2-OKLB-P-XX (corner mounted) or Lutron LRF2-OHLB-P-XX (hallway and stairwell mounted).
- d. PowPak controls shall be RMJ-ECO32-DV-B.

END OF SECTION