NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

LIGHTING SYSTEM IMPROVEMENT

(No.)

CODE 670

DEFINITION

Complete replacement or retrofitting of one or more components of an existing agricultural lighting system.

PURPOSE

This practice may be applied as part of a conservation management system to reduce energy use.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to any agricultural facility with an existing lighting system and a completed lighting assessment that complies with the guidelines for a Type 2 on-farm energy audit for the major activity of lighting per ANSI/ASABE S612.

CRITERIA

General Criteria Applicable to All Purposes

Implement recommendations of a Type 2 On-farm Energy audit as they pertain to lighting system energy improvement. To utilize this practice, the lighting assessment must document the following:

- The baseline – the current energy use of a lighting system
- The replacement or retrofit that will satisfy the minimum energy efficiency requirements established in this practice.
- The expected reduction in energy use over the baseline after the recommended replacement or retrofit is implemented.

Comply with all applicable electrical codes and fire protection standards as well as any local regulations.

Housing, wiring, mounting, and connections shall meet National Electrical Code: Article 547, Agricultural Buildings (NFPA, 2011).

Recommend that the modified lighting system meets the recommended light quality and light levels (illuminance) in foot candles (fc) (lm/ft^2) or lux (lx) (lm/m^2) for the space being lighted and the tasks performed in that space (see Tables 2, 5-7, and 9-11, ASABE EP344.3).

A lighting system may include luminaires (lamps, ballasts and fixtures), controls, and wiring as appropriate.

Where components will be exposed to dust, moisture, or corrosive atmosphere (such as in animal housing operations), use non-corrosive, water resistant light fixtures to protect lamps from environmental exposure in accordance with the National Electric Code (NFPA 2011).

Recommend to provide light uniformity based on Task Classification and maximum spacing-to-mounting-height ratio (s/Hp) given in Table 3 of ASABE EP344.3. Use manufacturer's uniformity data if available or a commercial light modeling software to ensure level and uniform distribution of light.

Lamps and Ballasts. Select replacement lamps, or lamp/ballast combinations, that are identified in the energy audit.

Select lamps and ballasts that meet facility requirements for starting characteristics of the light (warm-up period and start-up temperature).

Dispose of lamps and ballasts in accordance with environmental laws and regulations.

Controls. Use automatic controls to reduce operating time or input power of a lighting system if intermittent use or natural lighting makes continuous artificial lighting

unnecessary. Lighting controls include but are not limited to switches, dimmers, photo-sensors, occupancy sensors and timers.

Design and install sensors and controls to meet their intended purpose and to ensure compatibility with the luminaire(s) used.

When automatic controls are used, install an independent manual override.

CONSIDERATIONS

In some cases, lighting modifications may impact heating, cooling, or ventilation requirements of a building. These impacts are often minor, but they should be considered when planning for changeover of lamp types.

Protect switches and dimmers from environmental exposure by locating them away from damp or dusty environments, where feasible, or by using corrosion-resistant controls.

In buildings, utilization of reflective, matte finishes on interior surfaces will reduce glare and help create a comfortable visual environment.

PLANS AND SPECIFICATIONS

Ensure plans and specifications for lighting systems meet the requirements of this standard. Plans and specifications should:

Identify and describe the existing lighting environment, including lumen output, number and placement of luminaires, number of lamps per fixture, wattage, lamp-type, brand and model of fixture, controls for discrete areas.

Identify the replacement brand and model of fixture, number of lamps per fixture, ballast type, lamp wattage, lamp-type, and fixture rating (dust proof, water resistance, wash down, etc.).

Describe the specific number and arrangement of fixtures to be replaced and/or installed, along with the power source and controls

Include a plan view showing the location of the lighting system.

OPERATION AND MAINTENANCE

The producer/client is responsible for maintaining the lighting system. Provide operation and maintenance instructions that include the following:

Inspect lamps, ballasts, fixtures, wiring, and controls regularly. Replace burned out lamps promptly, and repair or replace other system components as appropriate to ensure the system is functioning properly.

Clean lamps, fixtures, and room surfaces regularly to ensure a high-quality light environment is maintained.

REFERENCES

American Society of Agricultural and Biological Engineers. 2010. Lighting Systems for Agricultural Facilities ASAE EP344.3 JAN2005 (R2010) ASABE, St. Joseph, MI.

American Society of Agricultural and Biological Engineers. 2009. Performing On-farm Energy Audits. ANSI/ASABE S612 JUL2009. St. Joseph, MI.

National Fire Protection Association (NFPA). 2011. Article 547 Agricultural Buildings. NFPA 79. Boston, MA.

National Lighting Product Information Program. 2011. NLPIP Lighting Research Center Glossary. http://www.lrc.rpi.edu/programs/NLPIP/glossary.asp