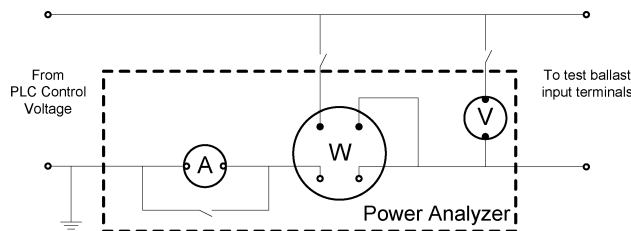


3.3.4.3. *Power Line Carrier (PLC) Control Signal*. Measure the PLC control signal power (watts) using a wattmeter (W) connected to the ballast in accordance with the circuit shown in Figure 6 of this section. The wattmeter must have a frequency response

that is at least 10 times higher than the PLC being measured in order to measure the PLC signal correctly. The wattmeter must also be high-pass filtered to filter out power at 60 Hertz.



**Figure 6: Circuit for Measuring PLC Control Signal Power in Standby Mode**

3.3.4.4. *Wireless Control Signal*. The power supplied to a ballast using a wireless signal is not easily measured but is estimated to be well below 1.0 watt. Therefore, the wireless control signal power is not measured as part of this test procedure.

[80 FR 31983, June 5, 2015, as amended at 81 FR 25600, Apr. 29, 2016]

APPENDIX R TO SUBPART B OF PART 430—UNIFORM TEST METHOD FOR MEASURING AVERAGE LAMP EFFICACY (LE), COLOR RENDERING INDEX (CRI), AND CORRELATED COLOR TEMPERATURE (CCT) OF ELECTRIC LAMPS

1. *Scope*: This appendix applies to the measurement of lamp lumens, electrical characteristics, CRI, and CCT for general service fluorescent lamps, and to the measurement of lamp lumens, electrical characteristics for general service incandescent lamps and incandescent reflector lamps.

2. *Definitions*

2.1 To the extent that definitions in the referenced IESNA and CIE standards do not conflict with the DOE definitions, the definitions specified in section 3.0 of IES LM-9 (incorporated by reference; see § 430.3), section 3.0 of IESNA LM-20 (incorporated by reference; see § 430.3), section 3.0 and the Glossary of IES LM-45 (incorporated by reference; see § 430.3), section 2 of IESNA LM-58 (incorporated by reference; see § 430.3), and Appendix 1 of CIE 13.3 (incorporated by reference; see § 430.3) shall be included.

2.2 *ANSI Standard* means a standard developed by a committee accredited by the American National Standards Institute (ANSI).

2.3 *CIE* means the International Commission on Illumination.

2.4 *CRI* means Color Rendering Index as defined in § 430.2.

2.5 *IESNA* means the Illuminating Engineering Society of North America.

2.6 *Lamp efficacy* means the ratio of measured lamp lumen output in lumens to the measured lamp electrical power input in watts, rounded to the nearest tenth, in units of lumens per watt.

2.7 *Lamp lumen output* means the total luminous flux produced by the lamp, at the reference condition, in units of lumens.

2.8 *Lamp electrical power input* means the total electrical power input to the lamp, including both arc and cathode power where appropriate, at the reference condition, in units of watts.

2.9 *Reference condition* means the test condition specified in IES LM-9 for general service fluorescent lamps, in IESNA LM-20 for incandescent reflector lamps, and in IES LM-45 for general service incandescent lamps.

3. *Test Conditions*

3.1 *General Service Fluorescent Lamps*: For general service fluorescent lamps, the ambient conditions of the test and the electrical circuits, reference ballasts, stabilization requirements, instruments, detectors, and photometric test procedure and test report shall be as described in the relevant sections of IES LM-9 (incorporated by reference; see § 430.3).

3.2 *General Service Incandescent Lamps*: For general service incandescent lamps, the selection and seasoning (initial burn-in) of the

test lamps, the equipment and instrumentation, and the test conditions shall be as described in IES LM-45 (incorporated by reference; see § 430.3).

3.3 *Incandescent Reflector Lamps:* For incandescent reflector lamps, the selection and seasoning (initial burn-in) of the test lamps, the equipment and instrumentation, and the test conditions shall conform to sections 4.2 and 5.0 of IESNA LM-20 (incorporated by reference; see § 430.3).

#### 4. Test Methods and Measurements

All lumen measurements made with instruments calibrated to the devalued NIST lumen after January 1, 1996, shall be multiplied by 1.011.

##### 4.1 General Service Fluorescent Lamps

4.1.1 The measurement procedure shall be as described in IES LM-9 (incorporated by reference; see § 430.3), except that lamps shall be operated at the appropriate voltage and current conditions as described in ANSI C78.375 (incorporated by reference; see § 430.3) and in ANSI C78.81 (incorporated by reference; see § 430.3) or ANSI C78.901 (incorporated by reference; see § 430.3), and lamps shall be operated using the appropriate reference ballast at input voltage specified by the reference circuit as described in ANSI C82.3 (incorporated by reference; see § 430.3). If, for a lamp, both low-frequency and high-frequency reference ballast settings are included in ANSI C78.81 or ANSI C78.901, the lamp shall be operated using the low-frequency reference ballast.

4.1.2 For lamps not listed in ANSI C78.81 (incorporated by reference; see § 430.3) nor in ANSI C78.901 (incorporated by reference; see § 430.3), the lamp shall be operated using the following reference ballast settings:

4.1.2.1 4-Foot medium bi-pin lamps shall be operated using the following reference ballast settings: T10 or T12 lamps are to use 236 volts, 0.43 amps, and 439 ohms; T8 lamps are to use 300 volts, 0.265 amps, and 910 ohms.

4.1.2.2 2-Foot U-shaped lamps shall be operated using the following reference ballast settings: T12 lamps are to use 236 volts, 0.430 amps, and 439 ohms; T8 lamps are to use 300 volts, 0.265 amps, and 910 ohms.

4.1.2.3 8-foot slimline lamps shall be operated using the following reference ballast settings:

(a) *T12 lamps:* 625 volts, 0.425 amps, and 1280 ohms.

(b) *T8 lamps:* 625 volts, 0.260 amps, and 1960 ohms.

4.1.2.4 8-foot high output lamps shall be operated using the following reference ballast settings:

(a) *T12 lamps:* 400 volts, 0.800 amps, and 415 ohms.

(b) *T8 lamps:* 450 volts, 0.395 amps, and 595 ohms.

4.1.2.5 4-foot miniature bipin standard output or high output lamps shall be operated

using the following reference ballast settings:

(a) *Standard Output:* 329 volts, 0.170 amps, and 950 ohms.

(b) *High Output:* 235 volts, 0.460 amps, and 255 ohms.

4.1.3 Lamp lumen output (lumens) and lamp electrical power input (watts), at the reference condition, shall be measured and recorded. Lamp efficacy shall be determined by computing the ratio of the measured lamp lumen output and lamp electrical power input at equilibrium for the reference condition.

##### 4.2 General Service Incandescent Lamps

4.2.1 The measurement procedure shall be as described in IES LM-45 (incorporated by reference; see § 430.3). Lamps shall be operated at the rated voltage as defined in § 430.2.

4.2.2 The test procedure shall conform to sections 6 and 7 of IES LM-45, and the lumen output of the lamp shall be determined in accordance with section 7 of IES LM-45. Lamp electrical power input in watts shall be measured and recorded. Lamp efficacy shall be determined by computing the ratio of the measured lamp lumen output and lamp electrical power input at equilibrium for the reference condition. The test report shall conform to section 8 of IES LM-45.

4.2.3 The measurement procedure for testing the lifetime of general service incandescent lamps shall be as described in IESNA LM-49 (incorporated by reference; see § 430.3). The lifetime measurement shall be taken by measuring the operating time of a lamp, expressed in hours, not including any off time. The percentage of the sample size that meets the minimum rated lifetime shall be recorded. The lamp shall be deemed to meet minimum rated lifetime standards if greater than 50 percent of the sample size specified in § 429.27 meets the minimum rated lifetime.

4.2.3.1 Accelerated lifetime testing is not allowed. The second paragraph of section 6.1 of IESNA LM-49 is to be disregarded.

##### 4.3 Incandescent Reflector Lamps

4.3.1 The measurement procedure shall be as described in IESNA LM-20 (see 10 CFR 430.22). Lamps shall be operated at the rated voltage as defined in § 430.2.

4.3.2. Lamp lumen output shall be determined as total forward lumens, and may be measured in an integrating sphere at the reference condition in accordance with § 7.2 of IESNA LM-20 (incorporated by reference; see § 430.3) or from an average intensity distribution curve measured at the reference condition specified in § 6.0 of IESNA LM-20. Lamp electrical power input in watts shall be measured and recorded.

4.3.3 Lamp efficacy shall be determined by computing the ratio of the measured lamp lumen output and lamp electrical power

input at equilibrium for the reference condition. The test report shall conform to section 10.0 of IES LM-20 (incorporated by reference; see § 430.3).

#### 4.4 Determination of Color Rendering Index and Correlated Color Temperature

4.4.1 The CRI shall be determined in accordance with the method specified in CIE 13.3 (incorporated by reference; see § 430.3) for general service fluorescent lamps. The CCT shall be determined in accordance with the method specified in IES LM-9 (incorporated by reference; see § 430.3) and rounded to the nearest 10 kelvin for general service fluorescent lamps. The CCT shall be determined in accordance with the CIE 15 (incorporated by reference; see § 430.3) for incandescent lamps. The required spectroradiometric measurement and characterization shall be conducted in accordance with the methods set forth in IESNA LM-58 (incorporated by reference; see § 430.3).

4.4.2 The test report shall include a description of the test conditions, equipment, measured lamps, spectroradiometric measurement results, and CRI and CCT determinations.

[62 FR 29240, May 29, 1997, as amended at 74 FR 34177, July 14, 2009; 77 FR 4217, Jan. 27, 2012]

#### APPENDIX S TO SUBPART B OF PART 430—UNIFORM TEST METHOD FOR MEASURING THE WATER CONSUMPTION OF FAUCETS AND SHOWERHEADS

NOTE: After April 21, 2014, any representations made with respect to the water consumption of showerheads or faucets must be made in accordance with the results of testing pursuant to this appendix.

Manufacturers conducting tests of showerheads or faucets November 22, 2013 and prior to April 21, 2014, must conduct such test in accordance with either this appendix or appendix S as it appeared at 10 CFR part 430, subpart B, appendix S, in the 10 CFR parts 200 to 499 edition revised as of January 1, 2013. Any representations made with respect to the water consumption of such showerheads or faucets must be in accordance with whichever version is selected. Given that after April 21, 2014 representations with respect to the water consumption of showerheads and faucets must be made in accordance with tests conducted pursuant to this appendix, manufacturers may wish to begin using this test procedure as soon as possible.

1. *Scope*: This appendix covers the test requirements used to measure the hydraulic performance of faucets and showerheads.

#### 2. Flow Capacity Requirements

a. *Faucets*—The test procedures to measure the water flow rate for faucets, expressed in gallons per minute (gpm) and liters per minute (L/min), or gallons per cycle (gal/cycle) and liters per cycle (L/cycle), shall be conducted in accordance with the test requirements specified in section 5.4, Flow Rate, of ASME A112.18.1-2012 (incorporated by reference, see § 430.3). Measurements shall be recorded at the resolution of the test instrumentation. Calculations shall be rounded off to the same number of significant digits as the previous step. The final water consumption value shall be rounded to one decimal place for non-metered faucets, or two decimal places for metered faucets.

b. *Showerheads*—The test procedures to measure the water flow rate for showerheads, expressed in gallons per minute (gpm) and liters per minute (L/min), shall be conducted in accordance with the test requirements specified in section 5.4, Flow Rate, of the ASME A112.18.1-2012 (incorporated by reference, see § 430.3). Measurements shall be recorded at the resolution of the test instrumentation. Calculations shall be rounded off to the same number of significant digits as the previous step. The final water consumption value shall be rounded to one decimal place. If the time/volume method of section 5.4.2.2(d) is used, the container must be positioned as to collect all water flowing from the showerhead, including any leakage from the ball joint.

[63 FR 13316, Mar. 18, 1998, as amended at 78 FR 62986, Oct. 23, 2013]

#### APPENDIX T TO SUBPART B OF PART 430—UNIFORM TEST METHOD FOR MEASURING THE WATER CONSUMPTION OF WATER CLOSETS AND URINALS

NOTE: After April 21, 2014, any representations made with respect to the water consumption of water closets or urinals must be made in accordance with the results of testing pursuant to this appendix.

Manufacturers conducting tests of water closets or urinals after November 22, 2013 and prior to April 21, 2014, must conduct such test in accordance with either this appendix or appendix T as it appeared at 10 CFR part 430, subpart B, appendix S, in the 10 CFR parts 200 to 499 edition revised as of January 1, 2013. Any representations made with respect to the water consumption of such water closets or urinals must be in accordance with whichever version is selected. Given that after April 21, 2014 representations with respect to the water consumption of water closets and urinals must be made in accordance with tests conducted pursuant to this appendix, manufacturers may wish to