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[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Parts 429 and 430

[Docket No. EERE-2011-BT-TP-0071]

RIN: 1904-AC67

Energy Conservation Program: Test Procedures for Integrated Light-Emitting Diode Lamps

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Supplemental notice of proposed rulemaking.

SUMMARY: On June 3, 2014, the U.S. Department of Energy (DOE) published a supplemental notice of proposed rulemaking (SNOPR) (hereafter the June 2014 SNOPR) in which DOE proposed test procedures for light-emitting diode (LED) lamps. The June 2014 SNOPR defined methods for measuring the lumen output, input power, and relative spectral distribution (to determine correlated color temperature, or CCT). Further, the June 2014 SNOPR proposed a method for calculating the lifetime of LED lamps, and defined the lifetime as the time required for the LED lamp to reach a lumen maintenance of 70 percent (that is, 70 percent of initial light output). Additionally, the June 2014 SNOPR added calculations for lamp efficacy as well as the color rendering index (CRI) of LED lamps. This SNOPR revises DOE's proposed definition for lifetime in the June 2014 SNOPR. The definition of lifetime contained in this document better aligns with the statutory definition of lifetime in the Energy Policy and Conservation Act of 1975, as amended. DOE also proposes a new definition for time to failure to support the revised

definition of lifetime. Finally, this SNOPR discusses other necessary changes to the regulations to support the new and revised definitions.

DATES: DOE will accept comments, data, and information regarding this SNOPR until August 4, 2014. See section V, "Public Participation," for details.

ADDRESSES: Any comments submitted must identify the SNOPR for Test Procedures for LED lamps, and provide docket number EE-2011–BT–TP–0071 and/or regulatory information number (RIN) number 1904-AC67. Comments may be submitted using any of the following methods:

1. Federal eRulemaking Portal: www.regulations.gov. Follow the instructions for submitting comments.
2. E-mail: LEDLamps-2011-TP-0071@ee.doe.gov. Include the docket number and/or RIN in the subject line of the message.
3. Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. If possible, please submit all items on a CD. It is not necessary to include printed copies.
4. Hand Delivery/Courier: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC, 20024. Telephone: (202) 586-2945. If possible, please submit all items on a CD. It is not necessary to include printed copies.

For detailed instructions on submitting comments and additional information on the rulemaking process, see section V of this document (Public Participation).

Docket: The docket is available for review at regulations.gov, including Federal Register notices, public meeting attendee lists and transcripts, comments, and other supporting documents/materials. All documents in the docket are listed in the regulations.gov index. However, not all documents listed in the index may be publicly available, such as information that is exempt from public disclosure.

A link to the docket web page can be found at: www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx/ruleid/18. This web page will contain a link to the docket for this notice on the regulations.gov site. The regulations.gov web page contains simple instructions on how to access all documents, including public comments, in the docket. See section V for information on how to submit comments through regulations.gov.

For further information on how to submit a comment, review other public comments and the docket, or participate in the public meeting, contact Ms. Brenda Edwards at (202) 586-2945 or by email: Brenda.Edwards@ee.doe.gov.

FOR FURTHER INFORMATION CONTACT:

Ms. Lucy deButts, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-5B, 1000 Independence Avenue, SW.,

Washington, DC, 20585-0121. Telephone: (202) 287-1604. E-mail: light_emitting_diodes@ee.doe.gov.

Ms. Celia Sher, U.S. Department of Energy, Office of the General Counsel, GC-71, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-6122. E-mail: Celia.Sher@hq.doe.gov.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Authority and Background

Title III of the Energy Policy and Conservation Act of 1975 (42 U.S.C. 6291, et seq.; "EPCA") sets forth a variety of provisions designed to improve energy efficiency. (All references to EPCA refer to the statute as amended through the American Energy Manufacturing Technical Corrections Act (AEMTCA), Pub. L. 112-210 (Dec. 18, 2012)). Part B of title III, which for editorial reasons was redesignated as Part A upon incorporation into the U.S. Code (42 U.S.C. 6291–6309, as codified), establishes the "Energy Conservation Program for Consumer Products Other Than Automobiles."

Under EPCA, this program consists of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. This rulemaking proposes test procedures that manufacturers of integrated LED lamps (hereafter referred to as "LED lamps") would use to meet two requirements, namely, to: (1) satisfy any future energy conservation standards for general service LED lamps, and (2) meet obligations under labeling requirements for LED lamps promulgated by the Federal Trade Commission (FTC).

First, test procedures in this rulemaking would be used to assess the performance of LED lamps relative to any potential energy conservation standards in a future rulemaking that includes general service LED lamps. DOE is currently developing energy conservation standards for general service lamps (GSLs), a category of lamps that includes general service LED lamps. 78 FR 73737 (Dec. 9, 2013).

Second, this rulemaking supports obligations under labeling requirements promulgated by FTC under section 324(a)(6) of EPCA (42 U.S.C. 6294(a)(6)). The Energy Independence and Security Act of 2007 (EISA 2007) section 321(b) amended EPCA (42 U.S.C. 6294(a)(2)(D)) to direct FTC to consider the effectiveness of lamp labeling for power levels or watts, light output or lumens, and lamp lifetime. This rulemaking supports FTC's determination that LED lamps, which had previously not been labeled, require labels under EISA section 321(b) and 42 U.S.C. 6294(a)(6) in order to assist consumers in making purchasing decisions. 75 FR 41696, 41698 (July 19, 2010).

DOE previously published two Federal Register documents pertaining to the test procedure for LED lamps. On April 9, 2012, DOE published a test procedure NOPR. 77 FR 21038. Following the publication of the NOPR, DOE held a public meeting on May 3, 2012 to receive feedback from interested parties. Then, on June 3, 2014, DOE published a test procedure SNOPR (the June 2014 SNOPR). 79 FR 32020. The June 2014 SNOPR revised the method of measuring lifetime and added directions for calculating and measuring lamp efficacy, CRI, and standby mode power.

For a more complete discussion of authority and background, see the June 2014 SNOPR. 79 FR 32020.

II. Summary of the Supplemental Notice of Proposed Rulemaking

This SNOPR (hereafter the lifetime SNOPR) builds upon the June 2014 SNOPR, which DOE hereby affirms, except for those provisions that are modified by this supplemental proposal. The lifetime SNOPR proposes to revise the definition of lifetime as it relates to LED lamps. The definition of lifetime contained in this notice better aligns with the EPCA definition of lifetime in 42 U.S.C. 6291(30)(P). DOE also proposes a new definition for time to failure to support the revised definition of lifetime. The lifetime SNOPR describes these new definitions and discusses other necessary changes to 10 CFR parts 429 and 430 to support the new and revised definitions.

III. Discussion

A. Definition of Lifetime of Integrated Light-emitting Diode Lamps

In the June 2014 SNOPR, DOE proposed to define lifetime of LED lamps as the time at which the lumen output is equal to 70 percent of the initial lumen output. 79 FR at 32029. This definition was to appear in Appendix BB to subpart B of 10 CFR part 430, and was to be measured and calculated for each individual sample unit. 79 FR at 32047. DOE also proposed a mechanism to determine the upper limit for the represented value of lifetime for a basic model based on the mean or lower confidence limit of the sample at 10 CFR 429.56(a)(1)(i)(B)(1). *See* 79 FR at 32045.

Upon further review, DOE concludes the proposed definition of lifetime should be revised to better align with the EPCA definition of lifetime in 42 U.S.C. 6291(30)(P). This statutory definition states that lifetime means the length of operating time of a statistically large group of lamps between first use and failure of 50 percent of the group in accordance with test procedures described in the Illuminating Engineering Society (IES) Lighting Handbook-Reference Volume. In addition, DOE proposes to name this metric with a term specific to LED lamps to clarify that this definition only applies to LED lamps.

DOE proposes revising the name of the metric from "lifetime," to "lifetime of integrated light-emitting diode lamps." DOE proposes defining the lifetime of integrated light-emitting diode lamps to be as follows: "the length of operating time between first use and failure of 50 percent of the sample units (as defined in § 429.56(a)(1)(i)), in accordance with the test procedures described in section 4.5 of Appendix BB to subpart B of part 430 of this chapter." DOE's proposed definition is consistent with the statutory definition of lifetime in EPCA. First, DOE specifies a statistically large group of lamps by referring to the represented value

requirements in section 429.56(a)(1)(i). Second, the test procedure in section 4.5 of appendix BB to subpart B of part 430 refers to IES LM-79-2008 for test conditions, setup, and measurements. The references to IES LM-79-2008 are consistent with EPCA's lifetime definition, which requires use of the test procedures described by the IES. DOE seeks comment on the proposed definition of lifetime of integrated light-emitting diode lamps.

B. Definition of Time to Failure

To support the revised definition of lifetime as applied to LED lamps, DOE also proposes to define time to failure for LED lamps in Appendix BB to subpart B of 10 CFR part 430. The revised definition of lifetime refers to the "failure" of a lamp. Failure in the context of compact fluorescent lamps (CFLs), for example, is the time at which the lamp fully extinguishes and no longer creates light. However, LED lamps typically exhibit gradual degradation of light output over a long period of time, rather than a sudden loss of light output. While other criteria may also apply, lumen maintenance of 70 percent is generally accepted as a criterion of reaching the end of useful LED lamp lifetime. 79 FR at 32029. DOE proposes to treat the point in time where an individual LED lamp reaches 70 percent lumen maintenance as the point of "failure."

In order to calculate the lifetime of integrated light-emitting diode lamps for a particular basic model, the tester must determine the length of time between first use and failure for each unit in the sample. Therefore, DOE proposes to define time to failure, in section 2.2 of Appendix BB to subpart B of 10 CFR part 430, as "the time elapsed between first use and the point at which the lamp reaches 70 percent lumen maintenance as measured in section 4.5 of appendix BB of this subpart." DOE seeks comment on the proposed definition of time to failure.

C. Other Revisions to 10 CFR parts 429 and 430

To support the revised definition of lifetime and the newly added definition of time to failure, DOE also proposes other modifications to 10 CFR parts 429 and 430. These revisions clarify that the metric "time to failure" would be measured for an individual lamp, while "lifetime of integrated light-emitting diode lamps" is a metric calculated for all sample units collectively. For example, DOE modifies the scope and content of Appendix BB to subpart B of 10 CFR part 430 (See Appendix BB at sections 1, 2.2, 4, 4.2.1, 4.5, 4.5.2, 4.5.3, 4.5.4), 10 CFR 430.23 (See section 430.23(dd)(6), and (7)), and 10 CFR 430.25 (See section 430.25(b)) to specify measurement of time to failure, rather than directly measuring lifetime. Then, in proposed 10 CFR 429.56, DOE specifies the calculation of lifetime of integrated light-emitting diode lamps, the metric used for representations based on all sample units collectively (See 429.56(a)(1)(i)(B)(*1*), (a)(1)(i)(B)(*1*)(*ii*), (a)(1)(i)(B)(*4*), (c), and (c)(6)).

IV. Procedural Issues and Regulatory Review

DOE has concluded that the determinations made pursuant to the various procedural requirements applicable to the June 2014 SNOPR remain unchanged for this lifetime SNOPR. These determinations are set forth in the June 2014 SNOPR. 79 FR 32020, 32040-32044. The additional changes proposed in this lifetime SNOPR (a revised definition of lifetime, a new definition of time to failure, and other supporting modifications) would not be expected to increase testing burden beyond what is specified in the June 2014 SNOPR.

V. Public Participation

A. Submission of Comments

DOE will accept comments, data, and information regarding this proposed rule no later than the date provided in the DATES section at the beginning of this proposed rule. Interested parties may submit comments using any of the methods described in the ADDRESSES section at the beginning of this proposed rule.

Submitting comments via regulations.gov. The regulations.gov web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit to regulations.gov information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as

Confidential Business Information (CBI)). Comments submitted through regulations.gov cannot be claimed as CBI. Comments received through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

DOE processes submissions made through regulations.gov before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that regulations.gov provides after you have successfully uploaded your comment.

Submitting comments via email, hand delivery, or mail. Comments and documents submitted via email, hand delivery, or mail also will be posted to regulations.gov. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information on a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments

Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via mail or hand delivery, please provide all items on a CD, if feasible. It is not necessary to submit printed copies. No facsimiles (faxes) will be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide documents that are written in English, free of any defects or viruses, and not secured. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

Campaign form letters. Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters' names compiled into one or more PDFs. This reduces comment processing and posting time.

Confidential Business Information. According to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery two well-marked copies: one copy of the document marked confidential including all the information believed to be confidential, and one copy of the document marked non-confidential with the information believed to be confidential deleted. Submit these documents via email or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Factors of interest to DOE when evaluating requests to treat submitted information as confidential include: (1) A description of the items; (2) whether and why such items are customarily treated as confidential within the industry; (3) whether the information is generally

known by or available from other sources; (4) whether the information has previously been made available to others without obligation concerning its confidentiality; (5) an explanation of the competitive injury to the submitting person which would result from public disclosure; (6) when such information might lose its confidential character due to the passage of time; and (7) why disclosure of the information would be contrary to the public interest.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

B. Issues on Which DOE Seeks Comment

Although DOE welcomes comments on any aspect of this proposal, DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

1. DOE seeks comment on the proposed definition of lifetime of integrated light-emitting diode lamps.
2. DOE seeks comment on the proposed definition of time to failure.

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this proposed rule.

List of Subjects

10 CFR Part 429

Confidential business information, Energy conservation, Household appliances, Imports, Reporting and recordkeeping requirements.

10 CFR Part 430

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Incorporation by reference, Intergovernmental relations, Small businesses.

Issued in Washington, DC, on June 18, 2014.

Kathleen B. Hogan
Deputy Assistant Secretary for Energy Efficiency
Energy Efficiency and Renewable Energy

For the reasons stated in the preamble, DOE is proposing to amend parts 429 and 430 of Chapter II of Title 10, Subchapter D of the Code of Federal Regulations to read as set forth below:

PART 429—CERTIFICATION, COMPLIANCE, AND ENFORCEMENT FOR CONSUMER PRODUCTS AND COMMERCIAL AND INDUSTRIAL EQUIPMENT

1. The authority citation for part 429 continues to read as follows:

Authority: 42 U.S.C. 6291–6317.

2. Section 429.56 is added to read as follows:

§429.56 Integrated light-emitting diode lamps.

(a) Determination of Represented Value. (1) Manufacturers must determine the represented value, which includes the certified rating, for each basic model of integrated light-emitting diode lamps by testing, in conjunction with the following sampling provisions:

(i) Units to be tested. (A) The general requirements of §429.11(a) are applicable except that the sample must be comprised of production units; and

(B) For each basic model of integrated light-emitting diode lamp, the minimum number of units tested shall be no less than 10 and the same units must be used for testing all metrics. If more than 10 units are tested as part of the sample, the total number of units must be a multiple of two. For each basic model, a sample of sufficient size shall be randomly selected and tested to ensure that:

(1) Represented values of initial lumen output, lamp efficacy, and color rendering index (CRI) of a basic model for which consumers would favor higher values must be less than or equal to the lower of:

(i) The mean of the sample, where:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

and, $\bar{x}$ is the sample mean; n is the number of units; and x_i is the i^{th} unit;

Or,

(ii) The lower 99 percent confidence limit (LCL) of the true mean divided by 0.97 for initial lumen output; the lower 99 percent confidence limit (LCL) of the true mean divided by 0.98 for lamp efficacy; and the lower 99 percent confidence limit (LCL) of the true mean divided by 0.99 for CRI, where:

$$LCL = \bar{x} - t_{0.99}\left(\frac{s}{\sqrt{n}}\right)$$

and, $\bar{x}$ is the sample mean; s is the sample standard deviation; n is the number of samples; and $t_{0.99}$ is the t statistic for a 99 percent one-tailed confidence interval with n-1 degrees of freedom (from Appendix A of this part).

(2) Represented values of input power and standby mode power of a basic model for which consumers would favor lower values must be greater than or equal to the higher of:

(i) The mean of the sample, where:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

and, $\bar{x}$ is the sample mean; n is the number of units; and x_i is the i^{th} unit;

Or,

(ii) The upper 99 percent confidence limit (UCL) of the true mean divided by 1.01, where:

$$UCL = \bar{x} + t_{0.99}\left(\frac{s}{\sqrt{n}}\right)$$

and, $\bar{x}$ is the sample mean; s is the sample standard deviation; n is the number of samples; and $t_{0.99}$ is the t statistic for a 99 percent one-tailed confidence interval with n-1 degrees of freedom (from Appendix A of this part);

(3) Represented values of correlated color temperature (CCT) of a basic model must be equal to the mean of the sample, where:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

and, $\bar{x}$ is the sample mean; n is the number of units; and x_i is the i^{th} unit.

(4) The lifetime of integrated light-emitting diode lamps is calculated by determining the median time to failure of the sample (calculated as the arithmetic mean of the time to failure of the two middle sample units when the numbers are sorted in value order) rounded to the nearest hour. Represented values of lifetime cannot exceed the lifetime of integrated light-emitting diode lamps.

(b) [Reserved]

(c) Rounding requirements for representative values, including certified and rated values, of lumen output, input power, efficacy, CCT, CRI, lifetime of integrated light-emitting diode lamps, standby mode power, and estimated annual energy cost.

(1) The represented value of input power must be rounded to the nearest tenth of a watt.

(2) The represented value of lumen output must be rounded to three significant digits.

(3) The represented value of lamp efficacy must be rounded to the nearest tenths place.

(4) The represented value of correlated color temperature must be rounded to the nearest 100 Kelvin.

(5) The represented value of color rendering index must be rounded to the nearest whole number.

(6) The represented value of lifetime of integrated light-emitting diode lamps must be rounded to the nearest whole hour.

(7) The represented value of standby mode power must be rounded to the nearest tenth of a watt.

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

3. The authority citation for part 430 continues to read as follows:

Authority: 42 U.S.C. 6291–6309; 28 U.S.C. 2461 note.

4. Section 430.2 is amended by revising the definition of "basic model" and adding in alphabetical order the definitions of "integrated light-emitting diode lamp" and "lifetime of integrated light-emitting diode lamps" to read as follows:

§ 430.2 Definitions.

* * * * *

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency; and

(1) with respect to general service fluorescent lamps, general service incandescent lamps, and incandescent reflector lamps: Lamps that have essentially identical light output and electrical characteristics – including lumens per watt (lm/W) and color rendering index (CRI).

(2) With respect to integrated light-emitting diode lamps: Lamps that have essentially identical light output and electrical characteristics—including lumens per watt (lm/W), color rendering index (CRI), correlated color temperature (CCT), and lifetime of integrated light-emitting diode lamps.

(3) With respect to faucets and showerheads: Have the identical flow control mechanism attached to or installed within the fixture fittings, or the identical water-passage design features that use the same path of water in the highest flow mode.

(4) With respect to furnace fans: Are marketed and/or designed to be installed in the same type of installation.

* * * * *

Integrated light-emitting diode lamp means an integrated LED lamp as defined in ANSI/IESNA RP-16 (incorporated by reference; see §430.3).

* * * * *

Lifetime of integrated light-emitting diode lamps means the length of operating time between first use and failure of 50 percent of the sample units (as defined in §429.56(a)(1)(i)), in accordance with the test procedures described in section 4.5 of Appendix BB to subpart B of part 430 of this chapter.

* * * * *

5. Section 430.23 is amended by adding paragraph (dd) to read as follows:

§ 430.23 Test procedures for the measurement of energy and water consumption.

* * * * *

(dd) *Integrated light-emitting diode lamp.* (1) The input power of an integrated light-emitting diode lamp must be measured in accordance with section 3 of Appendix BB of this subpart. Individual unit input power must be rounded to the nearest tenth of a watt.

(2) The lumen output of an integrated light-emitting diode lamp must be measured in accordance with section 3 of Appendix BB of this subpart. Individual unit lumen output must be rounded to three significant digits.

(3) The lamp efficacy of an integrated light-emitting diode lamp must be calculated in accordance with section 3 of Appendix BB of this subpart. Individual unit lamp efficacy must be rounded to the nearest tenths place.

(4) The correlated color temperature of an integrated light-emitting diode lamp must be measured in accordance with section 3 of Appendix BB of this subpart. Individual unit correlated color temperature must be rounded to the nearest 10 Kelvin.

(5) The color rendering index of an integrated light-emitting diode lamp must be measured in accordance with section 3 of Appendix BB of this subpart. Individual unit color rendering index must be rounded to the nearest whole number.

(6) The time to failure of an integrated light-emitting diode lamp must be measured in accordance with section 5 of Appendix BB of this subpart. Individual unit time to failure must be rounded to the nearest hour.

(7) The life (in years) of an integrated light-emitting diode lamp must be calculated by dividing the lifetime of integrated light-emitting diode lamps (see 10 CFR 429.56) by the estimated

annual operating hours as specified in 16 CFR 305.15(b)(3)(iii). The life must be rounded to the nearest tenth of a year.

(8) The estimated annual energy cost for an integrated light-emitting diode lamp, expressed in dollars per year, must be the product of the average input power in kilowatts as determined in accordance with appendix BB to this subpart, an electricity cost rate as specified in 16 CFR 305.15(b)(1)(ii), and an estimated average annual use as specified in 16 CFR 305.15(b)(1)(ii). The resulting estimated annual energy cost for an individual unit must be rounded to the nearest cent per year.

(9) The standby mode power must be measured in accordance with section 5 of appendix BB of this subpart. Individual unit standby mode power must be rounded to the nearest tenth of a watt.

* * * * *

6. Section 430.25 is revised to read as follows:

§ 430.25 Laboratory Accreditation Program.

(a) Testing for general service fluorescent lamps, general service incandescent lamps, and incandescent reflector lamps must be performed in accordance with appendix R to this subpart. Testing for medium base compact fluorescent lamps must be performed in accordance with appendix W to this subpart. Testing for fluorescent lamp ballasts must be performed in accordance with appendix Q1 to this subpart. This testing, with the exception of lifetime testing of general service incandescent lamps, must be conducted by test laboratories accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) or an accrediting organization recognized by International Laboratory Accreditation Cooperation (ILAC). NVLAP is a program of the National Institute of Standards and Technology, U.S. Department of Commerce. NVLAP standards for accreditation of laboratories that test are set forth in 15 CFR part 285. The

following metrics should be measured by test laboratories accredited by NVLAP or an accrediting organization recognized by International Laboratory Accreditation Cooperation (ILAC):

(1) Fluorescent lamp ballasts: ballast luminous efficiency (BLE);

(2) General service fluorescent lamps: lamp efficacy, color rendering index;

(3) General service incandescent reflector lamps: lamp efficacy;

(4) General service incandescent lamps: lamp efficacy; and

(5) Medium base compact fluorescent lamps: initial efficacy, lamp life. Testing for BLE may also be conducted by laboratories accredited by Underwriters Laboratories or Council of Canada. Testing for fluorescent lamp ballasts performed in accordance with appendix Q to this subpart is not required to be conducted by test laboratories accredited by NVLAP or an accrediting organization recognized by NVLAP.

(b) Testing of integrated light-emitting diode lamps must be performed in accordance with appendix BB of this subpart. Testing must be conducted in test laboratories accredited by NVLAP or an accrediting organization recognized by International Laboratory Accreditation Cooperation (ILAC) for the following metrics: input power, lumen output, lamp efficacy, correlated color temperature, color rendering index, time to failure, and standby mode power. A manufacturer's own laboratory, if accredited, may conduct the testing.

7. Appendix BB to subpart B of part 430 is added to read as follows:

Appendix BB to Subpart B of Part 430—Uniform Test Method for Measuring the Input Power, Lumen Output, Lamp Efficacy, Correlated Color Temperature (CCT), Color Rendering Index (CRI), Time to Failure, and Standby Mode Power of Integrated Light-Emitting Diode (LED) Lamps

Note: After [**Date 180 Days after Publication of Final Rule in the Federal Register**], any representations made with respect to the energy use or efficiency of light-emitting diode lamps must be made in accordance with the results of testing pursuant to this appendix. Given that after [**Date 180 Days after Publication of Final Rule in the Federal Register**] representations with respect to the energy use or efficiency of light-emitting diode lamps 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 specifies how to measure input power, lumen output, lamp efficacy, CCT, CRI, time to failure, and standby mode power for integrated LED lamps.
2. *Definitions*
   2.1. The definitions specified in section 1.3 of IES LM-79 except section 1.3(f) (incorporated by reference; see §430.3) apply.
   2.2. *Time to failure* means the time elapsed between first use and the point at which the lamp reaches 70 percent lumen maintenance as measured in section 4.5 of appendix BB of this subpart.
   2.3. *Initial lumen output* means the measured lumen output after the lamp is initially energized and stabilized using the stabilization procedures in section 3 of appendix BB of this subpart.
   2.4. *Rated input voltage* means the voltage(s) marked on the lamp as the intended operating voltage. If not marked on the lamp, assume 120 V.
   2.5. *Lamp efficacy* means the ratio of measured initial lumen output in lumens to the measured lamp input power in watts, in units of lumens per watt.

2.6. *CRI* means color rendering index as defined in §430.2.

2.7. *Test duration* means the operating time of the LED lamp after the initial lumen output measurement and before, during, and including the final lumen output measurement.

3. Active Mode Test Method for Determining Lumen Output, Input Power, CCT, CRI, and Lamp Efficacy

In cases where there is a conflict, the language of the test procedure in this appendix takes precedence over IES LM-79 (incorporated by reference; see §430.3).

3.1. *Test Conditions and Setup*

3.1.1. The ambient conditions, power supply, electrical settings, and instrumentation must be established in accordance with the specifications in sections 2.0, 3.0, 7.0, and 8.0 of IES LM-79 (incorporated by reference; see §430.3), respectively.

3.1.2. An equal number of integrated LED lamps must be positioned in the base up and base down orientations throughout testing.

3.1.3. The integrated LED lamp must be operated at the rated voltage throughout testing. For an integrated LED lamp with multiple rated voltages including 120 volts, the integrated LED lamp must be operated at 120 volts. If an integrated LED lamp with multiple rated voltages is not rated for 120 volts, the integrated LED lamp must be operated at the highest rated input voltage. Additional tests may be conducted at other rated voltages.

3.1.4. The integrated LED lamp must be operated at maximum input power. If multiple modes occur at the same maximum input power (such as variable CCT or CRI), the manufacturer can select any of these modes for testing; however, all measurements described in section 3 and section 4 must be taken at the same selected mode.

3.2. Test Method, Measurements, and Calculations

3.2.1. The integrated LED lamp must be stabilized prior to measurement as specified in section 5.0 of IES LM-79 (incorporated by reference; see §430.3). The stabilization variation is calculated as [maximum – minimum)/minimum] of at least three readings of the input power and lumen output over a period of 30 minutes, taken 15 minutes apart.

3.2.2. The input power in watts must be measured as specified in section 8.0 of IES LM-79 (incorporated by reference; see §430.3).

3.2.3. Lumen output must be measured as specified in section 9.1 and 9.2 of IES LM-79 (incorporated by reference; see §430.3). Goniometers must not be used.

3.2.4. CCT must be determined according to the method specified in section 12.0 of IES LM-79 (incorporated by reference; see §430.3) with the exclusion of section 12.2 of IES LM-79. Goniometers must not be used.

3.2.5. CRI must be determined according to the method specified in section 12.0 of IES LM-79 (incorporated by reference; see §430.3) with the exclusion of section 12.2 of IES LM-79. Goniometers must not be used.

3.2.6. Lamp efficacy must be determined by dividing measured initial lumen output by the measured input power.

4. *Active Mode Test Method to Measure Time to Failure*

In cases where there is a conflict, the language of the test procedure in this appendix takes precedence over IES LM-79 (incorporated by reference; see §430.3).

4.1. Measure Initial Lumen Output. Measure the initial lumen output according to section 3 of this appendix.

4.2. *Test Duration.* Operate the integrated LED lamp for a period of time (the test duration) after the initial lumen output measurement and before, during, and including the final lumen output measurement.

4.2.1. There is no minimum test duration requirement for the integrated LED lamp. The test duration is selected by the manufacturer. See section 4.5.3 for instruction on the maximum time to failure.

4.2.2. The test duration only includes time when the integrated LED lamp is energized and operating.

4.2.3. Operating conditions and setup during the test duration other than time during which lumen output measurements are being conducted are specified in section 4.3 of this appendix.

4.3. Operating Conditions and Setup Between Lumen Output Measurements

4.3.1. Ambient temperature must be controlled between 15°C and 40°C.

4.3.2. The integrated LED lamps must be spaced to allow airflow around each lamp.

4.3.3. The integrated LED lamps must not be subjected to excessive vibration or shock during lamp operation.

4.3.4. Line voltage waveshape must be as described in section 3.1 of IES LM-79 (incorporated by reference; see §430.3).

4.3.5. Input voltage must be monitored and regulated to within ± 2 percent of the voltage required in section 3.1.3 for the duration of the test.

4.3.6. Electrical settings must be as described in section 7.0 IES LM-79 (incorporated by reference; see §430.3).

4.3.7. An equal number of integrated LED lamps must be positioned in the base up and base down orientations throughout testing.

4.3.8. The integrated LED lamp must be operated at maximum input power. If multiple modes occur at the same maximum input power (such as variable CCT and CRI), the manufacturer can select any of these modes for testing. Measurements of all quantities described in sections 3 and 4 of this appendix must be taken at the same selected mode.

4.4. Measure Final Lumen Output. Measure the lumen output at the end of the test duration according to section 3.

4.5. *Calculate Lumen Maintenance and Time to Failure*

4.5.1. Calculate the lumen maintenance of the lamp after the test duration "t" by dividing the final lumen output "x_t" by the initial lumen output "x_0". Initial and final lumen output must be measured in accordance with sections 4.1 and 4.4 of this appendix, respectively.

4.5.2. For lumen maintenance values greater than 1, the time to failure (in hours) is limited to a value less than or equal to four times the test duration.

4.5.3. For lumen maintenance values less than 1 but greater than or equal to 0.7, the time to failure (in hours) is calculated using the following equation:

$$Time\ to\ Failure = t * \frac{\ln(0.7)}{\ln(\frac{x_t}{x_0})}$$

Where: t is the test duration in hours; x_0 is the initial lumen output; x_t is the final lumen output at time t, and ln is the natural logarithm function.

The maximum time to failure is limited to four times the test duration t.

4.5.4. For lumen maintenance values less than 0.7, including lamp failures that result in complete loss of light output, time to failure is equal to the previously recorded lumen output measurement at a shorter test duration where the lumen maintenance is greater than or equal to 70 percent, and time to failure shall not be calculated in accordance with section 4.5.3 of this appendix.

5. Standby Mode Test Method for Determining Standby Mode Power

In cases where there is a conflict, the language of the test procedure in this appendix takes precedence over IES LM-79 (incorporated by reference; see §430.3) and IEC 62301 (incorporated by reference; see §430.3).

5.1. *Test Conditions and Setup*

5.1.1. The ambient conditions, power supply, electrical settings, and instrumentation must be established in accordance with the specifications in sections 2.0, 3.0, 7.0, and 8.0 of IES LM-79 (incorporated by reference; see §430.3), respectively.

5.1.2. An equal number of integrated LED lamps must be positioned in the base up and base down orientations throughout testing.

5.1.3. The integrated LED lamp must be operated at the rated voltage throughout testing. For an integrated LED lamp with multiple rated voltages, the integrated LED lamp must be operated at 120 volts. If an integrated LED lamp with multiple rated voltages is not rated for 120 volts, the integrated LED lamp must be operated at the highest rated input voltage.

5.2. Test Method, Measurements, and Calculations

5.2.1. Standby mode power consumption must be measured for integrated LED lamps if applicable.

5.2.2. The integrated LED lamp must be stabilized prior to measurement as specified in section 5.0 of IES LM-79 (incorporated by reference; see §430.3). The stabilization variation is calculated as [maximum – minimum)/minimum] of at least three readings of the input power and lumen output over a period of 30 minutes, taken 15 minutes apart.

5.2.3. The integrated LED must be configured in standby mode by sending a signal to the integrated LED lamp instructing it to have zero light output.

5.2.4. The standby mode power in watts must be measured as specified in section 5 of IEC 62301 (incorporated by reference; see §430.3).