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[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 430

[EERE-2024-BT-TP-0010]

RIN 1904-AB99

Energy Conservation Program: Test Procedure for General Service Lamps

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

ACTION: Final rule.

SUMMARY The U.S. Department of Energy (“DOE”) is adopting clarifications to the test procedures for general service lamps (“GSLs”) located in appendix W, appendix BB and appendix DD. Specifically, DOE is clarifying instructions that GSLs must not be tested as colored lamps and that lamps with additional components that do not affect light output must be turned off during testing. The clarifications also specify that non-integrated lamps be tested with a fluorescent lamp ballast, high intensity discharge (“HID”) lamp ballast or external light-emitting diode (“LED”) driver selected based on compatibility lists and availability; and provide specifications regarding the starting method, ballast factor, and number of lamps. This rulemaking is limited in scope and is providing clarifications to the current test procedures that are required for certification of compliance with existing applicable GSL energy conservation standards. Further, this

rulemaking does not satisfy the Energy Policy and Conservation Act (“EPCA”) requirement that, at least once every 7 years, DOE review the test procedures for GSLs.

DATES: The effective date of this rule is **INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***. The amendments will be mandatory for product testing starting **INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***.

ADDRESSES: The docket, which includes *Federal Register* notices, comments, and other supporting documents/materials, is available for review at www.regulations.gov. All documents in the docket are listed in the www.regulations.gov index. However, not all documents listed in the index may be publicly available, such as those containing information that is exempt from public disclosure.

A link to the docket webpage can be found at www.regulations.gov/docket/EERE-2024-BT-TP-0010. The docket webpage contains instructions on how to access all documents, including public comments, in the docket.

For further information on how to review the docket contact the Appliance and Equipment Standards Program staff at (202) 287-1445 or by email: ApplianceStandardsQuestions@ee.doe.gov.

FOR FURTHER INFORMATION CONTACT:

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I. Authority and Background

GSLs are included in the list of “covered products” for which the DOE is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6291(30)(BB); 42 U.S.C. 6291(30)(DD); 42 U.S.C. 6295(i)(6)) GSLs include but are not limited to general service incandescent lamps (“GSILs”), incandescent reflector lamps (“IRLs”), compact fluorescent lamps (“CFLs”), and integrated LED lamps. DOE’s test procedure for GSILs and IRLs are set forth at 10 CFR part 430, subpart B, appendix R (“appendix R”). DOE’s test procedure for CFLs is set forth at 10 CFR part 430, subpart B, appendix W (“appendix W”). DOE’s test procedure for integrated LED lamps is set forth at 10 CFR part 430, subpart B, appendix BB (“appendix BB”). DOE’s test procedure for GSLs that are not GSILs, IRLs, CFLs, or integrated LED lamps is set forth at 10 CFR part 430, subpart B, appendix DD (“appendix DD”). The following sections discuss DOE’s authority to establish and amend test procedures for GSLs and relevant background information regarding DOE’s consideration of test procedures for this product.

A. Authority

The Energy Policy and Conservation Act, Pub. L. 94-163, as amended (“EPCA”),¹ authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317, as codified) Title III, Part B of EPCA² established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency. These products include GSLs, the subject of this document. (42 U.S.C. 6295(6))

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered products must use as the basis for: (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted under EPCA (42 U.S.C. 6295(s)), and (2) making other representations about the efficiency of those products (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to

¹ All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Pub. L. 116-260 (Dec. 27, 2020), which reflect the last statutory amendments that impact Parts A and A-1 of EPCA.

² For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.

determine whether the products comply with any relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

Federal energy efficiency requirements for covered products established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6297(d))

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE must follow when prescribing or amending test procedures for covered products. EPCA requires that any test procedures prescribed or amended under this section shall be reasonably designed to produce test results which measure energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle (as determined by the Secretary) or period of use and shall not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

EPCA also requires that, at least once every 7 years, DOE evaluate test procedures for each type of covered product, including GSLs, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle or period of use. (42 U.S.C. 6293(b)(1)(A))

If the Secretary determines, on her own behalf or in response to a petition by any interested person, that a test procedure should be prescribed or amended, the Secretary shall promptly publish in the *Federal Register* proposed test procedures and afford interested persons an opportunity to present oral and written data, views, and arguments with respect to such procedures. The comment period on a proposed rule to amend a test procedure shall be at least 60 days and may not exceed 270 days. In prescribing or amending a test procedure, the Secretary shall take into account such information as the Secretary determines relevant to such procedure, including technological developments relating to energy use or energy efficiency of the type (or class) of covered products involved. (42 U.S.C. 6293(b)(2)). If DOE determines that test procedure revisions are not appropriate, DOE must publish its determination not to amend the test procedures.

In addition, EPCA requires that DOE amend its test procedures for all covered products to integrate measures of standby mode and off mode energy consumption into the overall energy efficiency, energy consumption, or other energy descriptor, unless the current test procedure already incorporates the standby mode and off mode energy consumption, or if such integration is technically infeasible. (42 U.S.C. 6295(gg)(2)(A)(i)–(ii)) If an integrated test procedure is technically infeasible, DOE must prescribe separate standby mode and off mode energy use test procedures for the covered product, if a separate test is technically feasible. (42 U.S.C. 6295(gg)(2)(A)(ii)) Any such amendment must consider the most current versions of the International

Electrotechnical Commission (“IEC”) Standard 62301³ and IEC Standard 62087⁴ as applicable. (42 U.S.C. 6295(gg)(2)(A))

In this final rule, DOE is adopting clarifications to the test procedures for GSLs to address specific issues and to make minor clarifications to the current test procedures that are required for certification of compliance with applicable GSL energy conservation standards. Further, this final rule does not satisfy the EPCA requirement that, at least once every 7 years, DOE review the test procedures for GSLs. (42 U.S.C. 6293(b)(1)(A))

B. Background

DOE’s existing test procedures for GSLs appear at 10 CFR part 430, subpart B, appendix R for GSILs and IRLs, appendix W for CFLs, appendix BB for integrated LED lamps and appendix DD for all GSLs that are not GSILs, IRLs, CFLs, or integrated LED lamps. In this final rule, DOE is adopting clarifications to appendix W, appendix BB, and appendix DD.

On July 1, 2016, DOE published a final rule adopting a test procedure for integrated LED lamps in appendix BB. 81 FR 43404. On August 19, 2016, DOE published a final rule amending test procedures for medium base CFLs and adopting test procedures for new metrics for all CFLs including hybrid CFLs and CFLs with bases other than medium screw base in appendix W. 81 FR 59386. On October 20, 2016,

³ IEC 62301, *Household electrical appliances—Measurement of standby power* (Edition 2.0, 2011-01).

⁴ IEC 62087, *Audio, video and related equipment—Methods of measurement for power consumption* (Edition 1.0, Parts 1–6: 2015, Part 7: 2018).

DOE published a final rule adopting new test procedures for GSLs that are not integrated LED lamps, CFLs, or GSILs in appendix DD. 81 FR 72493.

On May 9, 2022, DOE published a final rule codifying the 45 lumens per watts (“lm/W”) backstop requirement for GSLs that Congress prescribed in amendments to EPCA. 87 FR 27439. DOE issued a phased-in enforcement policy for the 45 lm/W backstop requirement.⁵ On October 14, 2022, DOE issued a guidance document⁶ stating that manufacturers and importers are not currently required to certify compliance to the 45 lm/W backstop requirement and that DOE may address the certification requirements for the backstop in a separate, future rulemaking. On October 9, 2024, DOE published a final rule stating because DOE has reached the full enforcement phase of the enforcement policy, manufacturers and importers must certify compliance to the backstop requirement for GSLs. 89 FR 81994, 82052-82053.

On January 11, 2023, DOE published a notice of proposed rulemaking (“January 2023 NOPR”) proposing amended energy conservation standards for GSLs. 88 FR 1638. On April 19, 2024, DOE published a final rule adopting amended energy conservation standards for GSLs (“April 2024 Final Rule”). 89 FR 28856. Note, in the April 2024 Final Rule, for certain lamps, DOE determined that because the market is rapidly developing it was unable to make a clear and accurate determination regarding the consumer utility, how various technology options would affect the efficiency, and maximum technologically feasible efficiency of these lamps, which prevented DOE from

⁵ See https://www.energy.gov/sites/default/files/2022-04/GSL_EnforcementPolicy_4_25_22.pdf.

⁶ See https://www1.eere.energy.gov/buildings/appliance_standards/pdfs/GSL_Cert_Guidance_Final.pdf.

determining whether a specific standard for these lamps would be economically justified. Accordingly, the standards adopted in the April 2024 Final Rule do not apply to these lamps (see 10 CFR 430.32(dd)(1)(iv)(C)). DOE did note that these lamps are still subject to the 45 lm/W sales prohibition at 10 CFR 430.32(dd). 89 FR 28856, 28886-28888.

On November 25, 2024, DOE published a notice of proposed rulemaking (“November 2024 NOPR”) that proposed clarifications to the test procedures for GSLs to address specific issues and to make minor corrections to the current test procedures that are required for certification of compliance with applicable GSL energy conservation standards. 89 FR 92855. DOE received comments in response to the November 2024 NOPR from the interested parties listed in Table I.1.

Table I.1 List of Commenters with Written Submissions in Response to the November 2024 NOPR

Commenter(s)	Reference in this Final Rule	Comment No. in the Docket	Commenter Type
Bay Area Compliance Laboratories Corp. (“BACLC”)	BACLC	2	Laboratory
Michael Ravnitzky	Ravnitzky	3	Individual
Individual	Individual	4	Individual
Individual ⁷	Individual	6	Individual
Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison; collectively, the California Investor-Owned Utilities (“CA IOUs”)	CA IOUs	7	Utility
Westinghouse Lighting	Westinghouse	8	Manufacturer
Signify	Signify	9	Manufacturer

⁷ This comment was also submitted as comment No. 5 in the docket, <https://www.regulations.gov/document/EERE-2024-BT-TP-0010-0001>. In this document, the comment is referenced as comment No. 6.

National Electrical Manufacturers Association (“NEMA”)	NEMA	10	Industry Association
Appliance Standards Awareness Project (“ASAP”), Northwest Energy Efficiency Alliance (“NEEA”), National Consumer Law Center	ASAP <i>et al.</i>	11	Efficiency Organizations

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.⁸

II. Synopsis of the Final Rule

In this final rule, DOE is adopting clarifications to appendix W, “Uniform Test Method for Measuring the Energy Consumption of Compact Fluorescent Lamps;” appendix BB, “Uniform Test Method for Measuring the Input Power, Lumen Output, Lamp Efficacy, Correlated Color Temperature (CCT), Color Rendering Index (CRI), Power Factor, Time to Failure, and Standby Mode Power of Integrated Light-Emitting Diode (LED) Lamps;” and appendix DD, “Uniform Test Method for Measuring the Energy Consumption and Energy Efficiency of General Service Lamps That Are Not General Service Incandescent Lamps, Compact Fluorescent Lamps, or Integrated LED Lamps.” DOE is adopting clarifications to appendices W, BB and DD to specify: (1) lamps must not be tested as colored lamps; and (2) lamps with additional components that

⁸ The parenthetical reference provides a reference for information located in the docket of DOE’s rulemaking to develop test procedures for insert product. (Docket No. EERE-2024-BT-TP-0010, which is maintained at: www.regulations.gov). The references are arranged as follows: (commenter name, comment docket ID number at page of that document).

do not affect the light output of the lamp (*e.g.*, camera, speaker) must be tested with as many components turned off as possible.

Additionally, in this final rule, DOE is adopting clarifications to appendix DD as follows: (1) remove the instruction to operate non-integrated LED lamps at the manufacturer-declared input voltage and current; (2) specify that non-integrated lamps be tested on a fluorescent lamp ballast, HID lamp ballast, or external LED driver, in an order of preference based on being on a manufacturer-provided compatibility list and/or commercially available; (3) specify the starting method and ballast factors for the fluorescent lamp ballasts used in testing; and (4) specify that fluorescent lamp ballasts, HID lamp ballasts, or external LED drivers used in testing operate the maximum number of lamps and instructions for calculating individual lamp values where more than one lamp is operated.

DOE's actions are summarized in Table II.1 compared to the current test procedure as well as the reason for the change.

Table II.1 Summary of Changes in Test Procedure Relative to Current Test Procedure

Current DOE test procedure	Clarification to test procedure	Attribution
Does not include instruction to ensure lamps are not tested as a colored lamp.	Provides instructions that lamps must not be tested as colored lamps.	Response to industry comments
Does not include instructions to test lamps with additional components that do not affect the light output of the lamp (<i>e.g.</i> , camera, speaker) with as many features turned off as possible.	Provides instructions to turn off as many components as possible during testing for lamps with additional components that do not affect the light output of the lamp (<i>e.g.</i> , camera, speaker).	Response to industry comments
Includes instructions to test non-integrated LED lamps at the	Removes instructions to test non-integrated LED lamps at the manufacturer-declared input voltage and current and instead specifies	Response to industry comments

Current DOE test procedure	Clarification to test procedure	Attribution
manufacturer-declared input voltage and current.	to test non-integrated lamps with a fluorescent lamp ballast, HID lamp ballast or external LED driver selected in order of preference based on compatibility list and availability.	
Does not include instructions for starting method and ballast factor for a fluorescent lamp ballast used in testing non-integrated lamps.	Specifies that a fluorescent lamp ballast used in testing non-integrated lamps must have certain starting methods and ballast factors.	Response to industry comments
Does not include instructions for number of lamps for a fluorescent lamp ballast, HID lamp ballast used in testing non-integrated lamps.	Specifies that a fluorescent lamp ballast, HID lamp ballast used in testing non-integrated lamps must operate the maximum number of lamps and provides instructions for calculating individual lamp values where more than one lamp is operated.	Response to industry comments
Does not include certain test instructions for non-integrated lamps.	Adds language in appendix DD that provide relevant test setup instructions for testing non-integrated lamps that are designed and marketed to replace fluorescent lamps and HID lamps.	Response to industry comments

DOE has determined that the clarifications described in section III of this document and adopted in this document will not alter the measured efficiency of GSLs, or require retesting or recertification solely as a result of DOE's adoption of the clarifications to the test procedures. Additionally, DOE has determined that the clarifications will not increase the cost of testing. Discussion of DOE's actions are addressed in detail in section III of this document.

The effective date for the amended test procedures adopted in this final rule is 30 days after publication of this document in the *Federal Register*. Representations of energy use or energy efficiency must be based on testing in accordance with the amended test procedures beginning 180 days after the publication of this final rule.

III. Discussion

In the following sections, DOE discusses certain clarifications to its test procedures for GSLs. For each clarification DOE provides relevant background information, explains why the clarification merits consideration, discusses relevant public comments, and its final approach.

A. Scope of Applicability

This rulemaking applies to GSLs. DOE defines a GSL as a lamp that has an ANSI base; is able to operate at a voltage of 12 volts or 24 volts, at or between 100 to 130 volts, at or between 220 to 240 volts, or of 277 volts for integrated lamps (as set out in this definition), or is able to operate at any voltage for non-integrated lamps (as set out in this definition); has an initial lumen output of greater than or equal to 310 lumens (or 232 lumens for modified spectrum general service incandescent lamps) and less than or equal to 3,300 lumens; is not a light fixture; is not an LED downlight retrofit kit; and is used in general lighting applications. General service lamps include, but are not limited to, general service incandescent lamps, compact fluorescent lamps, general service light-emitting diode lamps, and general service organic light emitting diode lamps. 10 CFR 430.2. There are 26 lamp types exempt from the GSL definition.⁹

⁹ See definition of “general service lamp” in 10 CFR 430.2 for the specific exemptions from the definition.

B. Clarifications to Appendix W, Appendix BB, and Appendix DD

In this document, DOE is adopting clarifications to the existing test procedures for GSLs to ensure consistent testing to comply with the 45 “lm/W” backstop requirement for GSLs that Congress prescribed in amendments to EPCA. (42 U.S.C. 6295(i)(6)(A)(v)) DOE has determined these clarifications will further ensure consistency and repeatability in testing. To the extent that other GSLs may not be able to be tested in accordance with DOE’s test procedures, manufacturers may petition DOE for test procedure waivers in accordance with 10 CFR 430.27.

DOE received general comments regarding the clarifications to the GSL test procedures proposed in the November 2024 NOPR. The CA IOUs stated their general support for DOE’s proposals and recommended certain amendments to the proposed changes, suggesting that if these cannot be included in this final rule, DOE collaborate with CA IOUs and other stakeholders to consider them for a future update. (CA IOUs, No. 7 at pp. 1, 4) ASAP *et al.* supported DOE’s proposed clarifications in the November 2024 NOPR and agreed with DOE’s tentative determination that these clarifications would not alter the measured efficacy of GSLs nor require retesting or recertification. (ASAP *et al.*, No. 11 at p. 1) Additionally, one individual commenter, Michael Ravnitzky, stated support of DOE’s efforts to provide clarifications to the GSL test procedures in the November 2024 NOPR. (Ravnitzky, No. 3 at p.1)

One individual commented in opposition to the proposed clarifications to the GSL test procedures, stating they lead to unnecessary regulation of GSLs. (Individual, No. 4 at p. 1) Another individual stated concern regarding the complexity of the test procedures

in particular for newer smart appliances and recommended DOE ensure test conditions better reflect real-world usage. They also stated that some of the proposed clarifications were vague, and DOE should provide clearer instructions, frequently answered questions (“FAQs”), and practical examples—possibly in the form of webinars and step-by-step guidance—to help manufacturers better understand the test procedures. (Individual, No. 6 at pp. 1, 1–2)

In this final rule, DOE is adopting clarifications to existing GSL test procedures to ensure they provide the appropriate and necessary instructions for showing compliance to existing GSL energy conservation standards. Moreover, in this final rule, in response to comments received on the November 2024 NOPR, DOE has adopted several amendments to the proposed clarifications to further improve clarity. Specific comments regarding amendments to the proposals in the November 2024 NOPR are discussed in the following sections. Additionally, DOE has a webpage through which it provides guidance and answers Frequently Asked Questions (FAQs) on its appliance standards program.¹⁰

DOE also received comments on aspects of the GSL test procedures for which DOE did not propose clarifications in the November 2024 NOPR. Signify and NEMA stated that DOE should replace the current industry reference for measuring standby

¹⁰ Appliance Standards Guidance and Frequently Asked Questions (FAQs), available at www.energy.gov/eere/buildings/appliance-standards-guidance-and-frequently-asked-questions-faqs.

mode, IEC 62301¹¹ with ANSI C137.63103¹², which is a national adoption of IEC 63103¹³. (Signify, No. 9 at p. 6–7; NEMA, No. 10 at p. 2) Signify stated that this standard is similar to IEC 62301 except it includes test setups specific to lighting products (e.g., LED lamps) and its adoption would increase repeatability, reduce lab-to-lab setup variability, and harmonize with international test methods. (Signify, No. 9 at p. 6–7) NEMA stated that the currently referenced IEC 62301 is ineffective for use with lighting products and if DOE cannot replace it in this rule, it should do so in a future rulemaking. (NEMA, No. 10 at p. 2)

This final rule is limited in scope to providing clarifications to the current GSL test procedures that are required for certification of compliance with existing GSL energy conservation standards. Standby mode power consumption of GSLs is not currently subject to standards and therefore, is not within the scope of this rulemaking.

Finally, Ravnitzky recommended adjustments to the language implementing the clarifications proposed in the November 2024 NOPR, stating those adjustments would enhance clarity without changing meaning. (Ravnitzky, No. 3 at pp. 2-7) DOE reviewed the recommendations and adopted certain suggestions that it determined improved clarity while maintaining the original meaning. For example, stating “select a ballast” instead of “choose a ballast;” stating “test report must specify” instead of “manufacturer must

¹¹ International Electrotechnical Commission, *IEC 62301 Household electrical appliances—Measurement of standby power*, (Edition 2.0, 2011-01).

¹² American National Standards Institute, *ANSI C137.63103 Lighting Systems—Non-Active Mode Power Measurement*, Approved December 13, 2021.

¹³ IEC 63103, *Lighting Equipment—Non-Active Mode Power Measurement* (Edition 1.0, 2020-07).

indicate in the test report;” stating “if the procedure in section 3.1.3.1 is not possible” instead of “if section 3.1.3.1 is not possible.”

The following sections discuss in detail the clarifications proposed in the November 2024 NOPR, relevant public comments, and DOE’s final approach.

1. Lamps with Multiple Modes

Appendices W, BB, and DD specify instructions to test at maximum input power for all lamps, including those that may operate in multiple modes. Section 3.1.4 of appendix BB and section 3.5 of appendix DD specify to operate the lamp at the maximum input power; and if multiple modes occur at the same maximum input power (such as variable CCT or color rendering index (“CRI”)) select any of these modes and ensure all measurements are taken at the same selected mode. Section 3.1.4 of appendix W specifies to operate the lamp, including those that are dimmable or multi-level, at the labeled wattage, defined as the highest wattage marked on the lamp and/or lamp packaging.

In the November 2024 NOPR, in section 3 of appendices W, BB, and DD, DOE proposed to specify to operate the lamp as not a colored lamp (as defined in 10 CFR 430.2) and if the lamp can operate at multiple CCTs to operate the lamp at 2700 K, or the closest available CCT greater than 2700 K. DOE also proposed to require manufacturers to indicate on the test report which CCT (numerical or on the graphical user interface) is selected for testing and include details such that another laboratory could operate the lamp at the same CCT. 89 FR 92855, 92859.

ASAP *et al.* stated its support for DOE’s clarification that lamps not be tested as colored lamps, noting that it ensures color tunable lamps are not tested as colored lamps which are exempt from the GSL definition. (ASAP *et al.*, No. 11 at p. 1)

DOE also received several comments regarding DOE’s proposal to test at 2700 K or the closest available CCT greater than 2700 K. ASAP *et al.* stated its support for the proposal. (ASAP *et al.*, No. 11 at p. 1) The CA IOUs stated that the proposal does not account for color tunable GSLs that can achieve the same CCT through various combinations of LED outputs, resulting in varying levels of electricity consumption. The CA IOUs cited NEMA’s recommendation that in cases where the same chromaticity can be achieved with multiple primary settings, the manufacturer be the one to determine the test conditions and provide instruction for how to repeat the condition for the highest input power white light chromaticity as per ANSI C78.377¹⁴. The CA IOUs stated that DOE did not adopt NEMA’s recommendation or offer alternative guidance for testing such GSLs and should provide further guidance in the final rule. (CA IOUs, No. 7 at p. 2) Ravnitzky stated they supported the proposal to test lamps at 2700 K or the closest available CCT greater than 2700 K because it ensures test conditions that reflect typical consumer usage. However, Ravnitzky asked for clarification on what “maximum input power” means for lamps with multiple modes. (Ravnitzky, No. 3 at p. 1)

The current test procedures in sections 3.1.4 of appendix W, BB, and section 3.5 of appendix DD already specify that the lamp must be operated at maximum input power.

¹⁴ American National Standards Institute, *ANSI C78.377—2017 American National Standard for Electric Lamps—Specifications for the Chromaticity of Solid-State Lighting Products*, Approved 2017.

In the November 2024 NOPR, DOE proposed to also clarify that the lamp must not be operated as a colored lamp and that if it could operate at multiple CCTs, it must be operated at 2700 K or the closest available CCT greater than 2700 K. 89 FR 92855, 92859. These instructions mean the lamp is tested at the maximum input power at which the lamp is not operating as a colored lamp and operating at 2700 K or the closest available CCT greater than 2700 K, and thereby align with NEMA’s recommendation for testing color tunable lamps at the highest input power white light chromaticity. To further clarify this, in this final rule, DOE has slightly rephrased the proposed language for this instruction from “Operate the lamp at the maximum input power and not as a colored lamp” to “Ensure that the lamp is not operating as a colored lamp and operate the lamp at maximum input power.”

Signify stated it supported DOE’s proposal to require that the lamp not be operated as a colored lamp (as defined in 10 CFR 430.2) but did not support using 2700 K as the only operating set point. Signify commented that tunable white lamps can always produce white light but at different CCTs and California Energy Commission (“CEC”) and ENERGY STAR require testing these lamps at maximum input power which typically occurs at CCTs as high as 4000 K or as low as 2700 K. Signify stated that maximum input power has been the historical set point and renders realistic images with good color fidelity. Signify added stated that removing the proposed requirement to test at a specific CCT would avoid confusion rooted in different testing set points, enable comparison with existing databases and prevent test burden duplication. (Signify, No. 9 at p. 2–3) Similarly, BACLC stated that DOE’s proposal to test GSLs at 2700 K or the closest available CCT greater than 2700 K does not align with ENERGY STAR Lamps

V2.1 Final Specification, California's Title 20 (Appliance Efficiency Proceedings), or California's Title 24 (Building Standards Code) requirements to respectively, test at the most consumptive white light setting, typically testing at maximum power consumption, and at the least efficient CCT. (BACLC, No. 2 at p. 1) Westinghouse supported DOE's proposal to test at 2700 K or the closest available CCT greater than 2700 K, but stated it should be implemented for future testing. Westinghouse recommended that to prevent retest of thousands of lamps, for GSLs already on the market, DOE should allow prior test data used to certify the lamps to the ENERGY STAR specifications including lamps tested at higher than 2700 K. (Westinghouse, No. 8 at p. 1) NEMA also stated that for many years manufacturers have been testing according to ENERGY STAR specifications, including testing tunable and selectable CCT lamps at the most consumptive white light setting, often at nominal CCTs higher than 2700 K. NEMA stated that this test data was gathered voluntarily in accredited laboratories for provision to the Federal government and remains relevant for products on that market with unchanged designs. (NEMA, No. 10 at p. 3)

NEMA also stated that in its lighting product rulemakings, DOE should clearly distinguish between calculated and nominal CCT. NEMA stated that ANSI C78.377 assigns nominal CCTs (*e.g.*, 2700 K, 3000K, 4000 K) to ranges of calculated CCTs defined with targets and tolerances (*e.g.*, 2580 K – 2870 K is nominal 2700 K). NEMA stated that this convention was created to simplify end user product selection and nominal values should not be used for compliance purposes. NEMA also stated that DOE should delineate between tunable CCT and selectable CCT lamps, explaining that tunable CCT lamps allow the user to tune the color appearance continuously by selecting any number

of calculated CCTs within the design range while selectable CCT lamps allow for selection of limited, predetermined, stepped CCTs (*e.g.*, 2700 K, 3000 K). (NEMA, No. 10 at p. 3)

In the November 2024 NOPR, DOE proposed to test GSLs that can operate at multiple CCTs at 2700 K because a colored lamp has a CCT less than 2500 K or greater than 7000 K (see 10 CFR 430.2 “colored lamp”). Therefore, operating at 2700 K would ensure that the lamp is not operating as a colored lamp. Further, DOE noted that 2700 K is a common CCT for GSLs. 89 FR 92855, 92859. DOE has reviewed the comments stating that because manufacturers have not been historically testing these GSLs at 2700 K, the proposed clarification to test at a 2700 K may result in having to retest lamps. To avoid retesting of lamps, in this final rule, DOE is not adopting the proposed clarification to test at 2700 K or the closest available CCT greater than 2700 K for lamps that can operate at multiple CCTs. In this final rule, DOE is adopting the proposed clarification that the lamp cannot be tested as a colored lamp. DOE finds that the specification to not test as a colored lamp is sufficient to ensure that the lamp is not tested as a colored lamp, which is exempt from the GSL definition. DOE will consider adding the clarification of testing at a specific CCT, including NEMA’s suggested delineation of relevant terms, in a future rulemaking.

In the November 2024 NOPR, DOE proposed to remove the instruction in section 3.1 of appendix DD to take measurements at full light output. DOE explained that section 3.5 in appendix DD already specifies to operate the lamp at the maximum input

power which is equivalent to operating the lamp at full light output. 89 FR 92855, 92859.

Signify, NEMA, and Westinghouse stated their support for DOE's proposal to remove the test procedure instruction to take measurements at full light output in appendix DD. (Signify, No. 9 at p. 4; NEMA, No. 10 at p. 1; Westinghouse, No. 8 at p. 2)

In this final rule, DOE is adopting the clarification to remove of the instruction to take measurements at full light output in appendix DD as proposed in the November 2024 NOPR.

2. Lamps with Non-Illumination Components

In the November 2024 NOPR, for lamps with a component(s) that offer a distinct functionality (*e.g.*, a speaker, a camera, an air purifier, etc.) where the component is integrated into the lamp but does not affect the light output of the lamp (*e.g.*, does not turn the light on/off, dim the light, change the color of the light, etc.) and is capable of operating in standby mode, in section 3 of appendices W, BB, and DD, DOE proposed to specify to turn off as many of these components as possible during testing. DOE also proposed to require that the test report indicate which components were turned off and which, if any, components remained on. 89 FR 92855, 92859-92860.

Signify, NEMA, and ASAP *et al.* stated their support for DOE's proposal to turn off all components that do not affect light output during testing. (Signify, No. 9 at p. 4; NEMA, No. 10 at p. 1; ASAP *et al.*, No. 11 at p. 1) Ravnitzky stated that the proposal to

turn off non-illumination components during testing ensures the measured efficacy is not inflated by features that do not produce light. (Ravnitzky, No. 3, p. 1) The CA IOUs stated that DOE's proposed clarification states that only completely different functions operating in standby mode should be turned off, if possible, and does not address how to test a GSL that offers a different function but lacks a standby mode. For these GSLs, the CA IOUs asked that the test procedure clarify whether the electricity consumption associated with the different functionalities should be included with that for producing visible light when calculating energy efficiency. (CA IOUs, No. 7 at p. 3) The CA IOUs further stated that DOE's proposed language "turn off as many of these components as possible" is unclear as to whether it is referring to only components that must be user-switchable independent of the lamp's light output or also referring to components that are not user-switchable and should be mechanically or electrically turned off during testing. (CA IOUs, No. 7 at p. 3)

As noted, the proposed clarification is for lamps with component(s) that offer a distinct functionality where the component is integrated into the lamp but does not affect the light output of the lamp and is capable of operating in standby mode. 89 FR 92855, 92859-92860. In standby mode, the energy-using product is connected to a main power source and offers one or more of the following user-oriented or protective functions: (1) to facilitate the activation or deactivation of other functions (including active mode) by remote switch (including remote control), internal sensor, or timer; or

(2) continuous functions, including information or status displays (including clocks) or sensor-based functions. 10 CFR 430.2, 42 U.S.C. 6295(gg)(1)(A)(iii). If a

lamp has components that provide additional non-lighting functionality and that can be deactivated, it would be capable of operating in standby mode, consistent with the definition of standby mode. DOE understands that lamps with component(s) that offer distinct functionality that does not affect light output can be continuous functions, and therefore not meet the definition of standby mode, and it may not be possible to turn them off. In this case, the energy consumption of the component that offers that distinct functionality will have to be included in measured values during testing.

Further, the proposed language to “turn off as many of these components as possible” means without permanently altering the product. To clarify this meaning, in this final rule, DOE is adding language to clearly state to turn off components without permanently altering the product where permanently altering constitutes the cutting of wires, use of a soldering iron, or damage to or destruction of the lamp and does not constitute connecting or disconnecting wire nuts, fasteners or screws, or preserving the lamp as it was sold. If such components cannot be turned off without permanently altering the product, their energy consumption must be included in measurements.

In summary, in this final rule, DOE is adopting the clarification regarding turning off components that do not affect light output during testing, as proposed in the November 2024 NOPR with the added clarification that this instruction must be carried out without permanently altering the product. To the extent that a lamp would not be able to be tested in accordance with these provisions, manufacturers may petition for a test procedure waiver in accordance with 10 CFR 430.27.

3. Non-integrated Lamps

Section 3.4 of appendix DD provides instructions to operate a non-integrated lamp at the manufacturer-declared input voltage and current. In the November 2024 NOPR, DOE proposed to remove the instruction in section 3.4 of appendix DD to operate non-integrated LED lamps at the manufacturer-declared input voltage and current and specify that the remaining instructions regarding rated voltages apply to integrated lamps. Additionally, DOE proposed to add a section to appendix DD that specifies that a non-integrated lamp be operated on a fluorescent lamp ballast or external driver that is selected based on manufacturer-provided compatibility list and availability, starting method, and ballast factor. Finally, DOE proposed to add instructions for testing with a fluorescent lamp ballast or external driver in terms of number of lamps used, and references to relevant industry standards. 89 FR 92855, 92860. The proposal and relevant public comments are discussed in the following sections.

a. Selection of Fluorescent Lamp Ballast, HID Lamp Ballast or External LED Driver

In the November 2024 NOPR, DOE proposed that the fluorescent lamp ballast or external driver selected for testing must be, in the following order of preference: (1) from the lamp's publicly available manufacturer-provided compatibility list and commercially available; (2) commercially available and able to operate the lamp throughout the duration of the test; (3) previously procured and able to operate the lamp throughout the duration of the test. Only if the fluorescent lamp ballast and external driver cannot be selected from the previous preference should the next preference be available.

Additionally, DOE proposed that the manufacturer record the fluorescent lamp ballast or

external driver manufacturer and model name/number used for testing in the test report.
89 FR 92855, 92860.

DOE received general comments regarding this proposal. Ravnitzky supported DOE's proposal to test non-integrated lamps with a fluorescent lamp ballast or external driver selected from a compatibility list or based on availability, stating it would replicate real-world usage conditions. (Ravnitzky, No. 3, p. 1) ASAP *et al.* supported DOE's proposed specifications for selecting fluorescent lamp ballast or external driver and, if applicable, the starting method and/or ballast factor; stating they improved repeatability and ensured representativeness. (ASAP *et al.*, No. 11 at p. 2) Signify and NEMA stated they supported the order of preference of selection based on: (A) described in the lamp manufacturer compatibility list, (B) commercially available, (C) starting method as described in Table III.1 of the November 2024 NOPR and (D) ballast factor as described in Table III.2 of the November 2024 NOPR. (Signify, No. 9 at p. 4; NEMA, No. 10 at p. 2)

DOE also received specific comments regarding (1) definitions and terminology, (2) the organization of the proposed clarifications, (3) use of previously procured ballasts or external drivers, (4) instructions on preheat start fluorescent lamp ballasts, and (5) starting methods and ballast factors. These are discussed in detail in the following sections.

Definitions and Terms

DOE received comments on definitions and terms used in the proposed clarifications for selecting ballasts or external drivers for testing non-integrated lamps. NEMA recommended that, consistent with ANSI/Illuminating Engineering Society (“IES”) LS-1-22¹⁵, DOE employ the standardized term “LED driver” rather than “driver”. (NEMA, No. 10 at p. 3) DOE agrees that aligning with industry terminology will be a helpful clarification. Therefore, in this final rule, DOE is adopting the proposed clarifications in appendix DD with the term “driver” replaced with “LED driver.”

NEMA also recommended that DOE replace all instances of “fluorescent” with “fluorescent or HID,” given the inclusion of LED replacements for HID lamps in the proposed clarifications. (NEMA, No. 10 at p. 4) In the November 2024 NOPR, it was DOE’s intent to ensure that its proposed clarifications address testing of all non-integrated lamps including those that operate on HID lamp ballasts. While DOE proposed clarifications stating that non-integrated lamps that operate on HID lamp ballasts must be tested according to ANSI C78.53 (see section III.B.3.b of this document), DOE did not appropriately reference HID lamp ballasts in the proposed clarifications for selecting the ballast in the November 2024 NOPR. Therefore, in this final rule, DOE is adopting the proposed clarifications in appendix DD with the inclusion of the term “HID lamp ballast”. Note, that the specific ballast factors and starting

¹⁵ American National Standards Institute, Illuminating Engineering Society, *Lighting Science: Nomenclature and Definitions for Illuminating Engineering*, available at <https://www.ies.org/standards/definitions/>.

methods proposed in the November 2024 NOPR are applicable only to fluorescent lamp ballasts. 89 FR 92855, 92860-92861.

In the November 2024 NOPR, DOE proposed to define the term “commercially available fluorescent lamp ballast or external driver” as one that can be purchased by an individual consumer at a readily accessible retailer (*i.e.*, retailer with storefront or online purchasing). 89 FR 92855, 92860.

Signify and NEMA stated it concurred with DOE’s definition of “commercially available” as meaning the lamp can be purchased by a consumer in a readily accessible retail storefront or online. (Signify, No. 9 at p. 4; NEMA, No. 10 at p. 2) Ravnitzky recommended that DOE define “commercially available fluorescent lamp ballast” as a ballast that can be purchased by an individual consumer at an accessible retailer, that has either a storefront or online purchasing platform, and include the term in a glossary. (Ravnitzky, No. 3 at p. 1)

The proposed definition, which was included in the definitions section of appendix DD, aligns with Ravnitzky’s suggested definition. As noted in previous paragraphs, in this final rule, DOE is adding the term HID lamp ballast and also replacing the term “driver” with “LED driver”. Accordingly, in this final rule, DOE is renaming the proposed term “commercially available fluorescent lamp ballast or external driver” to “commercially available fluorescent lamp ballast, high intensity discharge (“HID”) ballast, or external LED driver.”

Ravnitzky recommended that DOE define “publicly available manufacturer-provided compatibility list” as lists made available by manufacturers on their official websites or through publicly accessible documents which detail the ballasts or drivers that are compatible with specific lamp models. (Ravnitzky, No. 3 at p. 1)

The term “publicly available manufacturer-provided compatibility list” is used throughout the proposed language in section 3.1.3 of appendix DD. 89 FR 92855, 92867. DOE agrees that defining this term will provide further clarification to the proposed instructions. DOE’s review of compatibility lists indicates that the information provided can range from a general statement that the lamp is compatible with electronic ballasts to specifying ballast or external LED driver models which are compatible with the lamp. Additionally, DOE’s intent in using the term “manufacturer-provided” is to ensure that the information is provided by the manufacturer either through the manufacturer’s website or publicly available documents. Therefore, in this final rule, DOE adopts language in appendix DD that defines “publicly available manufacturer-provided compatibility list” as a list or statement made available by the manufacturer on the manufacturer’s official website or made available by the manufacturer through publicly available documents (*e.g.*, product literature, catalogs, and packaging labels), that provides information on the ballasts or external LED drivers that are compatible with the lamp.

Organization of Proposed Clarifications

The CA IOUs stated that the proposed language in section 3.1.3 of appendix DD for selecting ballasts is challenging to understand and follow, including the tables of

ballast factors and starting methods. The CA IOUs stated that the proposed section 3.1.3.2.1.1 provides instructions for selecting ballasts on a “publicly available manufacturer-provided compatibility list” when based on the structure of the section, the instructions should be for selecting ballasts that are commercially available. (CA IOUs, No. 7 at p. 3)

The proposed language in section 3.1.3 of appendix DD is divided into three main subsections or scenarios that specify how the fluorescent lamp ballast or external driver must be selected and in the order of preference of: (1) on a publicly available manufacturer-provided compatibility list and commercially available (section 3.1.3.1) ; (2) commercially available and able to operate the lamp throughout the duration of the test (section 3.1.3.2); and (3) previously procured and able to operate the lamp throughout the duration of the test (section 3.1.3.3). Only if the fluorescent lamp ballast and external driver cannot be selected per the instructions of the previous subsection, is it necessary to move to next subsection. Within each of these subsections, DOE provides instructions for selecting the ballast factor and starting method. This presents a complete set of instructions for choosing the ballast or driver within each subsection. DOE has determined that this is the clearest presentation of the instructions allowing the user to step through the selection process, in the appropriate order of preference.

DOE agrees with CA IOUs that the proposed language in section 3.1.3.2.1.1 is incorrect. This is a subsection under 3.1.3.2, which includes the provisions for cases in which the ballast or external driver is being selected from what is commercially available and can operate the lamp throughout the duration of the test. Therefore, it should not

reference ballasts on the publicly available manufacturer-provided compatibility list, but rather commercially available ballasts. This is corrected in this final rule.

The CA IOUs commented that DOE's proposal to allow non-integrated GSLs to be tested using "previously procured ballasts or drivers" seems to endorse pairing of efficient tubular LED ("TLED") GSLs with inefficient magnetic ballasts and DOE should remove this option. The CA IOUs stated that T12 fluorescent lamps and magnetic ballasts use twice the electricity to produce the same light output as a LED luminaire. The CA IOUs stated that the exemption for high CRI linear fluorescent lamps from energy conservation standards has kept T12 lamps as well as magnetic ballasts on the market, and while the national inventory of T12 lamps has dropped from 941 million in 2010 to 341 million in 2020, the amount of remaining stock is unclear. (CA IOUs, No. 7 at pp. 3-4)

DOE's proposed language requires that the ballast or external driver: be selected first from the lamp's publicly available manufacturer-provided compatibility list and be commercially available; if that is not possible, then be commercially available and able to operate the lamp throughout the duration of the test; if neither of the previous options are possible, then be previously procured and able to operate the lamp throughout the duration of the test. Based on this order of selection, testing would be conducted with commercially available ballasts, first and foremost, whenever possible. Additionally, in a scenario where the lamp under test is only compatible with a ballast or external driver that is no longer commercially available, the option of using something that is previously procured minimizes issues of incompatibility.

Preheat Start Fluorescent Lamp Ballasts

DOE understands that because low frequency, preheat start fluorescent lamp ballasts are an older technology, they may not be commercially available. In the November 2024 NOPR, for lamps that operate only on such ballasts, and these ballasts are not available, DOE proposed to specify to operate the lamp on the manufacturer-declared voltage and current, and if this information is not provided, to operate the lamp in accordance with the applicable lamp voltage and current conditions specified in ANSI C78.901-2016. Finally, DOE proposed the manufacturer must indicate in the test report the voltage and current with which the lamp was operated. 89 FR 92855, 92860.

Signify and NEMA stated it supported DOE's proposal to use the lamp voltage and current specified by the manufacturer for preheat lamps meant to be used with magnetic ballasts when no commercial ballast is available. (Signify, No. 9 at p. 4; NEMA, No. 10 at p. 2)

As noted, in the November 2024 NOPR, DOE proposed to include the statement that if the manufacturer-declared voltage and current is not provided, to operate the lamp in accordance with lamp voltage and current conditions in ANSI C78.901-2016. Upon further review, DOE has determined that this instruction is unnecessary as manufacturers would have the necessary voltage and current for a given lamp, which could include voltages and currents as specified in ANSI C78.901-2016. The test procedure directs manufacturers to indicate in the test report the voltage and current with which the lamp was operated. Therefore, this information would be available from the manufacturers and the additional direction to operate the lamp on the settings specified in ANSI C78.901 is

not needed. Therefore, in this final rule, DOE is adopting the method for testing non-integrated lamps that operate only on low frequency, preheat start fluorescent lamp ballasts as proposed in the November 2024 NOPR, with the removal of the statement regarding use of ANSI C78.901.

Starting Methods and Ballast Factors

In the November 2024 NOPR, DOE proposed that for the ballasts identified based on availability (*i.e.*, manufacturer-provided compatibility list, commercially available, previously procured), if all the ballasts have the same starting method, choose a ballast with that starting method. If there is more than one starting method among them, choose a ballast with a starting method based on lamp type as specified in Table III.1. If the starting method in Table III.1 is not included among fluorescent lamp ballasts under consideration, then select any starting method. 89 FR 92855, 92860.

Table III.1 Starting Method by Lamp Type

Lamp Type	Starting Method
T8 medium bipin	Instant Start
T8 recessed double contact	Instant Start
T5 miniature bipin	Programmed Start
T12 single pin, slimline	Instant Start
T12 medium bipin	Rapid Start
T12 recessed double contact	Rapid Start
All other lamp types	Any

Signify and NEMA commented DOE should add a clarification that if fluorescent lamp ballasts under consideration do not employ any of the starting methods in the proposed table, then select any starting method utilized by a ballast on the compatibility

list. Signify stated this would prevent potential compatibility risks. (Signify, No. 9 at p. 4–5; NEMA, No. 10 at p. 2) DOE agrees this suggestion would help ensure testing is not conducted with a ballast or driver that is not compatible. Therefore, in this final rule, in the scenario where the ballast or driver is being selected from the lamp’s publicly available manufacturer-provided compatibility list, DOE is revising the instruction that “if starting method in Table III.1 is not included among fluorescent lamp ballasts under consideration, then select any starting method” and changing it to “select any starting method on the lamp’s publicly available manufacturer-provided compatibility list.”

Aside from this change, in this final rule, DOE is adopting the clarifications for selecting starting method as proposed in the November 2024 NOPR.

In the November 2024 NOPR, DOE proposed that for the set of ballasts that have been identified based on availability and starting method, if the ballasts have more than one ballast factor available, choose a ballast with a ballast factor based on lamp type as specified in Table III.2. If the ballast factor in Table III.2 is not included among ballasts under consideration, select a ballast with a ballast factor closest to the one listed in Table III.2. 89 FR 92855, 92860-92861.

Table III.2 Ballast Factor by Lamp Type

Lamp Type	Ballast Factor
T8 medium bipin	0.88
T8 recessed double contact	1.05
T5 miniature bipin	1
T12 single pin, slimline	Any
T12 medium bipin	Any

T12 recessed double contact	Any
All other lamp types	Any

Signify and NEMA stated their support of DOE’s proposal for selection of the fluorescent lamp ballast factor used in testing. (Signify, No. 9 at p. 5; NEMA, No. 10 at p. 2) In this final rule, DOE is adopting the clarifications for selecting the ballast factor as proposed in the November 2024 NOPR.

b. Testing with Ballast or External LED Driver

DOE understands that a ballast or external LED driver can operate more than one lamp at a time. Therefore, in the November 2024 NOPR, DOE proposed to specify that the fluorescent lamp ballast or external drivers be loaded with the maximum number of lamps when measuring the initial lumen output, initial input power, input voltage, and input current, and these measured values be divided by the maximum number of lamps. 89 FR 92855, 92861.

In response, the CA IOUs stated that placing multiple 4-foot TLED lamps in an integrating sphere to measure lumen output, if even physically possible, would result in some lumens emitted by one lamp to be absorbed by the other lamps, making the measurement inaccurate. The CA IOUs stated that DOE does not allow for the use of goniophotometer, an alternative method to testing light output, nor does it suggest alternative instrumentation for these situations. (CA IOUs, No. 7 at p. 4) Further, the CA IOUs stated that not all measured values may be appropriately divided by the number

of lamps (*e.g.*, input voltage). The CA IOUs also recommended that DOE reference a standard like ANSI/IES LM-79¹⁶. (CA IOUs, No. 7 at p. 4)

Signify, Westinghouse, and NEMA stated they supported testing the lamp with a ballast that is fully loaded (*i.e.*, with the maximum number of lamps) but recommended DOE clarify that only one lamp at a time be tested in the integrating sphere. Signify and NEMA stated that testing multiple lamps in the integrating sphere could lead to optical interference skewing lumen output measurements. (Signify, No. 9 at p. 5–6; NEMA, No. 10 at p. 2; Westinghouse, No. 8 at p. 2)

Signify, Westinghouse, and NEMA also provided alternative instructions for testing multiple non-integrated lamps in an integrating sphere. Signify recommended DOE provide clarification that only one lamp be placed in the sphere, its light output, voltage, current, and power be recorded, and the lamp efficacy be the average efficacy of all the lamps measured. NEMA recommended testing one lamp at a time in the sphere while operating others outside of the sphere and the averaged light output reported as the certified value to DOE. Westinghouse supported NEMA’s recommendation and also specified to divide values of each lamp by the number of lamps operated by the ballast. (Signify, No. 9 at p. 5–6; NEMA, No. 10 at p. 2; Westinghouse, No. 8 at p. 2)

DOE agrees that that there could be potential issues with initial lumen output measurements when testing multiple non-integrated lamps in the integrating sphere.

¹⁶ Illuminating Engineering Society, *Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products*.

DOE reviewed the alternative instructions suggested by commentators for conducting such testing and found these to provide similar instructions – to test one lamp at a time and take an average of measured values. Considering these recommendations, in this final rule, DOE is adding language to clarify that when testing multiple lamps, one lamp at a time be tested in the integrating sphere while operating the other lamps outside of the sphere; and the initial lumen output, initial input power, input voltage, and input current be measured for each lamp. Additionally, in this final rule, DOE is removing the proposed instruction to divide measured values by the maximum number of lamps. Instead, in sections 3.3.2 and 3.3.3 which provide instructions on calculating lamp efficacy and power factor, respectively, DOE is adding language stating that if multiple lamps are tested, the initial lamp efficacy and power factor will be determined as the average of the values of each lamp.

Regarding CA IOUs’ suggestion to reference ANSI/IES LM-79, DOE notes that this standard is already referenced in section 3.6 of appendix DD for measuring the initial lumen output, input power, input voltage, and input current of non-integrated LED lamps.

In summary, DOE is adopting the proposed clarification regarding testing with the ballast or external LED driver loaded with the maximum number of lamps as proposed in the November 2024 NOPR with the modifications that ensure that one lamp at time is tested in the integrating sphere.

Additionally, in the November 2024 NOPR, DOE proposed to incorporate by reference the applicable industry standard, ANSI C78.53-2023, in appendix DD and

reference it as follows: (1) for a non-integrated lamp marketed to replace a fluorescent lamp and operate on the existing fluorescent lamp ballast, testing should be conducted in accordance with the setup provisions in sections 5.6.3 (Thermal) and 5.6.4 (Electrical Characteristics) of ANSI C78.53-2023; and (2) for a non-integrated lamp marketed to replace a HID lamp and operate on the existing HID lamp ballast, testing should be conducted in accordance with the setup provisions in sections 5.7.2.1 (Thermal), 5.7.3 (Electrical Characteristics), and 5.7.5 (Compatibility Criteria) of ANSI C78.53-2023 sections. 89 FR 92855, 92861.

Signify, NEMA, and Westinghouse stated their support for DOE's proposal to incorporate by reference, ANSI C78.53-2023 for appendix DD. (Signify, No. 9 at p. 6; NEMA, No. 10 at p. 2; Westinghouse, No. 8 at p. 2)

Upon further review, DOE determined that ANSI C78.53-2023 includes instructions that would not be relevant to a non-integrated lamp being tested under the DOE test procedure. For example, instructions referencing de-lamping (*i.e.*, disabling or removing lamps) are not relevant as DOE is requiring testing be conducted with the ballast loaded with the maximum number of lamps (see section III.B.3.b of this document).). Therefore, in this final rule, DOE is not adopting the proposal to incorporate by reference ANSI C78.53-2023 in appendix DD and is instead adding language in appendix DD that provides only the relevant setup instructions applicable for testing non-integrated lamps from ANSI C78.53-2023. DOE has determined that this approach would improve clarity of the test procedure requirements proposed in the November 2024 NOPR.

Additionally, in this final rule, DOE is revising the proposed language “for a non-integrated lamp marketed to replace a fluorescent/HID lamp and operate on the existing fluorescent lamp/HID ballast” to state “designed and marketed” instead of “marketed”. Because “designed and marketed” is a term defined by DOE and specific to lighting products, it will provide further clarity to the instruction (see 10 CFR 430.2 “designed and marketed”).

C. Test Procedure Costs

EPCA requires that test procedures amended by DOE not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) The following section discusses DOE's evaluation of estimated costs associated with the clarifications in this final rule, including relevant public comments.

NEMA and Westinghouse stated their overall support for the proposed clarifications but, referencing ENERGY STAR testing, noting that manufacturers should not be required to retest lamps already on the market that have been tested and certified prior to market introduction. (NEMA, No. 10 at p. 2; Westinghouse, No. 8 at p. 2) In this final rule, DOE is not adopting the clarification to test at 2700 K or the closest available CCT greater than 2700 K, which will allow manufacturers to use previous test data submitted to entities such as ENERGY STAR (see section III.B.1 for complete discussion).

DOE is adopting two updates to appendices W, BB, and DD that provide clarification for testing lamps by specifying: (1) not to test the lamp as a colored lamp; and (2) to turn off components that do not affect light output. These clarifications only provide further clarification and more complete information regarding how to appropriately test certain lamps. Therefore, DOE has determined that the clarifications would not impact the representations of GSL energy efficiency based on the determination manufacturers would be able to rely on data generated under the current test procedure. As such, retesting of GSLs would not be required solely as a result of DOE's adoption of the clarifications to the test procedure.

Finally, in this final rule, DOE is adopting updates to appendix DD to remove the instruction to operate non-integrated LED lamps at the manufacturer-declared input voltage and current and instead specify that non-integrated lamps be operated on a fluorescent lamp ballast, HID lamp ballast or external LED driver. Based on comments from manufacturers, the instruction reflects how these lamps are currently being tested by manufacturers (*see* III.B.3 of this document). Additionally, the DesignLights Consortium (“DLC”) administers a voluntary certification program for high performing lighting products and lists almost 6,000 non-integrated lamps as qualified products. DLC testing requirements for non-linear integrated lamps¹⁷, which manufacturers must use to qualify their products, also require testing on a fluorescent lamp ballast or external LED driver. DOE has determined that manufacturers would be able to rely on data already generated

¹⁷ DLC, “Testing and Reporting Requirements for Linear Replacement Lamps under Technical Requirements V5.1”, July 1, 2020, available at https://designlights.org/wp-content/uploads/2023/06/DLC_Testing-Reporting-Requirements_Linear-Replacement-Lamps_V5-1_20230616.pdf.

for such lamps. As such, DOE has determined that the clarifications would not impact the representations of GSL energy efficiency.

In summary, DOE does not expect that the clarifications outlined in the November 2024 NOPR, and that are being adopted in this final rule, will result in increased costs or burden to manufacturers.

D. Effective and Compliance Dates

The effective date for the adopted test procedure amendment will be 30 days after publication of this final rule in the *Federal Register*. EPCA prescribes that all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with an amended test procedure, beginning 180 days after publication of the final rule in the *Federal Register*. (42 U.S.C. 6293(c)(2)) EPCA provides an allowance for individual manufacturers to petition DOE for an extension of the 180-day period if the manufacturer may experience undue hardship in meeting the deadline. (42 U.S.C. 6293(c)(3)) To receive such an extension, petitions must be filed with DOE no later than 60 days before the end of the 180-day period and must detail how the manufacturer will experience undue hardship. (*Id.*)

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866, 13563, and 14094

Executive Order (“E.O.”) 12866, “Regulatory Planning and Review,” as supplemented and reaffirmed by E.O. 13563, “Improving Regulation and Regulatory Review,” 76 FR 3821 (Jan. 21, 2011) and amended by E.O. 14094, “Modernizing Regulatory Review,” 88 FR 21879 (April 11, 2023), requires agencies, to the extent permitted by law, to: (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public. DOE emphasizes as well that E.O. 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of Information and Regulatory Affairs (“OIRA”) in the Office of Management and Budget (“OMB”) has emphasized that such techniques may include identifying changing future compliance costs that might

result from technological innovation or anticipated behavioral changes. For the reasons stated in the preamble, this final regulatory action is consistent with these principles.

Section 6(a) of E.O. 12866 also requires agencies to submit “significant regulatory actions” to OIRA for review. OIRA has determined that this final regulatory action does not constitute a “significant regulatory action” under section 3(f) of E.O. 12866. Accordingly, this action was not submitted to OIRA for review under E.O. 12866.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of a final regulatory flexibility analysis (“FRFA”) for any final rule where the agency was first required by law to publish a proposed rule for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, “Proper Consideration of Small Entities in Agency Rulemaking,” 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003 to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel’s website: www.energy.gov/gc/office-general-counsel. DOE reviewed this final rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003.

DOE has conducted a focused inquiry into small business manufacturers of the GSLs covered by this rulemaking. For this test procedure, DOE referenced the small business list created for the April 2024 Final Rule. In that final rule, DOE identified potential small manufacturers based on Small Business Administration guidelines categorizing businesses operating under North American Industry Classification System code 335139, “electric lamp bulb and other lighting equipment manufacturing”, with under 1,250 employees (including parent and affiliate companies) as a small business. The size standards are codified at 13 CFR part 121. DOE accessed the Compliance Certification Database¹⁸ to create a list of companies that import or otherwise manufacture the GSLs covered by this final rule. Using information from D&B Hoovers, DOE screened out companies that have more than 1,250 employees, are completely foreign owned and operated, or do not manufacture GSLs in the United States—ultimately identifying 261 small domestic businesses that assemble GSLs.

None of the identified small businesses are expected to incur costs because of the clarifications adopted in this rule. The clarifications to GSL test procedures being adopted in this final rule only provide further clarification regarding how to appropriately test certain lamps with additional functionality. These clarifications would not result in additional test costs, nor would they require retesting for any manufacturers. DOE is also adopting clarifications regarding testing non-integrated GSLs which reflect how these lamps are currently being tested by manufacturers and therefore, would also not result in

¹⁸ U.S. Department of Energy Compliance Certification Database, available at: www.regulations.doe.gov/certification-data/products.html.

additional test costs nor require retesting by any manufacturers—including small manufacturers.

An individual stated that the proposed changes could create significant financial challenges for small businesses, especially those without the resources (*e.g.*, specialized equipment, trained personnel, and a controlled testing environment) to conduct the required testing. The individual recommended that DOE consider simplifying the testing requirements or offering financial support through grants, loans, or extended deadlines for small manufacturers. (Individual, No. 6 at p. 1)

DOE notes that the test procedure amendments established in this final rule are not estimated to increase manufacturer testing costs and are intended as clarifications for manufacturers, corresponding to how those manufacturers have been testing covered products.

Therefore, DOE concludes that the cost effects accruing from the final rule would not have a “significant economic impact on a substantial number of small entities,” and that the preparation of a FRFA is not warranted. DOE has submitted a certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of GSLs must certify to DOE that their products comply with any applicable energy conservation standards. To certify compliance, manufacturers must

first obtain test data for their products according to the DOE test procedures, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including GSLs. (*See generally* 10 CFR part 429.) The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (“PRA”). This requirement has been approved by OMB under OMB control number 1910-1400. Public reporting burden for the certification is estimated to average 35 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

DOE is not amending the certification or reporting requirements for GSLs in this final rule.

Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number.

D. Review Under the National Environmental Policy Act of 1969

In this final rule, DOE establishes test procedure amendments that it expects will be used to develop and implement future energy conservation standards for GSLs. DOE has determined that this rule falls into a class of actions that are categorically excluded

from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and DOE's implementing regulations at 10 CFR part 1021. Specifically, DOE has determined that adopting test procedures for measuring energy efficiency of consumer products and industrial equipment is consistent with activities identified in 10 CFR part 1021, appendix A to subpart D, A5 and A6. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

Executive Order 13132, "Federalism," 64 FR 43255 (August 4, 1999), imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. The Executive order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE examined this final rule and determined that it will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of this final rule. States can petition

DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d)) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, “Civil Justice Reform,” 61 FR 4729 (February 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1) eliminate drafting errors and ambiguity, (2) write regulations to minimize litigation, (3) provide a clear legal standard for affected conduct rather than a general standard, and (4) promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in sections 3(a) and 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, this final rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (“UMRA”) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Pub. L. 104-4, sec. 201 (codified at 2 U.S.C. 1531). For a regulatory action resulting in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of \$100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a)–(b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed “significant intergovernmental mandate,” and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at www.energy.gov/gc/office-general-counsel. DOE examined this final rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of \$100 million or more in any year, so these requirements do not apply.

H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. No. 105-277) requires Federal agencies to issue a Family Policymaking

Assessment for any proposed rule or policy that may affect family well-being. When developing a Family Policymaking Assessment, agencies must assess whether: (1) the action strengthens or erodes the stability or safety of the family and, particularly, the marital commitment; (2) the action strengthens or erodes the authority and rights of parents in the education, nurture, and supervision of their children; (3) the action helps the family perform its functions, or substitutes governmental activity for the function; (4) the action increases or decreases disposable income or poverty of families and children; (5) the benefits of the action justify the financial impact on the family; (6) the action may be carried out by State or local government or by the family; and whether (7) the action establishes an implicit or explicit policy concerning the relationship between the behavior and personal responsibility of youth, and the norms of society. In evaluating the above factors, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment as none of the above factors are implicated. Further, this determination would not have any financial impact on families nor any impact on the autonomy or integrity of the family as an institution.

I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, “Governmental Actions and Interference with Constitutionally Protected Property Rights” 53 FR 8859 (March 18, 1988), that this regulation will not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

J. Review Under Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). Pursuant to OMB Memorandum M-19-15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf. DOE has reviewed this final rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any significant energy action. A "significant energy action" is defined as any action by an agency that promulgates or is expected to lead to promulgation of a final rule, and that: (1) is a significant regulatory action under Executive Order 12866, or any successor order, and is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (2) is designated by the Administrator of OIRA as a significant energy action. For any significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use if the regulation is

implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

This regulatory action is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

L. Review Under Section 32 of the Federal Energy Administration Act of 1974

Under section 301 of the Department of Energy Organization Act (Pub. L. 95-91; 42 U.S.C. 7101), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. (15 U.S.C. 788; “FEAA”) Section 32 essentially provides in relevant part that, where a proposed rule authorizes or requires use of commercial standards, the notice of proposed rulemaking must inform the public of the use and background of such standards. In addition, section 32(c) requires DOE to consult with the Attorney General and the Chairman of the Federal Trade Commission (“FTC”) concerning the impact of the commercial or industry standards on competition.

The modifications to the test procedures for general service lamps adopted in this final rule do not incorporate any new commercial standards or test procedures that are not already incorporated by reference at 10 CFR 430.3 and therefore DOE has not re-assessed such standards as part of this final rule.

M. Congressional Notification

As required by 5 U.S.C. 801, DOE will report to Congress on the promulgation of this rule before its effective date. The report will state that it has been determined that the rule is not a "major rule" as defined by 5 U.S.C. 804(2).

N. Description of Materials Incorporated by Reference

The following standards were previously approved for incorporation by reference in the regulatory sections where they appear, and no changes are made: IEC 62031-DD, IES LM-9-09-DD,¹⁹ IES LM-20-13²⁰, IES LM-45-15²¹, and IES LM-79-08-DD²².

V. Approval of the Office of the Secretary

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

List of Subjects in 10 CFR Part 430

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

¹⁹ Illuminating Engineering Society, *IES Approved Method for the Electrical and Photometric Measurement of Fluorescent Lamps*, Approved January 31, 2009.

²⁰ Illuminating Engineering Society, *IES Approved Method: Photometry of Reflector Type Lamps*, Approved February 4, 2013.

²¹ Illuminating Engineering Society, *IES Approved Method: Electrical and Photometric Measurement of General Service Incandescent Filament Lamps*, Approved August 8, 2015.

²² Illuminating Engineering Society, *IES LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products*, Approved December 31, 2007.

Signing Authority

This document of the Department of Energy was signed on January 10, 2025, by Jeffrey Marootian, Principal Deputy Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on January 10, 2025.

**JEFFREY
MAROOTIAN** Digitally signed by
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Jeffrey Marootian
Principal Deputy Assistant Secretary for
Energy Efficiency and Renewable Energy
U.S. Department of Energy

For the reasons stated in the preamble, DOE amends part 430 of Chapter II of Title 10, Code of Federal Regulations as set forth below:

PART 430 -- ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

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

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

2. Amend appendix W to subpart B by:

a. Redesignating sections 3.1.5 through 3.1.7 as sections 3.1.6 through 3.1.8;

b. Adding new sections 3.1.5 and 3.1.9.

The additions read as follows:

Appendix W to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Compact Fluorescent Lamps

Note: On and after **[INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, any representations made with respect to the energy efficiency of compact fluorescent lamps must be made in accordance with the results of testing pursuant to this appendix W. Manufacturers conducting tests of compact fluorescent lamps prior to **[INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, must conduct such tests in accordance with either this appendix or the procedures in appendix W as it appeared in the Code of Federal Regulations on January 1, 2023. Any representations made with respect to the energy efficiency of compact fluorescent lamps must be in accordance with whichever version is selected.

* * * * *

3. * * *

3.1. * * *

3.1.5. If the lamp can operate in multiple modes at the labeled wattage, operate the lamp as not a colored lamp (as defined in 10 CFR 430.2). If multiple modes occur at the same labeled wattage (such as variable CCT or CRI), select any of these modes for testing; however, all measurements must be taken at the same selected mode. The test report must specify which mode was selected for testing and include details such that another laboratory can replicate the test at the same mode.

* * * * *

3.1.9. For a CFL that has one or more component(s) that offer a completely different functionality (*e.g.*, a speaker, a camera, an air purifier, etc.) where the component is integrated into the lamp but does not affect the light output of the lamp (*e.g.*, does not turn the light on/off, dim the light, change the color of the light, etc.) and is capable of operating in standby mode, turn off as many of these components as possible during testing, without permanently altering the product. Permanently altering the product constitutes the cutting of wires, use of a soldering iron, or damage to or destruction of the lamp and does not constitute connecting or disconnecting wire nuts, fasteners or screws, or preserving the lamp as it was sold. If such components cannot be turned off without permanently altering the product, their energy consumption must be included in measurements. The test report must specify which components were turned off and any features that remained on.

* * * * *

3. Amend appendix BB to subpart B by revising section 3.1.4 and adding new section 3.1.5 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), Power Factor, Time to Failure, and Standby Mode Power of Integrated Light-Emitting Diode (LED) Lamps

Note: On and after [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER], any representations made with respect to the energy efficiency of integrated LED lamps must be made in accordance with the results of testing pursuant to this appendix BB. Manufacturers conducting tests of integrated LED lamps prior to [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER], must conduct such tests in accordance with either this appendix or the previous version of appendix BB as it appeared in the Code of Federal Regulations on January 1, 2023. Any representations made with respect to the energy efficiency of integrated LED lamps must be in accordance with whichever version is selected.

* * * * *

3. * * *

3.1. * * *

3.1.4. Ensure that the lamp is not operating as a colored lamp (as defined in 10 CFR 430.2) and operate the lamp at maximum input power. If multiple modes occur at the same maximum input power (such as variable CCT or CRI), select any of these modes

for testing; however, all measurements must be taken at the same selected mode. The test report must specify which mode was selected for testing and include details such that another laboratory can replicate the test at the same mode.

3.1.5 For a lamp that has one or more component(s) that offer a completely different functionality (*e.g.*, a speaker, a camera, an air purifier, etc.) where the component is integrated into the lamp but does not affect the light output of the lamp (*e.g.*, does not turn the light on/off, dim the light, change the color of the light, etc.) and is capable of operating in standby mode, turn off as many of these components as possible during testing, without permanently altering the product. Permanently altering the product constitutes the cutting of wires, use of a soldering iron, or damage to or destruction of the lamp and does not constitute connecting or disconnecting wire nuts, fasteners or screws, or preserving the lamp as it was sold. If such components cannot be turned off without permanently altering the product, their energy consumption must be included in measurements. The test report must specify which components were turned off and any features that remained on.

* * * * *

4. Revise appendix DD to subpart B to read as follows:

Appendix DD to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption and Energy Efficiency of General Service Lamps That Are Not General Service Incandescent Lamps, Compact Fluorescent Lamps, or Integrated LED Lamps

Note: On and after [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER], any representations made with respect to the energy

efficiency of general service lamps that are not general service incandescent lamps, compact fluorescent lamps, or integrated LED lamps must be made in accordance with the results of testing pursuant to this appendix DD. Manufacturers conducting tests of such general service lamps prior to **[INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, must conduct such tests in accordance with either this appendix or the version of appendix DD as it appeared in the Code of Federal Regulations on January 1, 2023. Any representations made with respect to the energy efficiency of such general service lamp must be in accordance with whichever version is selected.

1. *Scope:* This appendix DD specifies the test methods required to measure the initial lumen output, input power, lamp efficacy, power factor, and standby mode energy consumption of general service lamps that are not general service incandescent lamps, compact fluorescent lamps, or integrated LED lamps.

2. *Definitions:*

Commercially available fluorescent lamp ballast, high intensity discharge (“HID”) ballast, or external LED driver means one that can be purchased by an individual consumer at a readily accessible retailer (*i.e.*, retailer with storefront or online purchasing).

Measured initial input power means the input power to the lamp, measured after the lamp is stabilized and seasoned (if applicable), and expressed in watts (W).

Measured initial lumen output means the lumen output of the lamp, measured after the lamp is stabilized and seasoned (if applicable), and expressed in lumens (lm).

Power factor means the measured initial input power (watts) divided by the product of the input voltage (volts) and the input current (amps) measured at the same time as the initial input power.

Publicly available manufacturer-provided compatibility list means a list or statement made available by the manufacturer on the manufacturer's official website or made available by the manufacturer through publicly available documents (e.g., product literature, catalogs, and packaging labels), that provides information on ballasts or external LED drivers that are compatible with the lamp.

3. *Active Mode Test Procedures*

3.1. Test Conditions and Setup

3.1.1. For single base OLED and non-integrated LED lamps, position a lamp in either the base-up and base-down orientation throughout testing. Test an equal number of lamps in the sample in the base-up and base-down orientations, except that, if the manufacturer restricts the orientation, test all of the units in the sample in the manufacturer-specified orientation. For double base OLED and non-integrated LED lamps, test all units in the horizontal orientation except that, if the manufacturer restricts the orientation, test all of the units in the sample in the manufacturer-specified orientation.

3.1.2. For integrated lamps, operate the lamp at the rated voltage throughout testing. For lamps with multiple rated voltages including 120 volts, operate the lamp at 120 volts. If a lamp is not rated for 120 volts, operate the lamp at the highest rated input voltage.

3.1.3. For non-integrated lamps, operate the lamp on a fluorescent lamp ballast, HID lamp ballast, or external LED driver in order of the following preference:

3.1.3.1. Select a commercially available fluorescent lamp ballast, HID lamp ballast, or external LED driver from the lamp's publicly available manufacturer-provided compatibility list. The test report must specify the manufacturer and model name/number of the fluorescent lamp ballast, HID lamp ballast, or external LED driver used in the test.

3.1.3.1.1. If all ballasts on the publicly available manufacturer-provided compatibility list use the same starting method, then select a ballast with that starting method to test the lamp.

3.1.3.1.1.1. If ballasts on the publicly available manufacturer-provided compatibility list are available with multiple ballast factors, then select a ballast with a ballast factor based on lamp type specified in Table 3.1. If the ballast factor in the table is not available among ballasts on the publicly available manufacturer-provided compatibility list, select a ballast with a ballast factor closest to the one listed in the table:

Table 3.1 – Ballast Factor by Lamp Type

Lamp Type	Ballast Factor
T8 medium bipin	0.88
T8 recessed double contact	1.05
T5 miniature bipin	1
T12 single pin, slimline	Any
T12 medium bipin	Any
T12 recessed double contact	Any
All other lamp types	Any

3.1.3.1.2. If ballasts on the publicly available manufacturer-provided compatibility list are available with multiple starting methods, then select a ballast with a starting method based on lamp type specified in Table 3.2. If the starting method in the table is not available among ballasts on the publicly available manufacturer-provided compatibility list, select any starting method on the publicly available manufacturer-provided compatibility list:

Table 3.2 – Starting Method by Lamp Type

Lamp Type	Starting Method
T8 medium bipin	Instant Start
T8 recessed double contact	Instant Start
T5 miniature bipin	Programmed Start
T12 single pin, slimline	Instant Start
T12 medium bipin	Rapid Start
T12 recessed double contact	Rapid Start
All other lamp types	Any

3.1.3.1.2.1. If ballasts on the publicly available manufacturer-provided compatibility list are available with multiple ballast factors, then select a ballast with a ballast factor based on lamp type specified in Table 3.3. If the ballast factor in the table is not available among ballasts on the publicly available manufacturer-provided compatibility list, select a ballast with a ballast factor closest to the one listed in the table:

Table 3.3 – Ballast Factor by Lamp Type

Lamp Type	Ballast Factor
T8 medium bipin	0.88
T8 recessed double contact	1.05
T5 miniature bipin	1
T12 single pin, slimline	Any
T12 medium bipin	Any
T12 recessed double contact	Any
All other lamp types	Any

3.1.3.2. If the procedure in section 3.1.3.1 is not possible, select any commercially available fluorescent lamp ballast, HID lamp ballast, or external LED driver that can operate the lamp throughout the duration of the test. The test report must specify the manufacturer and model name/number of the fluorescent lamp ballast, HID lamp ballast, or external LED driver used in the test.

3.1.3.2.1. If all commercially available ballasts use the same starting method, then select a ballast with that starting method to test the lamp.

3.1.3.2.1.1. If commercially available ballasts are available with multiple ballast factors, then select a ballast with a ballast factor based on lamp type specified in Table 3.4. If the ballast factor in the table is not available among commercially available ballasts, select a ballast with a ballast factor closest to the one listed in the table:

Table 3.4 – Ballast Factor by Lamp Type

Lamp Type	Ballast Factor
-----------	----------------

T8 medium bipin	0.88
T8 recessed double contact	1.05
T5 miniature bipin	1
T12 single pin, slimline	Any
T12 medium bipin	Any
T12 recessed double contact	Any
All other lamp types	Any

3.1.3.2.2. If commercially available ballasts are available with multiple starting methods, then select a ballast with a starting method based on lamp type specified in Table 3.5. If the starting method in the table is not available among commercially available ballasts, select any starting method:

Table 3.5 – Starting Method by Lamp Type

Lamp Type	Starting Method
T8 medium bipin	Instant Start
T8 recessed double contact	Instant Start
T5 miniature bipin	Programmed Start
T12 single pin, slimline	Instant Start
T12 medium bipin	Rapid Start
T12 recessed double contact	Rapid Start
All other lamp types	Any

3.1.3.2.2.1. If commercially available ballasts are available with multiple ballast factors, then select a ballast with a ballast factor based on lamp type specified in Table 3.6. If the ballast factor in the table is not available among commercially available ballasts, select a ballast with a ballast factor closest to the one listed in the table:

Table 3.6 Ballast Factor by Lamp Type

Lamp Type	Ballast Factor
T8 medium bipin	0.88
T8 recessed double contact	1.05
T5 miniature bipin	1
T12 single pin, slimline	Any
T12 medium bipin	Any
T12 recessed double contact	Any
All other lamp types	Any

3.1.3.3. If the procedures in sections 3.1.3.1 and 3.1.3.2 are not possible, use any previously procured fluorescent lamp ballast, HID lamp ballast, or external LED driver that can operate the lamp throughout the duration of the test. The test report must specify the manufacturer and model name/number of the fluorescent lamp ballast, HID lamp ballast, or external LED driver used in the test.

3.1.3.3.1. If all previously procured ballasts use the same starting method, then select a ballast with that starting method to test the lamp.

3.1.3.3.1.1. If previously procured ballasts are available with multiple ballast factors, then select a ballast with a ballast factor based on lamp type specified in Table 3.7. If the

ballast factor in the table is not available among the previously procured ballasts, select a ballast with a ballast factor closest to the one listed in the table:

Table 3.7 – Ballast Factor by Lamp Type

Lamp Type	Ballast Factor
T8 medium bipin	0.88
T8 recessed double contact	1.05
T5 miniature bipin	1
T12 single pin, slimline	Any
T12 medium bipin	Any
T12 recessed double contact	Any
All other lamp types	Any

3.1.3.3.2. If previously procured ballasts are available with multiple starting methods, then select a ballast with a starting method based on lamp type specified in Table 3.8. If the starting method in the table is not available among the previously procured ballasts, select any starting method:

Table 3.8 – Starting Method by Lamp Type

Lamp Type	Starting Method
T8 medium bipin	Instant Start
T8 recessed double contact	Instant Start
T5 miniature bipin	Programmed Start
T12 single pin, slimline	Instant Start
T12 medium bipin	Rapid Start

T12 recessed double contact	Rapid Start
All other lamp types	Any

3.1.3.3.2.1. If previously procured ballasts are available with multiple ballast factors, then select a ballast with a ballast factor based on lamp type specified in Table 3.9. If the ballast factor in the table is not available among the previously procured ballasts, select a ballast with a ballast factor closest to the one listed in the table:

Table 3.9 – Ballast Factor by Lamp Type

Lamp Type	Ballast Factor
T8 medium bipin	0.88
T8 recessed double contact	1.05
T5 miniature bipin	1
T12 single pin, slimline	Any
T12 medium bipin	Any
T12 recessed double contact	Any
All other lamp types	Any

3.1.3.4. If the procedures in sections 3.1.3.1, 3.1.3.2 and 3.1.3.3 are not possible and the lamp only operates on a low frequency, preheat start fluorescent lamp ballast, operate the lamp on the manufacturer-declared voltage and current. The test report must specify the voltage and current with which the lamp was operated.

3.1.4. Operate the fluorescent lamp ballast, HID lamp ballast, or external LED driver loaded with the maximum number of lamps. Test one lamp at a time in the integrating

sphere, while operating the other lamps outside of the sphere. Measure the initial lumen output, initial input power, input voltage, and input current for each lamp according to section 3.2.1.

3.1.5. For a non-integrated lamp designed and marketed to replace a fluorescent lamp and operate on the existing fluorescent lamp ballast, conduct testing in accordance with the following setup provisions:

3.1.5.1 Thermal conditions: A compatible combination of ballast and LED replacement lamp designed for direct replacement of linear fluorescent lamp sources must not result in the overheating of components. LED replacement lamps that are compatible with a given ballast must not cause the ballast to operate at a higher temperature or power than the fluorescent ballast ratings. The temperature measured at the Tc point must not exceed the rating of the ballast. For magnetic ballasts and electronic ballasts with no Tc point identified, the ballast enclosure must not exceed 90 degrees Celsius.

3.1.5.2 Electrical conditions: LED replacement lamps must be measured with the ballast in the circuit, consistent with rated LED replacement lamp values on a given ballast condition (ballast type/ballast factor/lamp loading). Compatibility is based on the rated values specified by the LED lamp manufacturer. The lamp current must be equal to or less than the target lamp current. (The target lamp is the fluorescent lamp the replacement lamp is intended to replace.) The measured input power to the ballast must not exceed the rating of the ballast by more than 10%.

3.1.6. For a non-integrated lamp designed and marketed to replace an HID lamp and operate on the existing HID lamp ballast, conduct testing in accordance with the following setup provisions:

3.1.6.1. Thermal conditions: The LED replacement lamp must not exceed its maximum operational temperature rating as specified by the LED lamp manufacturer.

3.1.6.2. Electrical conditions: LED replacement lamps must be measured with the ballast in the circuit, consistent with rated LED replacement lamp values on a given ballast condition (ballast type/ballast factor/lamp loading). Compatibility is based on the rated values specified by the LED replacement lamp manufacturer. The LED replacement lamp voltage must be in a range of +/-15 percent of the nominal HID lamp voltage. The lamp current must be equal to or less than the target lamp current. (The target lamp is the HID lamp the device is intended to replace.) The measured input power to the ballast must not exceed the rating of the ballast by more than 10%.

3.1.6.3. Ballast conditions: For magnetic ballasts: (1) the ballast capacitor voltage for magnetic ballasts must not exceed the capacitor rating and (2) the ballast must not exceed the temperature described in its ballast temperature code. For electronic ballasts, the temperature at the Tc point must be equal or less than described on the ballast label.

3.1.7. Ensure that the lamp is not operating as a colored lamp (as defined in 10 CFR 430.2) and operate the lamp at maximum input power. If multiple modes occur at the same maximum input power (such as variable CCT or CRI), select any of these modes for testing; however, all measurements must be taken at the same selected mode. The test report must specify which mode was selected for testing and include details such that another laboratory can replicate the test at the same mode.

3.1.8. For a lamp that has one or more component(s) that offer a completely different functionality (e.g., a speaker, a camera, an air purifier, etc.) where the component is integrated into the lamp but does not affect the light output of the lamp (e.g., does not

turn the light on/off, dim the light, change the color of the light, etc.) and is capable of operating in standby mode, turn off as many of these components as possible during testing, without permanently altering the product. Permanently altering the product constitutes the cutting of wires, use of a soldering iron, or damage to or destruction of the lamp and does not constitute connecting or disconnecting wire nuts, fasteners or screws, or preserving the lamp as it was sold. If such components cannot be turned off without permanently altering the product, their energy consumption must be included in measurements. The test report must specify which components were turned off and any features that remained on.

3.2. Test Method, Measurements, and Calculations

3.2.1. To measure initial lumen output, input power, input voltage, and input current use the test procedures in the table in this section. Do not use a goniophotometer.

Table 3.10—References to Industry Standard Test Procedures	
Lamp type	Referenced test procedure
* Incorporated by reference, see § 430.3.	
Compact fluorescent lamps	Appendix W to subpart B of 10 CFR part 430.
General service incandescent lamps	Appendix R to subpart B of 10 CFR part 430.
Integrated LED lamps	Appendix BB to subpart B of 10 CFR part 430.

Table 3.10—References to Industry Standard Test Procedures

Lamp type	Referenced test procedure
Non-integrated LED lamps	IES LM-79-08-DD, sections 1.3 (except 1.3f), 2.0, 3.0, 5.0, 7.0, 8.0, 9.1 and 9.2.*
OLED lamps	IES LM-79-08-DD, sections 1.3 (except 1.3f), 2.0, 3.0, 5.0, 7.0, 8.0, 9.1 and 9.2.*
Other fluorescent lamps	IES LM-9-09-DD, sections 46, and section 7.5.*
Other incandescent lamps that are not reflector lamps	IES LM-45-15, sections 4-6, and section 7.1.*
Other incandescent lamps that are reflector lamps	IES LM-20-13, sections 4-6, and section 8.*

3.2.2. Determine initial lamp efficacy by dividing the measured initial lumen output (lumens) by the measured initial input power (watts). Per section 3.1.4, if multiple lamps were operated on the same ballast or external LED driver, determine the initial lamp efficacy by calculating the initial lamp efficacy for each lamp and calculating the average.

3.2.3. Determine power factor by dividing the measured initial input power (watts) by the product of the measured input voltage (volts) and measured input current (amps). Per section 3.1.4, if multiple lamps were operated on the same ballast or external LED driver, determine the power factor by calculating the power factor for each lamp and calculating the average.

3.3. Standby Mode Test Procedure

3.3.1. Measure standby mode power only for lamps that are capable of standby mode operation.

3.3.2. The test conditions and setup described in section 3.1 of this appendix apply to this section.

3.3.3. Connect the lamp to the manufacturer-specified wireless control network (if applicable) and configure the lamp in standby mode by sending a signal to the lamp instructing it to have zero light output. Lamp must remain connected to the network throughout testing.

3.3.4. Operate the lamp at the rated voltage throughout testing. For lamps with multiple rated voltages including 120 volts, operate the lamp at 120 volts. If a lamp is not rated for 120 volts, operate the lamp at the highest rated input voltage.

3.3.5. Stabilize the lamp prior to measurement as specified in section 5 of IEC 62301-DD (incorporated by reference; see § 430.3).

3.3.6. Measure the standby mode power in watts as specified in section 5 of IEC 62301-DD (incorporated by reference; see § 430.3).