DEPARTMENT OF ENERGY

10 CFR Parts 429 and 430

[EERE–2021–BT–TP–0036]

RIN 1904–AF26

Energy Conservation Program: Test Procedure for Air Cleaners

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

ACTION: Notice of proposed rulemaking and request for comment.

SUMMARY: The U.S. Department of Energy (''DOE'') proposes to establish definitions, a test procedure, and sampling and representation requirements for air cleaners. Currently, air cleaners are not subject to DOE test procedures or energy conservation standards. DOE proposes a test procedure for measuring the integrated energy factor for air cleaners. The proposed test method references the relevant industry standard, with certain proposed modifications. DOE is seeking comment from interested parties on the proposal.

DATES: DOE will accept comments, data, and information regarding this proposal no later than December 19, 2022. See section V, ''Public Participation,'' for details. DOE will hold a webinar on Wednesday, November 9, 2022, from 1:00 p.m. to 4:00 p.m. See section V, ''Public Participation,'' for webinar registration information, participant instructions, and information about the capabilities available to webinar participants.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov* under docket number EERE–2021–BT–TP–0036. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE–2021–BT–TP–0036, by any of the following methods:

Email: AirCleaners2021TP0036@ee.doe.gov. Include the docket number EERE–2021–BT–TP–0036 in the subject line of the message.

Postal Mail: Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, Mailstop EE–5B, 1000 Independence Avenue SW, Washington, DC 20585–0121. Telephone: (202) 287–1445. If possible, please submit all items on a compact disc (''CD''), in which case it is not necessary to include printed copies.

Hand Delivery/Courier: Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza SW, 6th Floor, Washington, DC 20024. Telephone: (202) 287–1445. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

No telefacsimiles (''faxes'') will be accepted. For detailed instructions on submitting comments and additional information on this process, see section V of this document.

Docket: The docket for this activity, which includes **Federal Register** notices, public meeting attendee lists and transcripts (if a public meeting is held), 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 information that is exempt from public disclosure.

The docket web page can be found at *www.regulations.gov/docket/EERE-2021-BT-TP-0036.* The docket web page contains instructions on how to access all documents, including public comments, in the docket. See section V for information on how to submit comments through *www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT:

Dr. Stephanie Johnson, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE–5B, 1000 Independence Avenue SW, Washington, DC 20585–0121. Telephone: (202) 287–1943. Email *ApplianceStandardsQuestions@ee.doe.gov.*

Ms. Amelia Whiting, U.S. Department of Energy, Office of the General Counsel, GC–33, 1000 Independence Avenue SW, Washington, DC 20585–0121. Telephone: (202) 586–2588. Email: *Amelia.Whiting@hq.doe.gov.*

For further information on how to submit a comment, review other public comments and the docket, or participate in a public meeting (if one is held), contact the Appliance and Equipment Standards Program staff at (202) 287–1445 or by email: *ApplianceStandardsQuestions@ee.doe.gov.*

SUPPLEMENTARY INFORMATION: DOE proposes to incorporate by reference the following draft industry standards into 10 CFR part 430:

AHAM AC–7–2022 Draft, ''Energy Test Method for Consumer Room Air Cleaners''.

AHAM AC–7–2022 Draft is in draft form and its text was provided to DOE for the purposes of review only during the drafting of this notice of proposed rulemaking (''NOPR''). DOE intends to update the reference to the final published version of AHAM AC–7–2022 Draft in the test procedure final rule, should it publish prior to the final rule, unless there are substantive changes between the draft and published versions, in which case DOE may adopt the substance of the AHAM AC–7–2022 Draft or provide additional opportunity for comment on the changes to the industry consensus test procedure.

A copy of AHAM AC–7–2022 Draft is included in the docket for this proposed rulemaking.

AHAM AC–7–2022 Draft additionally references ANSI/AHAM AC–1–2020, ''Method for Measuring Performance of Portable Household Electric Room Air Cleaners'' in several sections (''AHAM AC–1–2020'').

A copy of AHAM AC–1–2020 can be obtained from the Association of Home Appliance Manufacturers (AHAM) at 1111 19th Street NW, Suite 402, Washington, DC 20036; or *www.aham.org/AHAM/AuxStore.*

ASTM E741–11(2017), ''Standard Test Method for Determining Air Change in a Single Zone Means of a Tracer Gas Dilution'' Reapproved Sept. 1, 2017.

A copy of ASTM E741–11(2017) can be obtained from ASTM International (ASTM), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428–2959, or *www.astm.org.*

IEC 62301, ''Household electrical appliances—Measurement of standby power;'' Edition 2.0, 2011–01, (''IEC 62301 Ed. 2.0'').

A copy of IEC 62301 Ed. 2.0 can be obtained from the International Electrotechnical Commission (IEC), available from the American National Standards Institute (ANSI), 25 W 43rd Street, 4th Floor, New York, NY 10036, (212) 642–4900, or *webstore.ansi.org.*

See section IV.M of this document for a further discussion of these standards.

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I. Authority and Background

On July 15, 2022, DOE published a final determination (''July 2022 Final Determination'') in which it determined that air cleaners qualify as a ''covered product'' under the Energy Policy and Conservation Act, as amended (''EPCA'').[1] 87 FR 42297. DOE determined in the July 2022 Final Determination that coverage of air cleaners is necessary or appropriate to carry out the purposes of EPCA, and that the average U.S. household energy use for air cleaners is likely to exceed 100 kilowatt-hours (''kWh'') per year. *Id.* Currently, no energy conservation standards or test procedures are prescribed by DOE for air cleaners. The following sections discuss DOE's authority to establish test procedures for air cleaners and relevant background information regarding DOE's consideration of test procedures for this product.

A. Authority

EPCA, authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part B [2] of EPCA established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency for certain products, referred to as ''covered products.'' [3] In addition to specifying a list of consumer products that are covered products, EPCA contains provisions that enable the Secretary of Energy to classify additional types of consumer products as covered products. To classify a consumer product as a covered product, the Secretary must determine that classifying the product as a covered product is necessary or appropriate to carry out the purposes of EPCA and the average annual per household [4] energy use by products of such type is likely to exceed 100 kWh (or British thermal unit (''Btu'') equivalent) per year. (42 U.S.C. 6292(b)(1))

As stated, DOE has determined that air cleaners are covered products. 87 FR 42297.

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 pursuant to EPCA (42 U.S.C. 6295(s)), and (2) making other representations about the efficiency of those consumer products (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the products comply with 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 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 or period of use and not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

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

[1] All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Public Law 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.

[3] The enumerated list of covered products is at 42 U.S.C. 6292(a)(1)–(19).

[4] DOE has defined ''household'' to mean an entity consisting of either an individual, a family, or a group of unrelated individuals, who reside in a particular housing unit. For the purpose of this definition: *Group quarters* means living quarters that are occupied by an institutional group of 10 or more unrelated persons, such as a nursing home, military barracks, halfway house, college dormitory, fraternity or sorority house, convent, shelter, jail or correctional institution. *Housing unit* means a house, an apartment, a group of rooms, or a single room occupied as separate living quarters, but does not include group quarters.

Separate living quarters means living quarters: to which the occupants have access either: directly from outside of the building, or through a common hall that is accessible to other living quarters and that does not go through someone else's living quarters, and occupied by one or more persons who live and eat separately from occupant(s) of other living quarters, if any, in the same building. 10 CFR 430.2.

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. (42 U.S.C. 6293(b)(1)(A)(ii))

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. (42 U.S.C. 6295(gg)(2)(A)) Standby mode and off mode energy consumption must be incorporated into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product unless the current test procedures already account for and incorporate standby and off mode energy consumption or such integration is technically infeasible. If an integrated test procedure is technically infeasible, DOE must prescribe a separate standby mode and off mode energy use test procedure for the covered product, if technically feasible. (42 U.S.C. 6295(gg)(2)(A)(ii)) Any such amendment must consider the most current versions of the IEC Standard 62301 [5] and IEC Standard 62087 [6] as applicable. (42 U.S.C. 6295(gg)(2)(A))

DOE is publishing this NOPR consistent with its authority and these obligations.

B. Background

DOE has not previously conducted a test procedure rulemaking for air cleaners. As stated, DOE determined in the July 2022 Final Determination that: coverage of air cleaners is necessary or appropriate to carry out the purposes of EPCA; the average U.S. household energy use for air cleaners is likely to exceed 100 kWh per year; and thus, air cleaners qualify as a ''covered product'' under EPCA. 87 FR 42297.

On January 25, 2022, DOE published a request for information (''January 2022 RFI''), seeking comments on potential test procedure and energy conservation standards for air cleaners. 87 FR 3702. In the January 2022 RFI, DOE requested comments, data, and information regarding development and evaluation of a new air cleaners test procedure that would be reasonably designed to produce test results, which reflect energy use during a representative average use cycle for the product without being unduly burdensome to conduct.[7] *Id.* This NOPR addresses the comments received in response to the January 2022 RFI that pertain to the test procedure for air cleaners. DOE will address comments pertaining to the energy conservation standards for air cleaners in a separate standards rulemaking.

DOE received comments in response to the January 2022 RFI from the interested parties listed in Table I.1.

TABLE I.1—LIST OF COMMENTERS WITH WRITTEN SUBMISSIONS IN RESPONSE TO THE JANUARY 2022 RFI

Commenter(s)	Reference in this NOPR	Comment No. in the docket	Commenter type
American Council for an Energy-Efficient Economy, Appliance Standards Awareness Project, Association of Home Appliance Manufacturers, Consumer Federation of America, and Natural Resources Defense Council.	Joint Commenters ..	8	Efficiency Organizations and Trade Association.
Air-Conditioning, Heating, & Refrigeration Institute	AHRI	15	Trade Association.
Blueair IAQ	Blueair	11	Manufacturer.
Daikin U.S. Corporation	Daikin	13	Manufacturer.
Electrolux Home Products Inc. North America	Electrolux	6	Manufacturer.
Lennox International Inc	Lennox	7	Manufacturer.
Madison Indoor Air Quality	MIAQ	5	Manufacturer.
Molekule, Inc	Molekule	12	Manufacturer.
Northwest Energy Efficiency Alliance	NEEA	14	Efficiency Organization.
Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison; collectively, the California Investor Owned Utilities.	CA IOUs	10	Utility Association.
Synexis LLC	Synexis	9	Manufacturer.
Trane Technologies	Trane	3	Manufacturer.

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

On August 23, 2022, the Joint Commenters, New York State Energy Research and Development Authority, and Pacific Gas and Electric Company (hereafter referred to as ''Joint Stakeholders''), submitted a joint proposal recommending a test procedure and energy conservation standards for consumer room air cleaners. (Joint Stakeholders, No. 16 at p. 1)

C. Deviation From Appendix A

In accordance with section 3(a) of 10 CFR part 430, subpart C, appendix A (''appendix A''), DOE notes that it is deviating from the provision in appendix A that DOE will finalize coverage for a product/equipment at least 180 days prior to publication of a proposed rule to establish a test procedure. 10 CFR part 430, subpart C, appendix A, section 5(c). DOE is opting to deviate from this provision because of

[5] IEC 62301, *Household electrical appliances—Measurement of standby power* (Edition 2.0, 2011–01).

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

[7] The January 2022 RFI also solicited information regarding the development and evaluation of potential new energy conservation standards for air cleaners, and whether such standards would result in significant energy savings, be technologically feasible and economically justified. 87 FR 3702.

[8] The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking to develop test procedures for air cleaners. (Docket No. EERE–2021–BT–TP–0036, which is maintained at *www.regulations.gov*). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

broad support for the development of test procedures and energy conservation standards, which is further evidenced by the Joint Proposal outlining negotiated energy conservation standards and related test procedures for consumer room air cleaners. The Joint Stakeholders urged DOE to publish final rules adopting consumer room air cleaner test procedure and standards as soon as possible but not later than December 31, 2022. (Joint Stakeholders, No. 16 at p.1) DOE is working to conduct this rulemaking in accordance with that timeline which would require DOE to publish this test procedure NOPR less than 180 days after publication of the July 2022 Final Determination.

II. Synopsis of the Notice of Proposed Rulemaking

In this NOPR, DOE proposes to establish a new test procedure at 10 CFR part 430, subpart B, appendix FF (''appendix FF'') for air cleaners that would include methods to (1) measure the performance of the covered product and (2) use the measured results to calculate an integrated energy factor (''IEF'') to represent the energy efficiency of an air cleaner.

DOE's proposed test procedure for air cleaners includes measurements of smoke clean air delivery rate (''CADR'') and dust CADR, which are used to calculate $PM_{2.5}$ [9] CADR, and active mode and standby mode power consumption, which are used to calculate annual energy consumption (''AEC''). $PM_{2.5}$ CADR and AEC are required to calculate IEF. DOE also proposes to include measurements of pollen CADR and calculation of effective room size for representation purposes. For consistent and uniform measurement of these values, DOE proposes to incorporate by reference the industry standards AHAM AC–7–2022 Draft, AHAM AC–1–2020, and IEC 62301 Ed. 2.0. Specifically, DOE proposes to specify the following provisions from within the referenced industry standards:

(1) From AHAM AC–7–2022 Draft, the following items:

(a) Definition of ''conventional room air cleaners'' in 10 CFR 430.2, which would be used to specify the scope of the air cleaners test procedure in the proposed new appendix FF;

(b) Definitions of terms that are relevant to the test procedure;

(c) Test setup requirements for electrical supply and test chamber, which additionally include a reference to AHAM AC–1–2020;

(d) Instrumentation requirements for power measuring instruments and temperature and relative humidity measuring devices;

(e) Active mode and standby mode power measurements; the standby mode power measurement method additionally includes a reference to IEC 62301 Ed. 2.0 for the test conduct; and

(f) Calculations for PM2.5 CADR, AEC, and IEF.

(2) From AHAM AC–1–2020, test methods for determining the pollen CADR, smoke CADR, and dust CADR, calculation of effective room size, and test chamber construction and equipment.

This NOPR also proposes requirements regarding the sampling plan and representations for air cleaners at 10 CFR 429.67. DOE also proposes rounding requirements for the measured and calculated values of the air cleaners test procedure.

If the proposed test procedure and associated provisions are final, manufacturers would not be required to test according to the DOE test procedure until such time as compliance is required with energy conservation standards for air cleaners, should DOE establish such standards. Were DOE to establish test procedures as proposed, manufacturers choosing to make voluntary representations would be required to test the subject air cleaner according to the established test procedure, and any such representations would have to fairly disclose the results of such testing.

While discussion of DOE's proposed actions are addressed in detail in section III of this NOPR, DOE also received comments regarding the rulemaking process and timeline. These comments are summarized underneath.

AHRI and MIAQ commented that unresolved issues regarding scope and applicability from the September 2021 NOPD, made it difficult for stakeholders to participate meaningfully in providing substantive technical comments necessary to determine whether a particular test procedure is feasible and the impact of energy conservation standards on these products. (AHRI, No. 15 at p. 2; MIAQ, No. 5 at p. 2) AHRI and MIAQ additionally commented that the shortened comment period of 30 days from 75 days for the January 2022 RFI inhibited AHRI and MIAQ from investigating test laboratory capacity or capabilities. (AHRI, No. 15 at pp. 2–3; MIAQ, No. 5 at p. 2) Electrolux inquired about whether DOE's timeframe for the air cleaners rulemakings was long-term (*i.e.,* 5–6 years) or near-term (*i.e.,* 2–3 years). (Electrolux, No. 6 at p. 1) Electrolux further inquired if information from the air cleaner rulemakings would be incorporated into ongoing international standards discussions. (*Id.*)

In the September 2021 NOPD, DOE proposed a definition for the term ''air cleaner''. 86 FR 51629, 51632. At the time of the January 2022 RFI, DOE had not made a final determination about whether to cover air cleaners as a covered product nor had it finalized a definition of the term. 87 FR 3702, 3707. As such, the focus of the test procedure portion of the January 2022 RFI was to seek feedback primarily on the AHAM AC–1–2020 test procedure, which is an industry-accepted standard for testing portable household electric room air cleaners, as well as on other industry, investigative, and international test methods, including those under development. 87 FR 3702, 3707–3708. Further, as it pertains to the timeline for this rulemaking and as discussed in section I.C of this document, the timeline of this rulemaking is accelerated compared to DOE's typical timeline in order to follow as closely as possible the schedule outlined in the negotiated agreement.

III. Discussion

A. Scope of Applicability

In the September 2021 NOPD, DOE proposed the following definition for air cleaners:

An air cleaner is a consumer product that:

(1) Is a self-contained, mechanically encased assembly;

(2) Is powered by single-phase electric current;

(3) Removes, destroys, or deactivates particulates and microorganisms from the air;

(4) Excludes products that destroy or deactivate particulates and microorganisms solely by means of ultraviolet light without a fan for air circulation; and

(5) Excludes central air conditioners, room air conditioners, portable air conditioners, dehumidifiers, and furnaces as defined in 10 CFR 430.2. 86 FR 51629, 51632.

After considering the comments received in response to the September 2021 NOPD and January 2022 RFI, in the July 2022 Final Determination, DOE defined an air cleaner at 10 CFR 430.2 as ''a product for improving indoor air quality, other than a central air conditioner, room air conditioner, portable air conditioner, dehumidifier, or furnace, that is an electrically-powered, self-contained, mechanically

[9] $PM_{2.5}$ refers to particulate matter that are nominally 2.5 micrometers in width or smaller.

encased assembly that contains means to remove, destroy, or deactivate particulates, VOCs, and/or microorganisms from the air. It excludes products that operate solely by means of ultraviolet light without a fan for air circulation.'' 87 FR 42297, 42304 and 42308.

In the July 2022 Final Determination, DOE addressed comments it received in response to the September 2021 NOPD as well as some of the comments it received in response to the January 2022 RFI [10] that pertained to the scope of the rulemaking and definition of an air cleaner.

In this NOPR, DOE is proposing to establish test procedures for a subset of products that meet the definition of ''air cleaner'' as established by the July 2022 Final Determination. Specifically, DOE is proposing to define the scope of the proposed test procedure as covering products defined as ''conventional room air cleaners'' in the AHAM AC–7–2022 Draft standard. The proposed scope of the test procedure aligns with the available industry standard and encompasses a majority of the air cleaner market. Further, this scope is consistent with the scope in the Joint Proposal. (Joint Stakeholders, No. 16 at p. 5) DOE may consider test procedures for other types of air cleaners in a future rulemaking.

Section 2.1.1 of AHAM AC–7–2022 Draft defines a ''conventional room air cleaner'' as a consumer room air cleaner that is a portable or wall mounted (fixed) unit that plugs in to an electrical outlet; operates with a fan for air circulation; and contains means to remove, destroy, and/or deactivate particulates.

Sections 2.1.3.1 and 2.1.3.2 of AHAM AC–7–2022 Draft further define ''portable'' and ''fixed'', respectively, as follows:

Portable: can be easily moved from one place to another for use; and has no provision for permanent mounting. Tools are not required for the product installation or removal.

Fixed: permanently connected to the electrical supply source; permanently mounted, such that tools are required for the product installation or removal; or, sized so that it is not easily moved from one place to another.

[10] (Joint Commenters, No. 8 at pp. 2, 3; Daikin, No. 12 at p. 2; AHRI, No. 15 at pp. 3–4, 4, 4–5, 5, 5–6; MIAQ, No. 5, at pp. 3, 3–4, 4–5; Synexis, No. 14, at pp. 1, 1–2; Blueair, No. 11 at p. 2; Lennox, No. 7 at pp. 1–2, 2; NEEA, No. 13 at p. 3; CA IOUs, No. 9 at pp. 9–10, 11; Trane Technologies, No. 3 at p, 3).

DOE proposes to specify in section 1 of the proposed new appendix FF that the test procedure applies to ''conventional room air cleaners'' and to define that term in 10 CFR 430.2 through reference to Section 2.1.1 of AHAM AC–7–2022 Draft. DOE further proposes to add references to Sections 2.1.3.1 and 2.1.3.2 of AHAM AC–7–2022 Draft to the proposed definition of conventional room air cleaners to reference the definitions of portable and fixed conventional room air cleaners.

DOE requests comment on its proposal to define the scope of the proposed air cleaner test procedure as those air cleaners that meet the definition of a conventional room air cleaner as defined in Section 2.1.1 of AHAM AC–7–2022 Draft.

DOE requests comment on its proposal to reference Sections 2.1.1, 2.1.3.1, and 2.1.3.2 of AHAM AC–7–2022 Draft in 10 CFR 430.2 for the definitions of conventional room air cleaner, portable conventional room air cleaner, and fixed conventional room air cleaner, respectively.

In addition to defining the scope of the proposed air cleaner test procedure to conventional room air cleaners, DOE notes that Section 2 of AHAM AC–1–2020 indicates that the precision of the test method is as follows: ± 25 cubic feet per minute (''cfm'') for pollen CADR; ± 10 cfm for dust CADR; and ± 10 cfm for cigarette smoke CADR. Additionally, Section 2 of AHAM AC–1–2020 indicates that the theoretical maximum limits for CADR are determined by the maximum number of initial available particles, the acceptable minimum number of available particles, an average background natural decay rate (from statistical study), the size of the test chamber, and the available minimum experiment time. Given these levels of precision, Section 2 of AHAM AC–1–2020 specifies the test procedure being applicable only to air cleaners within rated CADR ranges of 10 to 600 cfm for dust and cigarette smoke and 25 to 450 cfm for pollen.

Further, in the negotiated agreement submitted by the Joint Stakeholders, they propose that negotiated standards are applicable to conventional room air cleaners with a minimum $PM_{2.5}$ CADR of 10 cfm. (Joint Stakeholders, No. 16 at p. 9)

As discussed, DOE's proposed scope pertains to conventional room air cleaners that are portable or wall mounted and plug into an electrical outlet. This is also the scope of the AHAM AC–7–2022 Draft and AHAM AC–1–2020 standards, which DOE is proposing to reference for the CADR and power measurement tests as discussed in later sections of this NOPR. Given that DOE is proposing to reference the AHAM industry standards for the DOE air cleaner test procedure, DOE requests comment on whether it should also specify the acceptable CADR range from AHAM AC–1–2020 as part of its test procedure scope. Specifically, DOE would consider specifying that the test procedure is applicable for conventional room air cleaners with smoke or dust CADR between 10 to 600 cfm.

DOE requests comment on whether it should reference Section 2 of AHAM AC–1–2020, which specifies that the standard is applicable for air cleaners only within rated CADR ranges of 10 to 600 cfm for dust and cigarette smoke. Additionally, DOE requests comment on whether this CADR range should be specified for $PM_{2.5}$ CADR instead of for dust CADR and smoke CADR.

B. Industry Standards Incorporated by Reference

1. AHAM AC–1 and AHAM AC–7 Industry Standards

As discussed, AHAM published AHAM AC–1–2020 for measuring the performance of portable household electric room air cleaners.

AHAM AC–1–2020 is a voluntary industry-developed test procedure that provides test methods to measure the relative reduction of smoke, dust, and pollen suspended in the air in a specified test chamber when an air cleaner is in operation. The test method is conducted by introducing a known initial concentration of a given particulate in the chamber, without the air cleaner in operation, to measure its natural decay. Next, the particulate is reintroduced in the chamber with the air cleaner in operation to measure the particulate decay with the air cleaner operating. The difference in the logarithmic rate of decay with the air cleaner in operation and without the air cleaner in operation, multiplied by the volume of the chamber, provides the CADR value of the test unit. AHAM AC–1–2020 additionally specifies methods to measure an air cleaner's active mode power consumption when conducting the pollen, smoke, or dust performance test in the test chamber, as well as methods to measure standby mode power consumption.

AHAM AC–1–2020 is currently referenced by the U.S. Environmental Protection Agency (''EPA'') in the ENERGY STAR Product Specification for Room Air Cleaners, Version 2.0, Rev. May 2022 (''ENERGY STAR V. 2.0 Specification'').[11] Further, the ENERGY STAR V. 2.0 Specification is referenced by air cleaner standards in Washington DC, New Jersey, Nevada, and Maryland.[12]

In the January 2022 RFI, DOE requested comment on whether AHAM AC–1–2020 provides an appropriate method to use as the basis for a Federal test method and for defining energy conservation standards for air cleaners. 87 FR 3702, 3708. DOE also sought feedback on industry standards that could be referenced for the standby power measurement procedure. Specifically, DOE requested feedback on the suitability of the standby power measurement test procedure specified in AHAM AC–1–2020, IEC 62301 Ed. 2.0, or any other test method for measuring standby mode and off mode energy use of consumer air cleaners, in light of EPCA's requirement in 42 U.S.C. 6295(gg)(2)(A)) for DOE to consider the most current version of IEC Standard 62301. *Id.* at 87 FR 3709, 3710.

The Joint Commenters stated that AHAM and its partners[13] are currently developing the AHAM AC–7–2022 Draft standard, which is a test procedure to measure the energy efficiency of air cleaners. (Joint Commenters, No. 8 at p. 3) The Joint Stakeholders recommended that DOE adopt AHAM AC–7–2022, which is currently in final draft form, as the test procedure. The Joint Stakeholders additionally stated that if a final version of AHAM AC–7–2022 is not available to incorporate by reference, DOE should align with the final draft version and AHAM authorized DOE to use the text of the final draft as the basis for DOE's test procedure. (Joint Stakeholders, No. 16 at p. 6)[14] Blueair expressed support for the AHAM AC–1–2020 standard as a robust method for determining air cleaner energy efficiency and stated that it should serve as the Federal test procedure. (Blueair, No. 11 at pp. 2–3) Blueair noted that laboratories across the country can readily run tests for manufacturers and third parties at reasonable costs and turnaround times. (*Id.*) Daikin commented that the AHAM AC–1–2020 test procedure was appropriate for testing portable small room air cleaners. (Daikin, No. 13 at p. 2) MIAQ and Lennox commented that the AHAM AC–1–2020 standard is appropriate to test portable air cleaners, but would not be appropriate to test non-portable air cleaners that would be included in the scope of DOE's covered product. (MIAQ, No. 5 at p. 3; Lennox, No. 7 at p. 2) Molekule commented that based on its research, existing standards, such as AHAM AC–1–2020 are limited in their ability to determine the efficacy of air cleaners that remove and oxidize airborne allergens (*i.e.,* aeroallergens). (Molekule, No. 12 at p. 4) Synexis commented that AHAM AC–1–2020 was designed for measuring the performance of indoor air cleaners, which remove particulates from the air, presumably via mechanical filtration and it does not account for the performance of devices that use mechanisms other than mechanical filtration. (Synexis, No. 9 at p. 2)

Since publication of the January 2022 RFI, DOE is aware that AHAM's air cleaner task force is working to establish a new test method, AHAM AC–7–2022 Draft, that would specify the test methods for measuring air cleaner efficiency. The power measurement test methods specified in AHAM AC–7–2022 Draft are being developed using the existing power measurement test methods specified in AHAM AC–1–2020, updated to reflect current air cleaner technologies and functionalities. Additionally, AHAM AC–7–2022 Draft specifies the methods to determine $PM_{2.5}$ CADR, which is calculated based on the smoke and dust CADR values; AEC; and IEF (expressed in CADR per watt (''CADR/W'')), which defines the efficacy of an air cleaner. DOE has participated in the meetings of the AHAM task force group responsible for developing AHAM AC–7–2022 Draft and has provided input on several topics during its development. DOE has also conducted testing according to AHAM AC–7–2022 Draft and provided input to the AHAM task force based on its observations and experience during testing.

AHAM AC–7–2022 Draft additionally references AHAM AC–1–2020 in several sections to specify requirements for the test chamber equipment and setup, as well as to conduct the in-chamber active mode power consumption test. All but one section refers to ''ANSI/AHAM AC–1,'' ''AHAM AC–1,'' or ''ANSI/AHAM AC–1–2020.'' DOE understands each of these references to be denoting the AHAM AC–1–2020 version of the standard, since it is included as a normative reference in AHAM AC–7–2022 Draft. In contrast, Section 5.7.1 of AHAM AC–7–2022 Draft references ANSI/AHAM AC–1–2022 Draft in stating that potassium chloride (''KCl'') is allowed as an alternate to cigarette smoke in ANSI/AHAM AC–1–2022 Draft. The text of AHAM AC–1–2022 Draft standard was not available publicly for DOE to review at the time of publication of this NOPR. However, from its participation on the AHAM task force, DOE understands AHAM AC–1–2022 Draft to be materially the same as AHAM AC–1–2020, with updates to harmonize with other AHAM air cleaners standards (*e.g.,* AC–7, AC–5[15] for microorganisms, AC–4[16] for gases, *etc.*) and to remove the power measurement requirements from AHAM AC–1–2020, given that these requirements are now specified in AHAM AC–7–2022 Draft.

In this NOPR, DOE proposes to incorporate by reference AHAM AC–7–2022 Draft into 10 CFR 430.3 and to reference the relevant sections of this industry standard in the DOE test procedure at the proposed new appendix FF. DOE is proposing modifications to certain aspects of AHAM AC–7–2022 Draft, as discussed in the relevant sections of this document that follow.

Specifically, DOE proposes to reference AHAM AC–7–2022 Draft to specify the test methods for determining $PM_{2.5}$ CADR, AEC, and IEF. AHAM AC–7–2022 Draft specifies definitions, test conditions, and test methods for determining active mode power, standby mode power, out of chamber active mode power, and $PM_{2.5}$ CADR. DOE has initially determined that the measurement of $PM_{2.5}$ CADR and power consumption as specified in the AHAM–AC–7–2022 Draft would produce test results that measure the energy efficiency of an air cleaner during a representative average use cycle or period of use and would not be unduly burdensome to conduct.

DOE additionally proposes to incorporate by reference AHAM AC–1–

[11] Further information on the ENERGY STAR V2.0 Specification is available online at: *www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20Version%202.0%20Room%20Air%20Cleaners%20Specification%20%28Rev.%20May%202022%29.pdf.*

[12] Further information on state air cleaner standards and timelines is available online from ASAP at: *https://appliance-standards.org/product/air-purifiers.*

[13] Partners include ASAP, the CA IOUs, DOE, and Guidehouse.

[14] The CA IOUs supported the updates that were being discussed by AHAM and its partners. (CA IOUs, No. 10 at p. 1) After publication of the Joint Statement, the CA IOUs also submitted a letter of support for the negotiated agreement, which includes using AHAM AC–7–2022 for the DOE air cleaner test procedure. (CA IOUs, No. 17 at p. 1).

[15] Method for Assessing the Reduction Rate of Key Bioaerosols by Portable Air Cleaners Using an Aerobiology Test Chamber, AHAM AC–5–2022.

[16] Method of Assessing the Reduction Rate of Chemical Gases by a Room Air Cleaner, AHAM AC–4–2022.

2020 to reference the test methods for determining pollen CADR, smoke CADR, and dust CADR and for each instance where AHAM AC–7–2022 Draft references AHAM AC–1–2020.

DOE additionally proposes to incorporate by reference IEC 62301 Ed. 2.0, which is referenced in AHAM AC–7–2022 Draft, for the instrumentation requirements and standby mode power measurement.

DOE additionally proposes to incorporate by reference ASTM E741–11(2017), which is the current version of the standard referenced in Section 3.3 of AHAM AC–7–2022 Draft with regard to determining the test chamber air exchange rate.

As discussed, DOE intends to update the reference to the final published version of AHAM AC–7–2022 in the test procedure final rule, should it publish prior to the final rule, unless there are substantive changes between the draft and published versions, in which case DOE may adopt the substance of the AHAM AC–7–2022 Draft or provide additional opportunity for comment on the changes to the industry consensus test procedure.

Given that AHAM is considering publishing an updated AHAM AC–1–2022, should AHAM AC–7–2022 Draft be updated to reference AHAM AC–1–2022, DOE will consider adopting the published version of AHAM AC–7–2022, including the reference to AHAM AC–1–2022 as long as it is also published and is substantively the same as AHAM AC–1–2020. If there are substantive changes between the final version of AHAM AC–1–2022 and AHAM AC–1–2020, DOE may consider providing additional opportunity for comment on the changes to the industry consensus test procedure or continue to reference AHAM AC–1–2020. Additionally, DOE is considering whether it should include reference to the use of KCl as an alternate to cigarette smoke, as currently specified in AHAM AC–7–2022 Draft.

DOE requests comment on its proposal to adopt the substantive provisions of AHAM AC–7–2022 Draft with certain modifications.

DOE requests comment on its proposal to incorporate by reference AHAM AC–1–2020, which is referenced in AHAM AC–7–2022 Draft, as well as to specify provisions related to the measurement of pollen CADR, smoke CADR, and dust CADR.

DOE also requests comment on whether it should consider specifying that KCl is an allowable alternate to cigarette smoke in the measurement of smoke CADR, even if AHAM AC–1–2022 Draft is not published by the time DOE publishes its final rule. DOE requests data and information on the implications of using cigarette smoke and KCl interchangeably when performing air cleaner performance tests. DOE requests data and information on how a CADR value obtained using KCl compares to the CADR value obtained using cigarette smoke.

DOE requests comment on its proposal to reference IEC 62301 Ed. 2.0, which is referenced in AHAM AC–7–2022 Draft for the instrumentation and testing provisions for measuring standby mode power consumption.

DOE requests comment on its proposal to reference ASTM E741–11(2017), which is referenced in AHAM AC–7–2022 Draft for determining the test chamber air exchange rate.

2. Other Industry Standards

In the January 2022 RFI, DOE also requested comment on whether it should consider any methodology for measuring the removal efficacy of microorganisms (*i.e.,* viruses, bacteria, mold, *etc.*) from indoor air as part of a Federal test procedure for air cleaners. 87 FR 3702, 3710. DOE also requested comment on other test methods that it should consider when developing a test procedure to measure the energy efficiency of air cleaners. *Id.*

In response to the January 2022 RFI, Lennox commented that the American Society of Heating, Refrigerating and Air-Conditioning Engineers (''ASHRAE'') standard ASHRAE 52.2–2017, ''Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size,'' methodology is acceptable for air cleaners that remove particles. (Lennox, No. 7 at pp. 2–3) DOE notes that ASHRAE 52.2–2017 provides a test method for measuring the performance of general ventilation air cleaning devices; specifically, it provides a metric to determine the performance of air filters that are part of in-duct or whole-home air cleaners. Non-powered products such as filters are not included within the proposed scope of the proposed test procedure.

MIAQ and AHRI commented that ASHRAE and AHRI standards and State regulations already require manufacturers of air cleaners to optimize their product air filter designs and that DOE's new standard would create potential conflicts, such as competing goals. (MIAQ, No. 5 at pp. 5–7; AHRI, No. 15 at pp. 7–8) DOE notes that while the ASHRAE and AHRI standards and State regulations may specify requirements for air filter designs, DOE's proposed test procedure is intended to evaluate the energy efficiency of an air cleaner; *i.e.,* the ability of the air cleaner to deliver clean air as a function of its energy use.

MIAQ commented that in addition to the industry test standards that DOE referenced in the January 2022 RFI, DOE could consider evaluating other international air cleaners test methods such as the CNS 16098 standard specified in Taiwan's regulations,[17] TIS 3061:2563 that is used in Thailand's voluntary program,[18] and several other AHAM, IEC, ASHRAE, and AHRI standards, such as AHAM AC–3; AHAM AC–5–2021; AHAM AC–4; GB/T18801–2015 (Chinese); NRCC–54013 (Canadian); ISO 16000–36; ISO/CD 16000–43; ISO/CD 16000–44; NF–B44–200:2016; NF EN 16846–1:2017; JEM 1467 2015 (Japan); IEC 63086–2 (gases); SPS–KACA002 2016 Korean; ISO/TC 142–IEC 63086; ASHRAE 52.2; ASHRAE 52.2 with optional appendix J; ASHRAE 52.2 proposed appendix; ISO 16890; AHRI Standard 850; AHRI Standard 680/681–2017; ASHRAE 145.2; ISO 10121; and ASHRAE 185.1. (MIAQ, No. 5 at pp. 7–8; AHRI, No. 15 at pp. 8–9)

DOE's preliminary assessment of Taiwan and Thailand's regulations indicate that these standards specify the evaluation of $PM_{2.5}$ CADR and power consumption, similar to the AHAM AC–7–2022 Draft. Additionally, DOE notes that AHAM AC–3 is similar to AHAM AC–1–2020 except that it provides test methods to evaluate the performance of portable air cleaners before and after the air cleaners have been subjected to accelerated particulate loading conditions. DOE is not evaluating accelerated particulate loading [19] conditions at this time; therefore, DOE is not proposing to reference AHAM AC–3. AHAM AC–4 and AHAM AC–5 are also similar to AHAM AC–1–2020, but specify test methods using different contaminants—gases and microorganisms, respectively. These industry standards were published recently and, as discussed later in this section, DOE is currently evaluating these standards. GB/T18801–2015 (Chinese), NRCC–54013 (Canadian), JEM 1467 2015 (Japan), IEC 63086–2 (gases), SPS–KACA002 2016 Korean, ISO/TC 142–IEC 63086 test air cleaners to determine CADR in a manner similar to AHAM AC–1–2020 (*i.e.,* in a test chamber after introducing a

[17] CNS 16098: *Air Cleaners for household and similar use—Methods for measuring the performance,* available at: *www.cnsonline.com.tw/?node=result&typeof=common&locale=zh_TW.*

[18] *labelno5.egat.co.th/new58/wp-content/uploads/update/product/airpure.pdf.*

[19] Accelerated particle loading is a method for simulating defined periods of use of the filter.

contaminant and taking measurements without the air cleaner operating (natural decay) and with the air cleaner operating). However, these standards specify certain different contaminants, including gaseous pollutants. Some of these standards also include additional performance tests, such as noise and ozone emissions. Given the widespread use of AHAM AC–1–2020 in the United States, DOE is not proposing any requirements from these additional standards at this time. ISO 16000–36, ISO/CD 16000–43, and ISO/CD 16000–44 are standards for assessing the reduction rate of culturable airborne bacteria, culturable airborne fungi, and gases, respectively. As noted, DOE is still evaluating test methods for gaseous and microorganism contaminants and will consider these standards for gaseous and/or microorganism testing. NF–B44–200:2016 also specifies multiple contaminants including particulates, gasses, and microorganisms. However, DOE could not identify the specified test method for testing with each contaminant and requests additional information.

Similarly, NF EN 16846–1:2017 is a test method to evaluate photocatalytic devices used for the elimination of gasses and DOE will evaluate this standard. ASHRAE 52.2, ASHRAE 52.2 with optional appendix J, ASHRAE 145.2, and ISO 10121 are standards for air filters used as part of in-duct devices, which are not included within the proposed scope of the proposed test procedure. Similarly, ISO 16890 is a standard for the air filters of general ventilation air cleaners, which are not included within the proposed scope of the proposed test procedure. AHRI Standard 850 and AHRI Standard 680/681—2017 are standards for air filters and associated equipment, which DOE is not proposing to regulate in this proposed test procedure. Finally, ASHRAE 185.1 is a standard for testing ultraviolet (''UV'') lights in air ducts; DOE's definition of air cleaners excludes products that operate solely by means of UV light without a fan for air circulation.

The CA IOUs stated that DOE should consider provisions specified in ANSI and ASHRAE standards for air cleaners that generate ozone or UV light. (CA IOUs, No. 10 at p. 11) DOE's objective is to establish test procedures for air cleaners that would evaluate the energy efficiency of an air cleaner. It is DOE's understanding that safety standards and requirements specified in industry standards ensure that both ozone and UV light generated as part of air cleaner operation remain within specified threshold limits. Therefore, DOE is not proposing to adopt these provisions in the air cleaners test procedure.

The CA IOUs additionally commented that in the absence of an acceptable standardized energy performance rating for biological agents, it would be reasonable to focus on the accepted particulate-based energy test, but recommended that DOE validate if a correlation exists between the microorganism and particulate tests. (CA IOUs, No. 10 at p. 6)

Synexis commented that DOE should consider test methods used to measure the removal of microorganisms such as AHAM AC–5–2022 Draft. Synexis stated that the Korean Test Labs test method only tests for bacterial reduction. Synexis stated that utilizing the Research Triangle Institute (''RTI'') test method in combination with some additional test methods (National Research Council Canada (''NRCC'') or others) would provide better evidence of device effectiveness. For example, the RTI and NRCC test methods capture many of the effectiveness criteria, as the RTI method measures airborne virus, bacteria and mold reduction while the NRCC method measures VOC and ozone reduction and would demonstrate that the devices are not producing harmful levels of by-products. (Synexis, No. 9 at pp. 3–4) Molekule commented that many of the industry standards that evaluate the performance of air cleaners against microorganisms and chemicals, such as AHAM AC–4, AHAM AC–5–2022, and the NRCC_54013 protocol, only gauge the initial reduction of pollutants and do not provide any insight into sustained performance over time. (Molekule, No. 12 at p. 4)

Lennox commented that microorganisms and VOCs present complex issues that DOE must consider before proceeding with a test procedure or standard. Lennox further stated that AHAM is working to include microorganisms as a new contaminant in its air cleaner standard and DOE should wait until that standard is published. (Lennox, No. 7 at p. 3) It is DOE's understanding that the AHAM standard that Lennox is referencing is AHAM AC–5–2022, which published after the comment period for the January 2022 RFI closed.

In proposing to establish an initial test procedure for measuring energy efficiency of air cleaners, DOE is focusing on the functionality most broadly implemented in air cleaners on the market in the United States; *i.e.,* the removal of particulate matter through mechanical filtration means, which may include ionization particulate capture as well. Certain microorganisms, depending on their size, also may be removed from the air by such devices. In light of the ongoing coronavirus-19 pandemic and other health concerns, DOE recognizes the utility to consumers of additional means to reduce concentrations of microorganisms in the air, including destruction or deactivation of the microorganisms. DOE expects to monitor the air cleaner market for the presence of models with such antimicrobial features and may evaluate in the future test methods for air cleaners that eliminate microorganisms.

An example of a test method for air cleaners that reduce concentrations of airborne microorganisms is AHAM AC–5–2022, which AHAM issued in March 2022. Under this test method, air cleaners are tested in a manner similar to AHAM AC–1–2020, except microorganisms are aerosolized and introduced into the chamber rather than particulates. AHAM AC–5–2022 specifies different types of bacteria, bacteriophages, and mold spores that could be used for testing. Although DOE is not proposing provisions in this proposed test procedure to measure the efficacy of an air cleaner's removal of microorganisms, DOE welcomes comment on the impact the type of microorganism selected for testing has on the CADR for microbes (''m-CADR'') value (*e.g.,* Phi-X 174 vs. MS2). DOE also welcomes comment on whether measurements taken every 2 minutes for a duration of 10 minutes, as specified in Section 7.3 of AHAM AC–5–2022 is sufficient to determine m-CADR. DOE additionally requests comment on the duration for which a sample must be collected during each measurement point. DOE also observed from test results that the natural decay curve for microorganisms could be increasing during the first 10–15 minutes and welcomes feedback on whether this is reasonable.

DOE requests comment on whether the m-CADR value specified in AHAM AC–5–2022 would change, and if so, how, if a different type of microorganism was used for testing from the same general microorganism category (*e.g.,* using MS–2 vs. Phi X 174 for bacteriophage testing).

DOE requests comment on whether measurements taken every 2 minutes for a duration of 10 minutes, as specified in Section 7.3 of AHAM AC–5–2022, is sufficient to determine m-CADR. DOE also requests comment on the duration for which a sample must be collected for each measurement point.

Additionally, if stakeholders indicate that operating the test unit for 10 minutes is sufficient, DOE requests comment on whether the natural decay

test should also be conducted for only 10 minutes. DOE also requests comment on whether it is reasonable for the natural decay curve for microorganisms to be increasing during the first 10–15 minutes of the test, and if not, how should DOE mitigate this issue.

C. Definitions

As discussed, the July 2022 Final Determination established a definition for air cleaners. Additionally, as discussed in section III.A of this document, DOE is proposing to reference Section 2.1.1 of AHAM AC–7–2022 Draft in 10 CFR part 430.2 to specify the definition for ''conventional room air cleaner'' and additionally reference within this definition Sections 2.1.3.1 and 2.1.3.2 of AHAM AC–7–2022 Draft to define ''portable air cleaner'' and ''fixed air cleaner,'' respectively. These definitions are relevant to establish the scope of the proposed new appendix FF.

In addition to these definitions, DOE proposes to specify certain additional definitions in the proposed new appendix FF that would be required to test air cleaners according to the proposed test procedure.

DOE proposes to reference Sections 2.2 and 2.3, Sections 2.4.1 through 2.4.2.4, and Sections 2.6 through 2.8 of AHAM AC–7–2022 Draft to specify definitions for the following terms in section 2 of the proposed new appendix FF:

- Function—means a predetermined operation undertaken by the air cleaner. Functions may be controlled by an interaction of the user, of other technical systems, of the system itself, from measurable inputs from the environment and/or time. In AHAM AC–7–2022 Draft, functions are grouped into four main types:
  - Primary functions
  - Secondary functions
  - User oriented secondary functions
  - Network related secondary functions
- Primary function—means an air cleaning function that reduces the concentration of one or more types of indoor air pollutants.
- Secondary function—means a function that enables, supplements, or enhances a primary function. For air cleaners, secondary functions are other functions which are not directly related to air cleaning. Examples may include a vacuum, heating, humidification, or additional ambient room lights (*e.g.,* night light).
- User oriented and network function (*i.e.,* control functions)—may include network connection, Wi-Fi, clocks, radio, remote controls, or other programmable functions that may continue to be enabled when the primary function is inactive.
- Mode—means a state that has no function, one function or a combination of functions present.
- Active mode—means a product mode where the energy using product is connected to a mains power source and at least one primary function is activated.
- Low power mode—as per IEC 62301 Ed. 2.0 means a product mode that falls into one of the following broad mode categories:
  - Off Mode(s)
  - Standby Mode(s)
  - Network Mode(s)
  - Inactive Mode
- Standby mode—means a mode offering one or more of the following user-oriented or protective functions which may persist for an indefinite time:

(a) To facilitate the activation of other modes (including activation or deactivation of active mode) by remote switch (including remote control), internal sensor, or timer.

Informative Note: A timer is a continuous clock function (which may or may not be associated with a display) that provides regular scheduled tasks (e.g., switching) and that operates on a continuous basis.

(b) Continuous functions, including information or status displays (including clocks) or sensor-based functions.

- Inactive mode—means a standby mode that facilitates the activation of active mode by remote switch (including remote control) or internal sensor or which provides continuous status display.
- Off mode—means a mode in which a consumer room air cleaner is not providing any active or standby mode function and where the mode may persist for an indefinite time, including an indicator that only shows the user that the product is in the off position.
- Network mode—means any product modes where at least one network function is activated (such as reactivation via network command or network integrity communication) but where the primary function is not active.
- Clean Air Delivery Rate (CADR)—is the measure of the delivery of contaminant free air, within a defined particle size range, by an air cleaner, expressed in cubic feet per minute (cfm). CADR is the rate of contaminant reduction in the test chamber when the air cleaner is turned on, minus the rate of natural decay when the air cleaner is not running, multiplied by the volume of the test chamber as measured in cubic feet. Note: CADR values are always the measurement of an air cleaner performance as a complete system and have no linear relationship to the air movement per se or to the characteristics of any particle removal methodology.
- Integrated energy factor (IEF)—is the energy the air cleaner uses when it is in standby mode, as well as, its active mode energy. This is fully defined as the measured $PM_{2.5}$ CADR per watt.
- $PM_{2.5}$—means particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers as measured by a reference method based on 40 CFR part 50, annex I. and designated in accordance with 40 CFR part 53 or by an equivalent method designated in accordance with 40 CFR part 53.
- $PM_{2.5}$ CADR—is from ANSI/AHAM AC–1–2020; Annex I. The performance on $PM_{2.5}$ of an air cleaner is represented by a clean air delivery rate (CADR) based on the dust and cigarette smoke performance data.

The diversity of particle natures and the sizes of the dust and smoke pollutants gives a well-balanced representation of the ultra-fine and fine particulate matters that define $PM_{2.5}$.

- $PM_{2.5}$ CADR is obtained by combining the CADR of cigarette smoke particle sizes ranging from 0.1 to 0.5 microns with the CADR of dust particles that fall in the range of 0.5 to 2.5 microns and performing a geometric average calculation.

$$PM_{2.5}\ CADR = \sqrt[2]{[Smoke\ CADR\ (0.1 - 0.5\ \mu m)\ \times Dust\ CADR(\ 0.5 - 2.5\ \mu m)}$$

AHAM AC–7–2022 Draft also includes definitions for other terms that DOE is not proposing to incorporate into the proposed new appendix FF. Generally, these other terms are inconsistent with or not relevant to the proposed scope of the DOE test procedure.

DOE requests comment on its proposal to include definitions for the aforementioned terms, via reference to AHAM AC–7–2022 Draft, in the proposed new appendix FF. Should the AHAM task force consider any changes to any of these definitions or include definitions for additional terms that would be relevant to DOE's proposed test procedure, DOE requests comment on such changes and the justification for DOE to consider including them in its test procedure for air cleaners.

D. Test Conditions

Section 3 of AHAM AC–7–2022 Draft specifies test conditions for the measurement of active mode and standby mode power consumption and includes references to certain sections of AHAM AC–1–2020 as appropriate. Specifically, Sections 3.1 through 3.6 of AHAM AC–7–2022 Draft specify requirements for active mode and standby mode electrical supply, test chamber ambient temperature, test chamber air exchange rate, test chamber particulate matter concentrations, chamber equipment, and test unit preparation (including conditioning of the air cleaner prior to testing, placement of the air cleaner for testing, and network connection setup requirements), respectively.

Through participation in the task force to develop AHAM AC–7–2022 and conducting preliminary testing, DOE has initially determined that the AHAM AC–7–2022 Draft test conditions produce test results that measure the efficiency of air cleaners during a representative average use cycle and are not unduly burdensome. Therefore, DOE proposes to reference the test condition requirements specified in Sections 3.1 through 3.6 of AHAM AC–7–2022 Draft in the proposed new appendix FF. The following sections summarize each of the requirements specified in AHAM AC–7–2022 Draft along with DOE's proposals.

1. Electrical Supply

Section 3.1 of AHAM AC–7–2022 Draft specifies the electrical supply requirements for active mode and standby mode testing. These requirements specify that active mode power supply test voltage and frequency must be set to the nameplate voltage ±1 percent. If a range of voltage is provided on the nameplate, then the voltage for the country for which the measurement is being determined shall be used per Table 1 of AHAM AC–7–2022 Draft (±1 percent). Table 1 specifies 120 volts and 60 hertz for units in North America. For standby mode testing, the power supply test voltage and frequency are to be set as noted in Table 1 of AHAM AC–7–2022 Draft (±1 percent), which specifies 115 volts and 60 hertz for units in North America. DOE notes that these power supply requirements are generally consistent with DOE test procedures for other consumer products for which standby mode and active mode are tested. Accordingly, DOE proposes to reference Section 3.1 of AHAM AC–7–2022 Draft for the electrical supply requirements.

DOE requests comment on its proposal to reference Section 3.1 of AHAM AC–7–2022 Draft for the electrical supply requirements for active mode and standby mode power measurement.

2. Ambient Conditions

Section 3.2 of AHAM AC–7–2022 Draft specifies the test chamber ambient temperature requirements for active mode and standby mode tests. The active mode ambient temperature requirement is 70 ± 5 degrees Fahrenheit (''°F'') (21 ± 3 degrees Celsius (''°C'')) with a relative humidity of 40 ± 5 percent. The standby mode ambient temperature requirement is 70 ± 9 °F (21 ± 5 °C), with no relative humidity requirement specified. DOE notes that the active mode test requirements are similar to the ambient conditions specified for certain other consumer products that affect room air besides heating or cooling (*e.g.,* DOE's ceiling fan test procedure specifies maintaining the room temperature at 70 ± 5 °F and the room relative humidity at 50 ± 5 percent during testing),[20] and as such, DOE expects that these conditions would also produce representative test results for air cleaners. Additionally, Section 5.7.2 of AHAM AC–7–2022 Draft, which specifies the supplemental test to measure active mode power consumption outside a test chamber, also references Section 3.2 of AHAM AC–7–2022 Draft to specify that the same ambient conditions must be maintained when testing outside the chamber.

DOE recognizes that standby mode testing is likely to be much less sensitive to ambient room temperature or humidity compared to active mode testing, such that the wider tolerance on ambient temperature and the lack of a humidity requirement for standby mode testing are appropriate. DOE understands that test laboratories already have the expertise and equipment necessary to maintain these specified ambient temperature and relative humidity test conditions, within the specified tolerances, when testing air cleaners within the test chamber as well as the expertise and equipment necessary for maintaining temperature within the specified tolerance for standby mode. Accordingly, DOE proposes to reference these ambient temperature and relative humidity requirements from AHAM AC–7–2022 Draft.

DOE requests comment on its proposal to reference Section 3.2 of AHAM AC–7–2022 Draft for the ambient temperature and humidity requirements for active mode and standby mode power measurement.

3. Test Chamber Air Exchange Rate

Section 3.3 of AHAM AC–7–2022 Draft requires that, per AHAM AC–1–2020, the test chamber air exchange rate must be less than 0.03 air changes per hour as determined by ASTM E741 or an equivalent method. Section 4.3 of AHAM AC–1–2020 provides these specifications. DOE does not have information on typical air changes within a representative room, but this condition is necessary to ensure consistent test chamber conditions by minimizing the air exchange rate, and DOE has tentatively determined that the industry-accepted specification for the air exchange rate, as reviewed by the AHAM task force, would be appropriate for air cleaner testing. Accordingly, DOE proposes to additionally reference Section 4.3 of AHAM AC–1–2020 within the proposed provisions of Section 3 of the proposed new appendix FF. As discussed, DOE is also proposing to incorporate by reference ASTM E741–11(2017), the most recent version of that industry standard.

DOE requests comment on its proposal to reference Section 3.3 of AHAM AC–7–2022 Draft for the test chamber air exchange rate requirements, including its reference to ASTM E741–11(2017).

4. Test Chamber Particulate Matter Concentrations

Section 3.4 of AHAM AC–7–2022 Draft specifies the acceptable range of particle concentrations for the initial test condition for the smoke and dust tests, via reference to Section 4.4 of AHAM AC–1–2020. DOE recognizes that initial particle concentration is a necessary requirement for repeatability and reproducibility by ensuring consistent test chamber conditions prior to measuring decay rate, and DOE has tentatively determined that the industry-accepted specification for the initial particle concentrations, as

[20] See section 3.3.1(1) of appendix U to subpart B of part 430—Uniform Test Method for Measuring the Energy Consumption of Ceiling Fans.

reviewed by the AHAM task force, would be appropriate for air cleaner testing. Accordingly, DOE is proposing to reference Section 3.4 of AHAM AC–7–2022 Draft and additionally reference Section 4.4 of AHAM AC–1–2020 within the proposed provisions of section 3 of the proposed new appendix FF.

DOE requests comment on its proposal to reference Section 3.4 of AHAM AC–7–2022 Draft for the initial particulate concentrations in the test chamber.

Test Chamber Construction and Equipment

Section 3.5 of AHAM AC–7–2022 Draft references Annex A of AHAM AC–1–2020 to specify the test chamber construction and equipment positioning during testing. This includes requirements for chamber size, framework, constructions and material for the walls and flooring, as well as additional equipment that must be used in the chamber for conducting tests. DOE believes these requirements are relevant to ensure that testing is conducted in a representative chamber and that it is repeatable and reproducible.

In response to the January 2022 RFI, Synexis commented that the CADR test chamber is not representative of actual room sizes, that testing should be conducted in a larger chamber, and that the setup of an air cleaner (*e.g.,* wall-mounted, ceiling-mounted, free-standing, *etc.*) is less critical in measuring efficiency than the air cleaning mechanism. (Synexis, No. 9 at pp. 4–5)

EPCA requires that any test procedures DOE prescribes or amends be reasonably designed to produce test results that measure energy efficiency, energy use, or estimated annual operating cost of a covered product during a representative average use cycle or period of use, as determined by the Secretary, and not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) DOE recognizes that the test chamber size specified in AHAM AC–1–2020, 10.5 feet (''ft'') × 12 ft × 8 ft, may not be representative of larger rooms, but DOE does not have consumer data on the room sizes in which air cleaners are most commonly used that would indicate that a different test chamber size would be more representative of average use. Additionally, utilizing a chamber of the same size for testing all conventional room air cleaners and that is required for testing in accordance with the ENERGY STAR V. 2.0 Specification would produce repeatable and reproducible test results, while also ensuring that the test setup and chamber size requirements are not unduly burdensome. Those laboratories that are currently testing air cleaners for the purposes of ENERGY STAR qualification are equipped with the test chamber specified in AHAM AC–1–2020, and specifying a larger test chamber size may reduce the capability of the industry to test at third-party laboratories and would also impose burden on test laboratories to upscale their test chambers. Further, AHAM AC–1–2020 specifies a maximum theoretical CADR that can be achieved when testing according to this standard, which is determined by the maximum number of initial available particles in the chamber, the acceptable minimum number of available particles in the chamber, an average background natural decay rate (from statistical study), and the size of the test chamber, and the available minimum experiment time.[21] That is, the size of the test chamber is one of the inputs that limits the size of air cleaners that can be tested according to this standard. Products that exceed a smoke or dust CADR of 600 cfm are not intended to be tested using this test method. For these reasons, DOE proposes in this NOPR to utilize the same test chamber requirements as specified in AHAM AC–1–2020.

DOE proposes to reference Section 3.5 of AHAM AC–7–2022 Draft, which references Annex A of AHAM AC–1–2020 for the details of the test chamber construction and equipment.

DOE requests comment on its proposal to reference Section 3.5 of AHAM AC–7–2022 Draft, which references Annex A of AHAM AC–1–2020 to specify the test chamber construction and equipment requirements.

5. Test Unit Preparation

Section 3.6 of AHAM AC–7–2022 Draft specifies three requirements regarding test unit preparation: conditioning of the air cleaner prior to measurement in Section 3.6.1; test unit placement for testing in Section 3.6.2; and network connectivity requirements in Section 3.6.3.

For the conditioning requirements, Section 3.6.1 of AHAM AC–7–2022 Draft specifies that air cleaners must be operated for 48 hours in maximum performance mode to break-in the motor prior to conducting any tests. It further specifies that this break-in must be conducted with replacement filters and that after the break-in period is completed, all original and as-received filters must be reinstalled, and non-replaceable components should be cleaned according to manufacturers instructions prior to performing the active mode test. Additionally, Section 3.6.1 of AHAM AC–7–2022 Draft specifies that installation of a UV device that is energized during air cleaning function and lamp assembly within the air cleaner shall be according to manufacturer's instructions and the burn-in time for the UV lamp shall also be 48 hours, run concurrently with the break-in period of the motor.

DOE requests comment on its proposal to reference Section 3.6.1 of AHAM AC–7–2022 Draft for the air cleaner conditioning requirements.

DOE requests comment on whether the 48 hour burn-in time for air cleaners with UV lights is sufficient or if the burn-in time duration should be increased.

6. Test Unit Placement for Testing

Section 3.6.2 of AHAM AC–7–2022 Draft specifies that the air cleaner must be placed in the test chamber in accordance with Section 4.6 of AHAM AC–1–2020, which states that the air cleaner must be installed per manufacturer's instructions in the center of the test chamber, facing the test window, positioned with its air discharge as close as possible to the test chamber center. Section 4.6 of AHAM AC–1–2020 further requires that if the manufacturer's instructions ''do not specify'' [22] and the air cleaner is not a floor model, the air cleaner must be placed on the table for testing. AHAM AC–1–2020 does not provide further specificity as to how to determine if an air cleaner is a floor model, which may potentially cause ambiguity in determining whether a particular air cleaner would need to be placed on the table or not. DOE notes that Section 5.7 of IEC 63086–1 [23] requires that if placement of an air cleaner is not specified by the manufacturer and the air cleaner's height is less than 0.7 meters from the floor, the unit shall be placed on a table of 0.7 meters in height. In all other instances, IEC 63086–1 specifies that the air cleaner shall be placed on the floor of the test chamber.

While DOE is proposing to reference Section 3.6.2 of AHAM AC–7–2022 Draft, DOE is considering if it should

[21] DOE infers this to mean the minimum number of time points required for running the test.

[22] DOE understands the language ''If manufacturer's instructions do not specify'' to mean that the manufacturer's instructions do not clearly indicate the placement of the air cleaner on a floor, table, or another flat surface.

[23] Household and similar electrical air cleaning appliances—Methods for measuring the performance—Part 1: General requirements. IEC 63086–1:2020.

also include the additional test unit placement requirement from IEC 63086–1 and requests comment. By referencing a measurable metric (unit height) to determine the installation configuration of the air cleaner in the absence of manufacturer's instructions, IEC 63086–1 may provide greater certainty regarding how to test certain air cleaner models, which could contribute to a more reproducible and representative test measurement. For the DOE test procedure, DOE could consider specifying the height limit for placement on the table in the test chamber as 28 inches, given that 0.7 meters is approximately 27.6 inches. Additionally, DOE is considering whether it should include any requirement for air cleaners shipped with casters; specifically, DOE is considering whether such air cleaners should be tested on the floor regardless of the unit's height.

DOE requests comment on its proposal to reference Section 3.6.2 of AHAM AC–7–2022 Draft, which references Section 4.6 of AHAM AC–1–2020 for the test unit placement instructions.

DOE also requests comment on whether it should consider including the requirement from IEC 63086–1 that specifies that if the placement of the air cleaner is not specified by the manufacturer and the air cleaner's height is less than 28 inches, then the unit must be tested on the table. Specifically, DOE requests comment on whether the language in AHAM AC–7–2022 Draft which states that, ''if the air cleaner is not a floor model'' is clear to follow, without any ambiguity, or whether a quantitative metric such as unit height would be better to ensure consistent test setup.

DOE also requests comment on whether it should include any placement instructions for air cleaners shipped with casters.

7. Network Functionality

Section 3.6.3 of AHAM AC–7–2022 Draft specifies requirements for setting up air cleaners with network functionality, including requirements for the network connection and for establishing the connection between the air cleaner and the network. This section specifies that air cleaners must be tested on a Wi-Fi network and that if the unit has additional network capabilities (*e.g.,* Bluetooth®), these capabilities shall remain in their default, as-shipped configuration. Additionally, Section 3.6.3 of AHAM AC–7–2022 Draft specifies that the network shall support the highest and lowest data speeds of the air cleaner's network function, and that the live connection must be maintained for the duration of the active mode and standby mode tests. AHAM AC–7–2022 Draft also specifies that if the air cleaner needs to install any software updates, testing must wait until these updates have occurred; otherwise, if the unit can operate without updates, the updates may be bypassed.

DOE is aware of at least one air cleaner on the market [24] that cannot be operated by the user, unless it is connected to an active network connection. On such a model, control of the air cleaner is provided exclusively through a mobile phone application. Accordingly, DOE is proposing to reference the AHAM AC–7–2022 Draft network connection requirements.

DOE requests comment on its proposal to reference Section 3.6.3 of AHAM AC–7–2022 Draft regarding network connection requirements during active mode and standby mode tests. DOE also requests comment on the impact on repeatability and reproducibility when testing air cleaners with network functionality while connected to a network.

DOE requests comment on whether the software update requirements are adequately specified or whether DOE should explicitly state that software updates must always be executed prior to running the tests.

DOE requests comment on its proposal to reference Sections 3.1 to 3.6 of AHAM AC–7–2022 Draft for the test conditions and setup. Should AHAM AC–7–2022 Draft change any of these requirements between publication of this NOPR and publication of the final version of AHAM AC–7–2022, DOE requests comment on these changes, the reasons for these changes, and the impact of these changes on the overall air cleaners test procedure.

E. Instrumentation

Section 4 of AHAM AC–7–2022 Draft specifies requirements for instrumentation used for measuring voltage and power by referencing IEC 62301 Ed. 2.0 and specifies the accuracy required for power measuring equipment.

Sections 4.1.1 through 4.1.3 of AHAM AC–7–2022 Draft specify requirements for power measurement uncertainty, frequency response, and long-term averaging, by referencing requirements in Sections 4.4.1 through 4.4.3 of IEC 62301 Ed. 2.0. Along with these requirements, Section 4 of AHAM AC–7–2022 Draft specifies the accuracy of instruments used for measuring voltage and power to be accurate to within ±0.5 percent of the quantity measured. Section 4 of AHAM AC–7–2022 Draft also specifies requirements for the accuracy of the temperature measuring device (error no greater than ± 1 °F (± 0.6 °C) over the range being measured) and the relative humidity measuring device (resolution of at least 1 percent relative humidity, and an accuracy of at least ± 6 percent relative humidity over the temperature range of (24 ± 3) °C [(75 ± 5) °F]).

DOE understands these instrumentation specifications to be appropriate for producing repeatable, reproducible, and representative test results for air cleaners, and that test laboratories currently have instrumentation that meets these proposed specifications. Therefore, DOE proposes to reference these instrumentation requirements specified in Section 4 of AHAM AC–7–2022 Draft, including the applicable provisions from Sections 4.4.1, 4.4.2, and 4.4.3, of IEC 62301 Ed. 2.0 in the proposed new appendix FF.

DOE requests comment on its proposal to incorporate by reference Section 4 of AHAM AC–7–2022 Draft regarding instrumentation requirements, including the applicable provisions from relevant sections of IEC 62301 Ed. 2.0. Should AHAM AC–7–2022 Draft change any of these requirements between publication of this NOPR and publication of the final version of AHAM AC–7–2022, DOE requests comment on these changes, the reasons for these changes, and the impact of these changes on the overall air cleaner test procedure.

F. Active Mode Testing

1. Background on CADR

Section 3.14 of AHAM AC–1–2020 defines CADR as the metric which measures an air cleaner's efficacy in removing particulate matter from the air. CADR represents the logarithmic rate of particulate reduction in the test chamber when the air cleaner is turned on (expressed as a number per minute), minus the logarithmic rate of ''natural decay'' [25] when the air cleaner is not running (also expressed as a number per minute), multiplied by the volume of the test chamber (specified as 1,008 cubic feet). As such, testing an air

[24] See, for example: *auraair.io/pages/aura-air-1.*

[25] Section 3.13 of AHAM AC–1–2020 defines ''natural decay'' as the reduction of particulate matter due to natural phenomena in the test chamber: principally agglomeration [a process in which fine particles ''clump'' together], surface deposition [a process in which particles attach to a surface] (including sedimentation [a process in which particles settle out of suspension in the air onto a surface due to gravity]), and air exchange.

cleaner requires conducting two separate tests: a first test with the air cleaner not operating in active mode, and a second test with the air cleaner operating in active mode. The CADR value is expressed in units of cfm.[26]

Sections 5, 6, and 7 of AHAM AC–1–2020 specify procedures for measuring air cleaner efficacy using three different types of particulates representing three ranges of particulate matter size: cigarette smoke (0.10 micrometer (''µm'') to 1.0 µm diameter), dust (0.5 µm to 3.0 µm diameter), and pollen (5 µm to 11 µm diameter), respectively.

In the January 2022 RFI, DOE requested comment on the use of CADR, as opposed to another metric such as rate of decay, to characterize air cleaner performance. In particular, DOE requested comment on whether consumers could find the unit of measurement of cfm for CADR confusing and misunderstand it as referring to the rate of air movement through the device. 87 FR 3702, 3708.

Synexis commented that CADR is not an appropriate performance metric because it applies only to filtration devices and that any metric must consider the mechanism of action of the air cleaner and types of contaminants it addresses. (Synexis, No. 9 at p. 2)

Daikin commented that CADR primarily measures the capacity of the unit, but there are other air cleaning efficacy metrics that should be considered based on product categories. Daikin stated that metrics like CADR and MERV are similar to the capacity of delivering clean air and air cleaning efficacy respectively, but they are not an energy efficiency metric. (Daikin, No. 13 at p. 2)

DOE recognizes that other capacity metrics may be relevant for the removal of other air contaminants such as gases and microorganisms. However, for the scope of products covered by this proposed test procedure, *i.e.,* conventional room air cleaners, and the contaminants used to test such air cleaners, *i.e.,* smoke, dust, and pollen, DOE has tentatively determined that CADR would be an appropriate capacity metric, as DOE is not proposing to test for gases and microorganisms at this time. CADR is a well-established industry capacity metric, and the AHAM AC–1 standard has been in use for over 30 years. CADR is a measure of the reduction rate of specific particulates by an air cleaner in a controlled environment. Accordingly, DOE proposes to use the CADR metric to evaluate the capacity of air cleaners. As discussed in later sections, DOE is proposing an IEF metric, which specifies the efficiency of an air cleaner in CADR/W.

2. Particulate Used for Testing and CADR Measurement

In the January 2022 RFI, DOE requested comment on whether the power measurement could vary based on the particulate test that is used to measure operating power. 87 FR 3702, 3708. If power measurement varies based on the particulate test, DOE requested comment on which particulate test (pollen, dust, or smoke) should be used as the basis for the power measurement in any Federal test procedure that DOE may develop. Alternately, DOE requested comment on whether it should consider requiring power measurements for each particulate test and use a simple or weighted average to determine operating power. *Id.*

DOE also requested comment on whether cigarette smoke would be the appropriate particulate for determining a CADR rating of air cleaners under a DOE test procedure, should DOE adopt a measurement of CADR in a test procedure for air cleaners. If cigarette smoke is not the most appropriate particulate, DOE requested comment on other particulate(s) that would be more appropriate as the basis for measurement, including data and information to support such a recommendation. *Id.* at 87 FR 3710–3711.

Blueair commented that it supports the use of cigarette smoke as the appropriate particulate for CADR ratings as it can be a surrogate for much smaller particles that can be found in the home, but that any pollutants specified in AHAM AC–1–2020 could be suitable alternatives. (Blueair, No. 11 at p. 3) Blueair additionally supported using $PM_{2.5}$ CADR as the performance metric for air cleaners. (*Id.*) Further, Blueair noted $PM_{2.5}$ is the primary concern from a health standpoint and is often found indoors. Blueair also commented that this particulate is likely to be of greatest concern to consumers and is very fine and can adequately represent a unit's performance for other particles. (*Id.*)

The Joint Commenters recommended that DOE adopt an air cleaner metric based on a $PM_{2.5}$ CADR. The Joint Commenters noted that fine particulate matter has been shown to cause serious health problems and can get into the lungs and bloodstream and likely be of concern to consumers. (Joint Commenters, No. 8 at p. 4) The Joint Commenters stated that due to the small size, $PM_{2.5}$ particles can adequately represent a unit's performance for other larger particles and noted that AHAM AC–7–2022 Draft measures efficiency based on $PM_{2.5}$ CADR as the numerator. (*Id.*)

Synexis commented that an air cleaner's energy consumption may vary based on the size of particles used in particulate tests because particulates of various sizes can cause filters to become entrained with pollutant particles and require greater pressure to move air through the device. Synexis further commented that power measurements for each particulate test would not be representative of real-world energy consumption and would not provide any useful data. (Synexis, No. 9 at p. 2) Testing conducted by DOE, as well as power consumption data provided in ENERGY STAR's database, do not indicate any substantive differences in power consumption among the smoke, dust, and pollen tests.

The CA IOUs recommended a $PM_{2.5}$ CADR performance metric. (CA IOUs, No. 10 at p. 2) The CA IOUs commented that they analyzed the $PM_{2.5}$ CADR metric and observed that a top-performing model based on $PM_{2.5}$ CADR will likely perform well on pollen as well, which is a particulate of concern to consumers. (*Id.* at p. 3) Additionally, the CA IOUs asserted that since AHAM AC–1–2020 indicates testing with pollen particles is not considered sufficiently accurate and is thus out of scope for products with a CADR below 25 cfm, while cigarette smoke and dust particles can be considered sufficiently accurate down to a CADR of 10 cfm, DOE should adopt a performance metric based on $PM_{2.5}$ CADR. The CA IOUs commented that this would ensure products with a low cfm can be included within scope and that this metric would produce the most precise test procedure that balances the representativeness of consumer use cases. The CA IOUs encouraged DOE to monitor pollen CADR performance to ensure a strong correlation is maintained between $PM_{2.5}$ and pollen performance. (*Id.* at p. 5)

For compliance with the standards in tier one of the Joint Proposal, the Joint Stakeholders recommended that DOE permit Section 6.2 of AHAM AC–1–2020 for dust CADR to be applied as an alternative for calculating $PM_{2.5}$ CADR. The Joint Stakeholders stated that the dust CADR, determined according to Section 6.2 of AHAM AC–1–2020, is nearly identical to the subset dust CADR used to calculate $PM_{2.5}$ CADR. The Joint

[26] Although the unit of measurement for CADR is cfm, Section 3.14 of AHAM AC–1–2020 explains that CADR values indicate the performance of an air cleaner as a complete system and that the metric has no linear relationship to air movement or to the characteristics of any particular particle removal methodology *per se.*

Stakeholders further stated that given many products have already been tested per AHAM AC–1–2020, allowing this alternative would ensure that manufacturers are not required to retest using AHAM AC–7–2022 to demonstrate compliance with a new standard on a short timeline. (Joint Stakeholders, No. 16 at p. 6)

Section 2.8 of AHAM AC–7–2022 Draft specifies that $PM_{2.5}$ means particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers, as measured by a reference method based on 40 CFR part 50, annex I and designated in accordance with 40 CFR part 53 or by an equivalent method designated in accordance with 40 CFR part 53.

Section 2.9 of AHAM AC–7–2022 Draft specifies the method used to calculate $PM_{2.5}$ CADR, which is based on the measured smoke CADR and dust CADR values. This section discusses that the diversity of particle natures and the sizes of the dust and smoke pollutants gives a well-balanced representation of the ultra-fine and fine particulate matters that define $PM_{2.5}$. Specifically, $PM_{2.5}$ CADR is obtained by combining the CADR of smoke (which includes particle sizes ranging from 0.1 to 0.5 micron meters (''μm'')) with the CADR of dust (which includes particle sizes ranging from 0.5 to 2.5 μm) and performing a geometric average calculation as follows:

$$PM_{2.5}CADR = \sqrt{Smoke\ CADR\ (0.1 - 0.5\ \mu m) \times Dust\ CADR\ (0.5 - 2.5\ \mu m)}$$

The tests to determine smoke CADR and dust CADR are specified in Sections 5 and 6 of AHAM AC–1–2020. These sections of AHAM AC–1–2020 specify the procedure for introducing the smoke and dust particulates, conducting the natural decay test, and the measuring the decay with the air cleaner in operation. However, $PM_{2.5}$ CADR specifies a narrower range of allowable particle sizes for the smoke CADR and dust CADR than the smoke CADR and dust CADR tests in Sections 5.2 and 6.2, respectively, of AHAM AC–1–2020. That is, the allowable particle size for smoke particles is 0.1 to 1 μm for the smoke CADR test in AHAM AC–1–2020, while it is 0.1 to 0.5 μm for the $PM_{2.5}$ calculation in AHAM AC–7–2022 Draft. Similarly, the allowable particle size for dust particles is 0.5 to 3 μm for the dust CADR test in AHAM AC–1–2020, while it is 0.5 to 2.5 μm for the $PM_{2.5}$ calculation in AHAM AC–7–2022 Draft. DOE interprets the Joint Stakeholders' recommendation of an alternative approach to mean that the Joint Stakeholders want the allowable range of particle size to encompass all dust particle sizes, as specified in AHAM AC–1–2020, in the calculation of $PM_{2.5}$ CADR. While not mentioned in the Joint Proposal, the same alternative could be required for the smoke CADR used in the calculation of $PM_{2.5}$ CADR.

While the allowable smoke and dust particle size for the smoke CADR and dust CADR tests in Sections 5 and 6 of AHAM AC–1–2020 is larger (*i.e.,* 0.1 to 1 μm for smoke particles and 0.5 to 3 μm for dust particles) than the allowable smoke and dust particle size for the calculation of $PM_{2.5}$ CADR (*i.e.,* 0.1 to 0.5 μm for smoke particles and 0.5 to 2.5 μm for dust particles), the calculated $PM_{2.5}$ CADR according to AC–7–2022 Draft is nearly identical to the smoke CADR and dust CADR as measured according to Sections 5 and 6 of AHAM AC–1–2020, as shown in the figures included in the Joint Proposal.[27] Accordingly, DOE proposes that $PM_{2.5}$ CADR may alternatively be calculated using the full range of particles used to calculate smoke CADR and dust CADR according to Sections 5 and 6 of AHAM AC–1–2020, respectively. DOE may further consider the option to allow the use of both approaches to calculate $PM_{2.5}$ CADR in a future standards rulemaking.

DOE requests comment on the Joint Stakeholders' recommendation of using dust CADR as calculated in Section 6 of AHAM AC–1–2020 as an alternative for calculating $PM_{2.5}$ CADR. DOE also requests comment on its proposal to allow the same alternative for the smoke CADR value used in the $PM_{2.5}$ CADR calculation.

DOE notes that AHAM AC–7–2022 Draft specifies calculating IEF using $PM_{2.5}$ CADR. Conversely, ENERGY STAR V. 2.0 Specification specifies its metric based on smoke CADR, whereas ENERGY STAR V. 1.0 Specification specified its metric based on dust CADR.

Given the historic use of both smoke and dust particulates to define a metric for air cleaners, as well as the range of particle sizes covered by the smoke and dust test, DOE proposes to incorporate by reference Section 2.9 of AHAM AC–7–2022 Draft to specify testing with smoke and dust and calculating $PM_{2.5}$ CADR. DOE also proposes to include an alternative for using the smoke CADR and dust CADR as calculated according to Sections 5 and 6 of AHAM AC–1–2020.

Additionally, DOE proposes to reference Sections 5 and 6 of AHAM AC–1–2020 for conducting the smoke CADR and dust CADR tests.

DOE requests feedback on its proposal to incorporate by reference Section 2.9 of AHAM AC–7–2022 Draft to calculate $PM_{2.5}$ CADR based on measurements of smoke CADR and dust CADR. DOE also requests comment on its proposal to allow the use of smoke CADR and dust CADR calculated according to Sections 5 and 6 of AHAM AC–1–2020.

DOE also requests comment on its proposal to reference Sections 5 and 6 of AHAM AC–1–2020 to specify the test methods for determining smoke CADR and dust CADR, respectively.

3. Performance Mode for Testing

In the January 2022 RFI, DOE requested comment on whether it should consider testing air cleaners at any other power level in addition to the maximum power level required by AHAM AC–1–2020. 87 FR 3702, 3708.

Consistent with AHAM AC–1–2020, Section 5.3.1 of AHAM AC–7–2022 Draft specifies that the active mode test for all conventional room air cleaners be performed with the air cleaner set to the highest flow rate setting.[28] Section 5.3.1 of AHAM AC–7–2022 Draft additionally specifies that products that include additional air cleaning functionality beyond mechanical filtration shall additionally have all air cleaning functions switched on, set to maximum. Section 5.6 of AHAM AC–7–2022 Draft specifies requirements for automatic mode, which is a mode in which the air cleaner performs air cleaning functionality in response to a sensor input, timer, or scheduling feature. AHAM AC–7–2022 Draft states that although a product may have an automatic mode, the product shall be operated in its maximum performance mode.

Synexis stated that it was appropriate to test air cleaners at their maximum performance mode because it represents a worst-case scenario in terms of energy

[27] The figure appears on page 6 of the Joint Proposal. (Joint Stakeholders, No. 16 at p. 6).

[28] AHAM AC–7–2022 Draft FN1 specifies that ''highest flow rate setting'' is the highest fan speed setting as identified in the manufacturer's instructions that would allow the product to operate indefinitely.

consumption. Synexis explained that medium and low power settings are likely to exhibit different performance characteristics in different devices and would not provide an appropriate metric to compare different air cleaners. (Synexis, No. 9 at p. 3) Molekule stated that its air cleaners use sensors and automatic mode to address indoor air quality conditions, and that energy efficiency requirements should take these features into account, rather than only considering a unit's maximum speed. (Molekule, No. 12 at p. 5) The Joint Commenters stated that they recognize the efficiency benefits of automatic mode for air cleaners, but that no test procedure exists currently that can account for the associated efficiency benefits or measure the effectiveness of automatic mode. (Joint Commentors, No. 8 at p. 4)

As discussed, AHAM AC–7–2022 Draft specifies that the active mode test be performed at the highest flow rate with all air cleaning functions switched on, set to maximum. Section 1 of AHAM AC–7–2022 Draft includes an informative note stating the following: ''The purpose of this standard is to have one standard for measurement of energy of air cleaners. The standard is designed in such a way to maximize the validity, repeatability and reproducibility of the testing, and thus to give manufacturers, public information groups and consumers information to compare air cleaners. AHAM recognizes that not all consumers will operate their air cleaner at maximum speed or conditions all the time. While it is possible to test air cleaners at different speeds and settings, the difficulty is to arrive at a consistent speed or function setting on all air cleaners for multiple manufacturers. The most consistent measurement for all air cleaners is to test at the Maximum Performance Test Setting.''

This informative note in AHAM AC–7–2022 Draft indicates that the requirement to perform testing at the maximum performance level provides the best balance among repeatability, reproducibility, and representativeness of test results at this time. For this reason, DOE has tentatively determined that maximum performance mode is the best approach currently established by the industry standard for producing test results during a representative average use cycle or period of use, while not being unduly burdensome to conduct. DOE is therefore proposing to adopt the active mode test provisions of AHAM AC–7–2022 Draft, including the requirement to test at the maximum performance mode.

DOE is aware that the AHAM task force has initiated an effort to develop test methods for automatic mode, and DOE is continuing to participate in this effort. If a test method to measure air cleaner performance when operating in automatic mode that produces results that are more representative of an average use cycle or period of use were to be developed, DOE would consider it in a future test procedure rulemaking.

Specific proposals regarding the active mode measurement requirements are discussed in the following paragraphs.

Section 5.3 of AHAM AC–7–2022 Draft specifies that all products shall be tested with the air cleaner set to the highest flow rate setting, also known as maximum performance mode. Additionally, Section 5.3 of AHAM AC–7–2022 Draft specifies that for products that have air cleaning functionality beyond mechanical filtration (*i.e.,* ionization, UV, *etc.*) the test unit shall be configured such that these features are enabled and set to the maximum level during active mode testing.

DOE proposes to reference Section 5.3 of AHAM AC–7–2022 Draft regarding test unit setup requirements for testing in maximum performance mode.

DOE requests comment on its proposal to reference Section 5.3 of AHAM AC–7–2022 Draft to test units in maximum performance mode.

4. Secondary Functions

Section 5.4 of AHAM AC–7–2022 Draft specifies the configuration for secondary functions, which are unrelated to air cleaning (*i.e.,* humidifier, ambient light, *etc.*). As these functions do not contribute to the air cleaning capabilities of the unit, they are switched off or disconnected for the duration of the test. If it is not possible to switch off or disconnect such functions, AHAM AC–7–2022 Draft states that these functions shall be set to their lowest power-consuming mode that is selectable when running the air cleaner at its maximum performance mode or highest fan speed. For customized control displays, AHAM AC–7–2022 Draft specifies that the test unit shall be configured to its default or as-shipped control setting intensity level, unless the panel lights are adjustable in intensity and are shipped in the off mode, in which case the control panel is run in the least-intensity mode that would keep it on for the test. DOE proposes to reference this requirement for the configuration of secondary functions.

Section 5.5 of AHAM AC–7–2022 Draft specifies the configuration of control functions during active mode testing. Control functions include any programmable functions that may continue to be enabled when the primary function is inactive (*i.e.,* clocks, Wi-Fi, remote controls, *etc.*). AHAM AC–7–2022 Draft states that control functions are intended to be on and connected to any communication network during active mode testing.

DOE proposes to reference this requirement to specify that control functions shall be in on mode and connected to any communication network during active mode testing as specified in Section 5.5 of AHAM AC–7–2022 Draft.

DOE requests comment on its proposal to reference Sections 5.4 and 5.5 of AHAM AC–7–2022 Draft to specify the configuration of secondary functions and control functions during active mode testing.

5. Power Measurement Procedure

Section 5.7 of AHAM AC–7–2022 Draft specifies the methods for measuring active mode power. These methods include measuring the power consumption when operating the test unit within the test chamber at the same time as the smoke CADR test and dust CADR test or by measuring the power consumption during a supplemental power test outside of a test chamber.

More specifically, Section 5.7.1 of AHAM AC–7–2022 Draft specifies that the power consumption measurement can be conducted simultaneously with the smoke CADR or dust CADR test from Section 5.2.5 or 6.2.5 of AHAM AC–1–2020, respectively. Section 5.7.2 of AHAM AC–7–2022 Draft specifies an alternative method for measuring active mode power consumption, referred to as the ''supplemental'' test. This test can be used to determine the active mode power consumption outside of the test chamber used for smoke CADR and dust CADR testing. The supplemental power test specifies the same unit configuration and records power over a period of 15 minutes at no greater than 1 second intervals, averaging the power consumption over 13 minutes starting after the initial 2 minutes. AHAM AC–7–2022 Draft additionally specifies that if the test unit has pollutant indicators and they do not light up when no pollutant is present in the air, but light up when detecting pollutants, then the test unit cannot be tested outside the chamber to measure active mode power consumption.

Finally, Sections 5.7.3 and 5.7.4 of AHAM AC–7–2022 Draft specify the equations to determine the average active mode power consumption and the annual active mode energy use, respectively.

DOE performed testing at a third-party laboratory to investigate the similarity

in power measurement between a test conducted simultaneously with the CADR measurement and a supplemental test performed outside of a test chamber. Testing was conducted on 11 units using smoke for the CADR test. Table III.1 shows the test results.

TABLE III.1—DIFFERENCE IN POWER CONSUMPTION BETWEEN SMOKE TEST AND SUPPLEMENTAL TEST

Unit number	Smoke test power (W)	Supplemental test power (W)	Percent difference
1	44.2	43.9	−0.7
2	51.5	54.0	+4.7
3	55.0	55.6	+1.1
4	24.6	25.4	+3.2
5	18.8	18.9	+0.3
6	42.6	42.6	+0.1
7	5.9	5.8	−1.4
8	38.2	37.4	−2.2
9	37.9	38.3	+1.2
10	58.1	57.8	−0.5
11	84.8	81.7	−3.6
Average Difference	.....	.....	+0.2%

As indicated in Table III.1, the percent difference between power consumption measured during the smoke CADR test and the supplemental out-of-chamber test ranged from –3.7 percent to +4.9 percent, with an average of +0.2 percent. Based on these data, DOE has tentatively determined that the power consumption of the out-of-chamber supplemental power test is closely comparable to the in-chamber smoke, and likely dust, CADR tests because measured power using the maximum performance mode is not significantly impacted by whether a particle is present. Accordingly, DOE proposes to reference Sections 5.7.1 through 5.7.4 of AHAM AC–7–2022 Draft to measure active mode power either in the test chamber (Section 5.7.1) at the same time as the smoke or dust CADR test or outside the chamber (Section 5.7.2) as a supplemental power test and to calculate average power (Section 5.7.3) and annual active mode energy use (Section 5.7.4).

DOE requests comment on its proposal to reference Sections 5.7.1 through 5.7.4 of AHAM AC–7–2022 Draft, which specify methods for measuring active mode power at the same time as the smoke or dust CADR test when the test unit is operating within the chamber and measuring the power consumption during a supplemental power test outside of a test chamber, respectively.

6. Pollen CADR

To enable consistent and meaningful representations of metrics most desirable to consumers, DOE is considering including an additional test to determine pollen CADR. Similar to dust and smoke CADR, pollen CADR provides a measurement of the air cleaner's performance to remove pollen from indoor air. Pollen CADR typically increases with increasing air cleaner energy use, and therefore DOE believes this is an appropriate metric to measure. Further, according to the Asthma and Allergy Foundation of America more than 50 million people in the United States experience various types of allergies each year and allergies are the sixth leading cause of chronic illness in the United States.[29] Further, pollen is one of the most common environmental allergens to trigger an allergic reaction. Accordingly, many air purifiers are marketed as providing pollen removal. DOE notes that the ENERGY STAR V. 2.0 Specification requires reporting of pollen CADR. Therefore, DOE believes it is important that any representation related to an air cleaner's pollen CADR performance must be made based on testing conducted in a repeatable and representative manner. Accordingly, DOE is proposing to include the pollen CADR measurement test specified in Section 7 of AHAM AC–1–2020.

Section 7 of AHAM AC–1–2020 specifies the test procedure for determining paper mulberry pollen CADR. The method for measuring pollen CADR is the same as dust CADR and smoke CADR; however, the test duration is only 10 minutes compared to 20 minutes for the smoke test and dust test. The reduced test duration is specified because pollen decays faster than both dust and smoke and thus only 10 minutes is necessary to determine pollen CADR. All other test conditions remain the same including the test chamber, use of a recirculation and ceiling fan, and test equipment.

As discussed in section III.A of this NOPR, Section 2 of AHAM AC–1–2020 specifies the test procedure being applicable only to air cleaners within rated CADR ranges of 10 to 600 cfm for dust and cigarette smoke and 25 to 450 cfm for pollen. Given that DOE is proposing to reference the AHAM industry standards for the DOE air cleaner test procedure, including the pollen CADR test, DOE requests comment on whether it should also specify that the acceptable pollen CADR range from AHAM AC–1–2020 applies for measurements of pollen CADR. Specifically, DOE would consider specifying that the pollen CADR test is applicable for conventional room air cleaners with pollen CADR between 25 and 450 cfm.

Because this test is currently specified in the ENERGY STAR V. 2.0 Specification, DOE expects it would minimally increase test burden compared to the tests required for smoke CADR and dust CADR. While DOE is proposing to include only a pollen CADR test, it requests comment on whether it should also include an active mode power measurement associated with the pollen CADR test and specify a pollen CADR/W metric. If a pollen CADR/W metric is considered, DOE also welcomes comment on whether this measurement should be based only on active mode power consumption or if it should be calculated in a similar manner to the IEF metric, using energy consumption in both active mode and standby mode as opposed to active mode power.

DOE requests comment on its proposal to reference Section 7 of

[29] Asthma and Allergy Foundation of America. Allergy Facts and Figures. *www.aafa.org/allergy-facts/*.

AHAM AC–1–2020 for the pollen CADR measurement test.

DOE requests comment and data on the relationship between the pollen CADR measurement and the energy use of the air cleaner.

DOE requests comment on whether it should reference Section 2 of AHAM AC–1–2020, which specifies that the standard is applicable for air cleaners with pollen CADR of 25 to 450 cfm, for pollen CADR testing.

DOE also requests comment on whether it should specify measurement of active mode power consumption when conducting the pollen CADR measurement test.

DOE requests comment on whether it should consider specifying a pollen CADR/W metric and whether such a metric should be based on active mode power consumption or include energy consumption in both active mode and standby mode.

7. Consumer Use Hours

In the January 2022 RFI, DOE requested comment on consumer usage of air cleaners, in particular, the amount of time spent in active mode, standby mode, and off mode. 87 FR 3702, 3710. DOE requested comment on its example approach of defining an integrated CADR/W metric, in which the denominator would represent a weighted average of the power consumption associated with active mode, standby mode, and off mode, weighted by the amount of time spent in each mode. *Id.*

In response to the January 2022 RFI, Blueair supported the use of the active mode and standby mode hours specified in ENERGY STAR V. 2.0 Specification, which assumes 16 active mode hours per day and 8 inactive mode hours per day, to calculate the annual energy consumption of qualifying air cleaners. (Blueair, No. 11 at p. 3) Daikin commented that DOE's assumption that an air cleaner runs at 100-percent capacity for 16 hours a day is flawed and asserted that most air cleaners currently on the market are recommended by the manufacturer to operate in automatic mode, which runs the unit at 100-percent capacity only when indoor air quality drops. (Daikin, No. 13 at pp. 2–3) The CA IOUs presented data from a survey conducted by Evergreen Economics, which indicated a wide range of active mode operating hours: 23 percent of respondents reported operating their air cleaners all day (*i.e.,* 24 hours), while 53 percent of respondents reported operating their air cleaners for 6 hours or fewer each day. The CA IOUs further stated that DOE should consider the prevalence of automatic mode and the time spent in each mode when determining appropriate weighting factors. (CA IOUs, No. 10 at p. 8)

AHAM AC–7–2022 Draft Section 5.7.4 specifies the calculation for E_{active}, which is used to convert the power consumption measurement to an energy consumption value. To calculate E_{active}, AHAM AC–7–2022 Draft estimates that an air cleaner spends 5,840 annual hours in active mode, which is equivalent to 16 hours per day.

DOE is proposing to align with the estimated active mode annual hours specified in AHAM AC–7–2022 Draft (corresponding to 16 hours per day) and consistent with the ENERGY STAR V. 2.0 specification. As discussed, the informative note in Section 1 of AHAM AC–7–2022 Draft acknowledges that not all consumers will operate their air cleaner at maximum speed or conditions all the time. For the reasons discussed in section III.F.3 of this document, DOE has tentatively determined, in accordance with AHAM AC–7–2022 Draft, that the most consistent measurement for all air cleaners is to test in the maximum performance mode and is proposing to allocate the same active mode annual hours in the proposed new appendix FF as in AHAM AC–7–2022 Draft. DOE is aware that the AHAM task force is initiating an effort to develop test methods for automatic mode. DOE will continue to participate in this effort and may consider any such method, including any associated active mode annual hours, in a future test procedure rulemaking.

DOE requests comment on its proposal to reference Section 5.7.4 of AHAM AC–7–2022 Draft, which specifies the calculation of active mode energy consumption using an estimated 5,840 hours per year in active mode.

G. Standby Mode Testing

In the January 2022 RFI, DOE requested comment on the suitability of the standby power measurement procedure specified in AHAM AC–1–2020, IEC 62301 Ed. 2.0, or any other test method for measuring standby mode and off mode energy use of air cleaners, in light of EPCA's requirement in 42 U.S.C. 6295(gg)(2)(A) for DOE to consider the most current version of IEC Standard 62301. 87 FR 3702, 3709.

The CA IOUs commented that DOE should test standby power in the as-shipped condition, with any manufacturer's recommended settings for normal use enabled. (CA IOUs, No. 10 at p. 8) As discussed further in this section, DOE is proposing to reference the relevant sections of AHAM AC–7–2022 Draft pertaining to the standby power measurement, which includes the specification that standby power be tested in the as-shipped condition.

Synexis commented that a standby mode power test may provide baseline energy use data, but maximum energy utilization would occur when the air cleaner is operating, and that many air cleaners are intended to operate continuously. (Synexis, No. 9 at p. 3) Synexis further commented that if standby mode power is tested, the test time period would need to be 24 hours to provide meaningful results. (Synexis, No. 9 at p. 5) DOE has initially determined based on stakeholder comments and a review of existing test standards that testing an air cleaner in standby mode would be representative of average use. Further, as noted in section III.F.7 of this document, DOE is proposing to align with the estimated active mode annual hours specified in AHAM AC–7–2022 Draft (corresponding to 16 hours per day). AHAM AC–7–2022 Draft additionally estimates the remaining hours in a day are spent in standby mode (*i.e.,* 8 hours per day in standby mode). DOE is proposing to align with the estimated standby mode annual hours specified in AHAM AC–7–2022 Draft. DOE additionally notes that IEC 63201 Ed. 2.0, which EPCA requires to be considered by DOE, specifies a maximum duration of 3 hours for standby mode testing. DOE specifies use of IEC 63201 Ed. 2.0 for measuring the standby power of numerous other consumer products and finds the procedure to be suitable for providing a repeatable, reproducible, and representative measure of standby power. Based on successful application of IEC 63201 Ed. 2.0 for other consumer products, DOE tentatively concludes that requiring a 24-hour time period for measuring standby power would be unduly burdensome.

DOE notes that while the January 2022 RFI requested comment on the use of AHAM AC–1–2020 or IEC 62301 Ed. 2.0, AHAM AC–7–2022 Draft references IEC 62301 Ed. 2.0 for conducting standby mode tests. Section 6 of AHAM AC–7–2022 Draft defines the setup and procedures to measure air cleaner standby mode power consumption. DOE proposes to incorporate by reference all subsections of Section 6 of AHAM AC–7–2022 Draft, which establish conditions of measurement, preparation of the air cleaner model for testing, test procedure, test results, and the annual combined low power mode energy consumption calculations.

Section 6.3 of AHAM AC–7–2022 Draft references Section 5.3 of IEC 62301 Ed. 2.0 for the procedure to

measure standby mode power. Sections 6.4.1 and 6.4.2 of AHAM AC–7–2022 Draft define measurements for inactive mode power, P^{IA}, and off mode power, P^{OM}, respectively. DOE proposes to reference Section 6.4 of AHAM AC–7–2022 Draft.

Section 6.5 of AHAM AC–7–2022 Draft defines an annual combined low power mode energy consumption calculation based on P^{IA} and P^{OM} as follows:

$E^{TLP} = \{P_{IA} \times S_{IA} + P_{OM} \times S_{OM}\} \times K$

where:

P^{IA} = air cleaner inactive mode power, in W, for air cleaners capable of operating in inactive mode; otherwise, $P^{IA} = 0$,

P^{OM} = air cleaner off mode power, in W, for air cleaners capable of operating in off mode; otherwise, $P^{OM} = 0$,

S_{IA} = annual hours in inactive mode and defined as S_{LP} if no off mode is possible, [S^{LP}/2] if both inactive mode and off mode are possible, and 0 if no inactive mode is possible,

S^{OM} = annual hours in off mode and defined as LP^{LP} if no inactive mode is possible, [S^{LP}/2] if both inactive mode and off mode are possible, and 0 if no off mode is possible,

K = 0.001 kWh/Wh conversion factor for Wh to kWh.

S^{LP} = 2,920 air cleaner inactive mode annual hours

Consistent with the active mode energy consumption calculation, AHAM AC–7–2022 Draft specifies 2,920 annual hours in standby mode, which is equivalent to 8 hours per day and is consistent with the estimated standby mode hours specified in the ENERGY STAR V. 2.0 Specification. Accordingly, DOE proposes to reference these requirements for standby mode.

DOE requests feedback on its proposal to reference Section 6 of AHAM AC–7–2022 Draft to determine annual combined low power mode energy consumption.

H. Integrated Energy Factor Metric

In the January 2022 RFI, DOE requested comment on the technical feasibility of integrating measures of standby mode and off mode energy consumption into the overall energy efficiency metric (*i.e.,* creating an integrated metric) for air cleaners. 87 FR 3702, 3710. In particular, DOE requested comment on its example approach of defining an integrated CADR/W metric, in which the denominator would represent a weighted average of the power consumption associated with active mode, standby mode, and off mode, weighted by the amount of time spent in each mode. *Id.*

The Joint Commenters stated that it is technically feasible to integrate standby mode and off mode energy consumption into the overall energy efficiency metric and intend to propose a method to do so in the future. (Joint Commenters, No. 8 at p. 4)

Blueair commented that CADR/W was the appropriate metric to determine air cleaner efficiency as a function of the unit's performance output. (Blueair, No. 11 at pp. 2–4) Trane commented that the integrated CADR/W metric is appropriate and stated that additional metrics should be considered as well, such as noise thresholds to avoid occupant space disruption and lack of use. (Trane, No. 3 at p. 2) DOE is aware that noise and noise reduction is an important representation for air cleaners; however, DOE has initially determined that noise is unrelated to energy consumption and is therefore not a suitable performance metric for DOE's test procedure.

Synexis stated that CADR/W would not be an effective metric for air cleaners that do not utilize filtration (*e.g.,* air cleaners that destroy microorganisms or particulates) and commented that a metric expressed in square feet per watt would be more representative. (Synexis, No. 9 at p. 6) Synexis also commented that a systemic approach, which accounts for a device's power use, capacity, and environment in which the device is working to improve air quality, should be adopted to evaluate air cleaners. (*Id.* at p. 7)

The CA IOUs commented that an integrated performance metric that appropriately allocates active, standby, and off mode operating hours should be implemented for air cleaners and that it is technically feasible to integrate measures of standby and off mode energy consumption into an overall performance metric for air cleaners. The CA IOUs further commented that DOE should review survey information when allocating hours to active mode and standby modes for the calculation of an IEF. (CA IOUs, No. 10 at p. 8)

DOE's analysis shows that it is technically feasible to integrate active mode and standby mode energy consumption into an overall performance metric for air cleaners. Specifically, active mode and standby mode power consumption can be combined into the AEC metric using the respective estimated annual usage hours. Further, to express air cleaner performance as a function of its power use, DOE's analysis shows that an integrated metric, such as IEF, is technically feasible. This approach is similar to other DOE test procedures, such as room air conditioners and dehumidifiers, which specify a metric that is expressed as space conditioning function provided per unit power. DOE additionally notes that all products included in the scope of the proposed test procedure are those that could remove, destroy, and/or deactivate particulates. Accordingly, a CADR/W metric is appropriate. Additionally, DOE is proposing to include a calculation for representation of room size, in square feet, as discussed in section III.I of this document.

DOE proposes to incorporate by reference Section 7 of AHAM AC–7–2022 Draft, which provides a calculation to determine AEC and IEF for air cleaners as follows:

$$AEC = E_{active} + E_{TLP}$$

$$IEF = \left[\frac{CADR\left(\frac{ft^3}{min}\right)}{\left(AEC\left(\frac{kWh}{year}\right) * \frac{1\ year}{5{,}840\ hours} * \frac{1000\ Wh}{1\ kWh}\right)}\right]$$

where,

$CADR = PM_{2.5}$ Clean air delivery rate from the combined smoke and dust test [cfm]
E_{active} = air cleaner active mode test energy consumption (in kWh per year).
E_{TLP} = low power mode annual energy consumption (expressed in kWh per year).

DOE requests comment on its proposal to reference Section 7 of AHAM AC–7–2022 Draft for the AEC and IEF calculations. Should AHAM AC–7–2022 Draft specify a different method to calculate AEC and/or IEF, DOE requests comment on the new methodology, the reasons for adopting this new methodology, and the impact, if any, of using the new methodology compared to the equations proposed in this document.

I. Representations

DOE is aware that air cleaner manufacturers typically include several representations in marketing materials for their air cleaner models (*e.g.,* smoke CADR, dust CADR, pollen CADR, CADR/W, room size, *etc.*) DOE has observed that room size is represented in different ways among various models and different values of suitable room sizes may be specified even for the same model. As an illustrative example, DOE identified a model that is marketed for a large room up to 912 square feet, when completing one air change per hour and taking up to 60 minutes to clean air, while the same air cleaner is also represented as being suitable for a room size of 190 square feet with 4.8 air changes per hour and taking about 12.5 minutes to clean air. Further, this unit is rated in the AHAM Verifide [30] program as being applicable for a room size of 190 square feet. It is unlikely that the acceptable room size for an air cleaner of a given capacity can be increased proportionally, potentially to infinity, in such a manner, without having an impact on the cleaning performance of the air cleaner.

Room size would strongly impact the capacity of the air cleaner that would be required to clean the air in the desired room. For instance, if the air cleaner is too small compared to the size of the room it is being used in, it will be ineffective, thus providing low efficiency. Conversely, if an air cleaner is too big for the room that it is operated in, it will clean the air very quickly and still continue operating, leading to wasted energy use. Therefore, it is important that an air cleaner be selected such that its capacity (expressed in terms of its CADR) is appropriate for the size of the room that it is intended to be used in. Additionally, for any air cleaner, the represented values of CADR and IEF are inherently a function of the room size that the unit is expected to operate in; *i.e.,* the represented CADR value is inherently a function of the test chamber size, number of air exchanges provided, and the initial concentration of the contaminant. Accordingly, DOE considers room size an important metric that must be represented accurately and consistently to provide meaningful information to consumers.

Section 8.6 and Annex E of AHAM AC–1–2020 specify a calculation for the effective room size based on standard construction criteria for rooms and a history of the natural decay rate of small particles as determined for cigarette smoke. Specifically, the room size calculation is based on the ability of the air cleaner to reduce the concentration of particles, expressed in CADR, in a room at steady-state to a new steady-state concentration that is 80 percent less than the original when the air cleaner is operating. The calculation includes additional assumptions such as a mixing factor equal to 1.0, an air exchange rate of 1 per hour, a cigarette smoke particle natural decay equal to the average background natural decay (from statistical study), a ceiling height of 8 ft, and a cigarette smoke particle generation or influx rate such that a cigarette smoke particle concentration of 1 is maintained at the initial steady state. Based on its estimations, AHAM AC–1–2020 specifies that the effective room size, in square feet, that can be serviced by an air cleaner is 1.55 times the smoke CADR value of the air cleaner.

DOE is proposing to include this calculation as a represented value for room size. Specifically, DOE is proposing to include in 10 CFR 429.67 that the effective room size be calculated as the product of 1.55 and the basic model's represented value of smoke CADR. DOE further proposes that this represented value of effective room size, in square feet, be rounded to the nearest whole number.

While DOE is proposing to align with AHAM AC–1–2020 to specify that the effective room size be calculated from smoke CADR, DOE welcomes comment on if it should consider using $PM_{2.5}$ CADR, or a different CADR value, instead.

DOE requests comment on its proposal to include a calculation from AHAM AC–1–2020 for the effective room size that can be serviced by an air cleaner. DOE requests comment on whether it is appropriate to use smoke CADR as the metric to calculate effective room size or if it should be based on $PM_{2.5}$ CADR instead. If stakeholders indicate the use of $PM_{2.5}$ CADR, DOE requests comment on whether multiplying $PM_{2.5}$ CADR by 1.55 to determine effective room size in square feet is appropriate or if a different constant would need to be used instead.

J. Sampling Plan

DOE is proposing the following sampling plan and rounding requirements applicable to any representations of energy consumption or energy efficiency of air cleaners. The sampling requirements would be included in the proposed 10 CFR 429.67. Specifically, DOE is proposing that the general sampling requirements of 10 CFR 429.11 for selecting units to be tested be applicable to air cleaners. In addition, DOE is proposing that for each air cleaner basic model, a sufficient sample size must be randomly selected to ensure that a representative value of energy consumption for a basic model is greater than or equal to the higher of the mean of the sample or upper 95 percent confidence limit (''UCL'') of the true mean divided by 1.10. For IEF or other measure of energy consumption where a higher value is preferable to the consumer, the representative value shall be less than or equal to the lower of the mean of the sample or the lower 95 percent confidence limit (''LCL'') of the true mean divided by 0.90. The mean, UCL, and LCL are calculated as follows:

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

$$UCL = \bar{x} + t_{0.95}\left(\frac{s}{\sqrt{n}}\right)$$

$$LCL = \bar{x} - t_{0.95}\left(\frac{s}{\sqrt{n}}\right)$$

Where:
$\bar{x}$ is the sample mean;
n is the number of units in the test sample;
x_i is the ith sample;
s is the sample standard deviation; and
$t_{0.95}$ is the t statistic for a 95 percent one-tailed confidence interval with n–1 degrees of freedom.

This proposed sampling plan for air cleaners is consistent with sampling plans already established for portable

[30] AHAM Verifide. *https://ahamverifide.org/directory-of-air-cleaners/.*

air conditioners,[31] dehumidifiers [32] and other similar products that are portable and/or provide space conditioning functionality.

DOE also proposes that all calculations be performed with the unrounded measured values, and that representations of pollen CADR, smoke CADR, dust CADR, and $PM_{2.5}$ CADR values of a basic model be calculated as the mean of the CADR for each tested unit of the basic model, rounded to the nearest whole number. DOE further proposes that AEC be rounded to the nearest 0.1 kWh/year and the IEF be rounded to the nearest 0.1 CADR/W. As noted previously, DOE also proposed that the effective room size be rounded to the nearest whole number. DOE notes that these rounding instructions would be included in the proposed sampling plan for air cleaners.

As discussed, manufacturers would not be required to test according to the DOE test procedure until such time as compliance is required with energy conservation standards for air cleaners, should DOE establish such standards. Were DOE to establish test procedures as proposed, manufacturers choosing to make voluntary representations would be required to test the subject air cleaner according to the established test procedure, and any such representations would have to fairly disclose the results of such testing.

DOE is not proposing any certification or reporting requirements for air cleaners at this time. DOE will propose certification requirements through a separate rulemaking in the future.

DOE seeks comment on the proposed sampling plan and rounding requirements for smoke CADR, dust CADR, $PM_{2.5}$ CADR, AEC, and IEF.

K. Test Procedure Costs and Harmonization

1. Test Procedure Costs and Impact

EPCA requires that test procedures proposed by DOE not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) DOE proposes to reference industry standards AHAM AC–7–2022 Draft, AHAM AC–1–2020, and IEC 62301 Ed. 2.0 to measure pollen CADR, smoke CADR, dust CADR, and active mode and standby mode power consumption. DOE also proposes to use these measured values to calculate $PM_{2.5}$ CADR, AEC, and IEF as specified in AHAM AC–7–2022 Draft and effective room size as specified in AHAM AC–1–2020. The following paragraphs discuss DOE's evaluation of estimated costs associated with this proposal.

Based on quotes from third-party laboratories, DOE estimates average testing costs to be approximately $3,000 to test one unit according to AHAM AC–1–2020 at such a laboratory. These costs would include the tests to determine pollen CADR, smoke CADR, dust CADR, active mode power, and standby mode power. DOE typically requires at least two units to be tested for each basic model. Therefore, DOE estimates that manufacturers would incur testing costs of approximately $6,000 per basic model (because of the minimum sample size of two units, as specified in 10 CFR 429.11(b)).

DOE requests comment on its initial determination of the costs for testing according to the proposed new air cleaner test procedure. DOE also requests comment on the potential impact to manufacturers from the proposed new air cleaner test procedure.

2. Harmonization With Industry Standards

DOE's established practice is to adopt relevant industry standards as DOE test procedures unless such methodology would be unduly burdensome to conduct or would not produce test results that reflect the energy efficiency, energy use, water use (as specified in EPCA) or estimated operating costs of that product during a representative average use cycle or period of use. Section 8 of appendix A of 10 CFR part 430 subpart C. In cases where the industry standard does not meet EPCA statutory criteria for test procedures, DOE will make modifications through the rulemaking process to these standards as the DOE test procedure.

The test procedure for air cleaners at the proposed new appendix FF references AHAM AC–7–2022 Draft, which specifies the methods of measurement for active mode power consumption of conventional room air cleaners, and IEC 62301 Ed. 2.0, which is referenced in AHAM AC–7–2022 Draft for the measurement of standby mode power consumption. Proposed new appendix FF also references AHAM AC–1–2020, which specifies the methods to determine smoke CADR and dust CADR and is also referenced in AHAM AC–7–2022 Draft to specify the test chamber setup requirements. AHAM AC–7–2022 Draft specifies definitions, test setup, instrumentation, test methods for the measurement of active mode and standby mode power consumption, and calculation of AEC and IEF. The industry standards DOE proposes to incorporate by reference are discussed in further detail in section IV.N of this document.

DOE requests comments on the benefits and burdens of referencing the identified industry standards in the proposed new test procedure for air cleaners.

L. Compliance Date

EPCA prescribes that, if DOE amends a test procedure, all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with that amended test procedure, beginning 180 days after publication of such a test procedure final rule in the **Federal Register**. (42 U.S.C. 6293(c)(2))

If DOE were to publish a test procedure, 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 and 13563

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), 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

[31] 10 CFR 429.62.

[32] 10 CFR 429.36.

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 proposed 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 proposed 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 an initial regulatory flexibility analysis (''IRFA'') for any rule that by law must be proposed 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 proposed rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003.

The following sections detail DOE's IRFA for this test procedure rulemaking.

1. Description of Why Action is Being Considered

Currently, no energy conservation standards or test procedures are prescribed by DOE for air cleaners. On July 15, 2022, DOE published the July 2022 Final Determination in which it determined that air cleaners qualify as a ''covered product'' under EPCA. 87 FR 42297. DOE determined in the July 2022 Final Determination that coverage of air cleaners is necessary or appropriate to carry out the purposes of EPCA. Accordingly, air cleaners are included in the list of ''covered products'' for which DOE is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6292)(a)(20)) In this NOPR, DOE proposes to establish a new test procedure for air cleaners that would include methods to (1) measure the performance of the covered product and (2) use the measured results to calculate an IEF to represent the energy efficiency of an air cleaner.

2. Objective of, and Legal Basis for, Rule

EPCA, authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part B [33] of EPCA established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency for certain products, referred to as ''covered products.'' [34] In addition to specifying a list of consumer products that are covered products, EPCA contains provisions that enable the Secretary of Energy to classify additional types of consumer products as covered products.

3. Description and Estimate of Small Entities Regulated

DOE uses the Small Business Administration (''SBA'') small business size standards to determine whether manufacturers qualify as ''small businesses,'' which are listed by the North American Industry Classification System (''NAICS''). The SBA considers a business entity to be a small business if, together with its affiliates, it employs less than a threshold number of workers specific in 13 CFR part 121.

Air cleaner manufacturers, who produce the products covered by this rulemaking, are classified under NAICS code 335210: ''Small Electrical Appliance Manufacturing.'' The SBA sets a threshold of 1,500 employees or fewer for an entity to be considered a small business for this category.[35] This employee threshold includes all employees in a business's parent company and any other subsidiaries.

DOE conducted a focused inquiry into small business manufacturers of the products covered by this rulemaking. DOE reviewed AHAM's database of Certified Room Air Cleaners,[36] ENERGY STAR's data set of Certified Air Purifiers (Cleaners),[37] and retailer websites to create a list of companies that manufacture or import the products covered by this proposal. DOE then consulted other publicly available data, such as manufacturer specifications and product literature, import/export logs (*e.g.,* bills of lading from Panjiva,) [38] and model numbers, to identify original equipment manufacturers (''OEMs'') of the products covered by this proposed rulemaking. DOE further relied on public sources and subscription-based market research tools (*e.g.,* Dun & Bradstreet reports) [39] to determine company location, headcount, and annual revenue. DOE screened out companies that do not offer products covered by this proposed rulemaking, do not meet the SBA's definition of a ''small business,'' or are foreign-owned and operated.

DOE initially identified 31 OEMs offering covered air cleaners for the U.S. market. Of the 31 OEMs identified, DOE estimates that five qualify as small domestic OEMs.

4. Description and Estimate of Compliance Requirements

In this NOPR, DOE proposes to establish a new test procedure for air cleaners at appendix FF. DOE proposes to incorporate by reference in part 430 the industry standards AHAM AC–7–2022 Draft, AHAM AC–1–2020, and IEC 62301 Ed. 2.0. Specifically, DOE proposes to specify the following provisions from within the referenced industry standards:

(1) From AHAM AC–7–2022 Draft, the following items:

(a) Definition of ''conventional room air cleaners'' in 10 CFR 430.2, which would be used to specify the scope of the air cleaners test procedure in the proposed new appendix FF;

(b) Definitions of terms that are relevant to the test procedure;

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

[34] The enumerated list of covered products is at 42 U.S.C. 6292(a)(1)–(19).

[35] U.S. Small Business Administration. Table of Size Standards (Effective July 14, 2022). Available at: *www.sba.gov/document/support-table-size-standards* (Last accessed September 1, 2022).

[36] Association of Home Appliance Manufacturers. *Certified Room Air Cleaners.* Available at: *www.ahamdir.com/room-air-cleaners/* (Last accessed January 24, 2022).

[37] Energy Star. *ENERGY STAR Certified Air Purifiers (Cleaners).* Available at: *www.energystar.gov/productfinder/product/certified-room-air-cleaners/results* (Last accessed May 31, 2022).

[38] Panjiva Supply Chain Intelligence is available at: *panjiva.com/import-export/United-States.* (Last accessed July 8, 2022).

[39] The Dun & Bradstreet Hoovers subscription login is available online at: *app.dnbhoovers.com/.* (Last accessed July 8, 2022).

(c) Test setup requirements for electrical supply and test chamber, which additionally include a reference to AHAM AC–1–2020;

(d) Instrumentation requirements for power measuring instruments and temperature and relative humidity measuring devices;

(e) Active mode and standby mode power measurements; the standby mode power measurement method additionally includes a reference to IEC 62301 Ed. 2.0 for the test conduct; and

(f) Calculations for $PM_{2.5}$ CADR, AEC, and IEF.

(2) From AHAM AC–1–2020, test methods for determining the pollen CADR, smoke CADR, and dust CADR, calculation of effective room size, and test chamber construction and equipment.

This NOPR also proposes requirements regarding the sampling plan and representations for air cleaners at 10 CFR 429.67. DOE also proposes rounding requirements for the measured and calculated values of the air cleaners test procedure.

Were the proposed test procedure and associated provisions made final, manufacturers would not be required to test according to the DOE test procedure until such time as compliance is required with energy conservation standards for air cleaners, should DOE establish such standards. Were DOE to establish test procedures as proposed, manufacturers choosing to make voluntary representations would be required to test covered air cleaners according to the established test procedure, and any such representations would have to fairly disclose the results of such testing.

Air cleaner manufacturers, including small manufacturers, would not be required to test according to the proposed test procedure (other than making voluntary representations of energy consumption) until the compliance date of any energy conservation standards for products in these categories. As detailed in section III.K.1 of this document, DOE estimated that it would cost approximately $3,000 to test one unit of a basic model to obtain all the necessary measurements proposed in this document.[40] DOE typically requires at least two units to be tested for each basic model. Therefore, DOE estimates that manufacturers would incur testing costs of approximately $6,000 per basic model, should DOE establish the test procedure as proposed and establish energy conservation standards for air cleaners.

As previously discussed, DOE initially identified five domestic OEMs that qualify as ''small businesses.'' Based on a review of publicly available model databases and individual company product catalogues, DOE estimated the number of air cleaners covered by this test procedure proposal for each small business. DOE estimated the number of air cleaners covered by this test procedure proposal for each small business ranges from two unique basic covered models to 10 unique basic covered models, depending on the specific small business. As previously detailed, DOE estimated it would cost air cleaner manufacturers approximately $6,000 per basic model to be tested at a third-party laboratory facility. Therefore, DOE estimated that a small business could incur anywhere from $12,000 to $60,000, should DOE adopt the test procedure as proposed and establish energy conservation standards.

DOE used subscription-based market research tools[41] to estimate the annual revenue for each potential small business. DOE used these annual revenue estimates in addition to the number of air cleaner models covered by this proposal to estimate the potential impact on small businesses, should energy conservation standards be adopted in the future. Table IV.1 displays the potential testing costs these small businesses would incur at the time of compliance of any adopted energy conservation standards. DOE would reassess and incorporate the potential testing burden on small businesses at the NOPR stage of any proposed energy conservation standards for air cleaners.

TABLE IV.1—ESTIMATED POTENTIAL TESTING BURDEN ON SMALL BUSINESSES, BY ANNUAL REVENUE

Small business	Estimated annual revenue ($)	Number of models	One-time testing cost ($)	Testing cost as a percent of annual revenue (%)
Manufacturer A	1,000,000	10	60,000	6.0
Manufacturer B	1,300,000	10	60,000	4.6
Manufacturer C	500,000	2	12,000	2.4
Manufacturer D	3,600,000	5	30,000	0.8
Manufacturer E	19,600,000	4	24,000	0.1

To the extent that air cleaner manufacturers currently make claims regarding the energy consumption of their models, DOE observed that they typically do so in accordance with ENERGY STAR V. 2.0 Specification, which references AHAM AC–1–2020. Manufacturers currently making voluntary representations of air cleaners would be required to test according to the proposed test procedure beginning 180 days after the final rule, should DOE finalize the proposal.

Based on a review of AHAM's database of Certified Room Air Cleaners and ENERGY STAR's data set of Certified Air Purifiers, DOE identified only one small domestic OEM making claims regarding the energy consumption of their air cleaner models. Based on Dun & Bradstreet reports, this small domestic OEM has an estimated annual revenue of approximately $3.6 million. As previously discussed, DOE estimates a per-basic model test cost of $6,000. Therefore, DOE estimates that the potential costs associated with re-testing would be minimal, accounting for approximately 0.5 percent of annual revenue for this small business.[42]

DOE requests comments on its finding that there are five small, domestic OEMs of air cleaners. DOE also requests comment on its findings that costs are small relative to annual revenue for

[40] Approximately $3,000 to test each air cleaner at a third-party laboratory equipped with the test chamber to determine pollen CADR, smoke CADR, dust CADR, active mode power and standby mode power.

[41] The Dun & Bradstreet Hoovers subscription login is available online at: *app.dnbhoovers.com/*. (Last accessed July 8, 2022).

[42] The small domestic OEM currently makes claims regarding the energy consumption of three air cleaner models. (3 × $6,000)/$3.6 million = 0.5% of its annual revenue.

small manufacturers that currently make voluntary representations.

5. Duplication Overlap, and Conflict With Other Rules and Regulations

DOE is not aware of any rules or regulations that duplicate, overlap, or conflict with the proposed rule being considered.

6. Significant Alternatives to the Rule

DOE considered alternative test methods for air cleaners and tentatively determined that there are no better alternatives than the procedures proposed in this NOPR. DOE expects the proposals outlined would have no impact before an amended energy conservation standard is adopted, unless manufacturers make representations regarding energy use or efficiency. DOE examined relevant industry test standards, and the Department incorporated these standards in the proposed test procedure whenever appropriate. Specifically, DOE proposes to incorporate by reference the industry standards AHAM AC–7–2022 Draft, AHAM AC–1–2020, and IEC 62301 Ed. 2.0.

Additionally, manufacturers subject to DOE's energy efficiency standards may apply to DOE's Office of Hearings and Appeals for exception relief under certain circumstances. Manufacturers should refer to 10 CFR part 430, subpart E, and 10 CFR part 1003 for additional details for additional details.

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of covered products 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. (*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 proposing any certification or reporting requirements for air cleaners in this NOPR. Instead, DOE may consider proposals to establish certification requirements and reporting for air cleaners under a separate rulemaking regarding appliance and equipment certification. DOE will address changes to OMB Control Number 1910–1400 at that time, as necessary.

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 NOPR, DOE proposes a new test procedure that it expects will be used to develop and implement future energy conservation standards for air cleaners. 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 (Aug. 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 has examined this proposed rule and has determined that it would 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 proposed 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 (Feb. 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, the proposed 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. Public Law 104–4, sec. 201 (codified at 2 U.S.C. 1531). For a

proposed regulatory action likely to result 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 proposed 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. 105–277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This proposed rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

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 proposed regulation would 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 proposed 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 proposed significant energy action. A ''significant energy action'' is defined as any action by an agency that promulgated 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 (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

The proposed regulatory action to establish a test procedure for measuring the energy efficiency of air cleaners 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 proposed test procedure for air cleaners would incorporate testing methods contained in certain sections of the following commercial standards: AHAM AC–7–2022 Draft, AHAM AC–1–2020, and IEC 62301 Ed. 2.0. DOE has evaluated these standards and is unable to conclude whether they fully comply with the requirements of section 32(b) of the FEAA (*i.e.,* whether it was developed in a manner that fully provides for public participation, comment, and review.) DOE will consult with both the Attorney General and the Chairman of the FTC concerning the impact of these test procedures on competition, prior to prescribing a final rule.

M. Description of Materials Incorporated by Reference

AHAM AC–7–2022 Draft is a voluntary industry-accepted test procedure that measures active mode and standby mode power consumption of air cleaners. The proposed test procedure in this NOPR generally references AHAM AC–7–2022 Draft including provisions for: definitions, test conditions, instrumentation, active mode and standby mode power measurement, and calculation of $PM_{2.5}$ CADR, AEC, and IEF.

AHAM AC–1–2020 is a voluntary industry-accepted test procedure that provides test methods to measure the relative reduction of particulate matter, including smoke and dust, suspended in the air in a specified test chamber when an air cleaner is in operation. The proposed test procedure in this NOPR generally references Sections 5 and 6 of AHAM AC–1–2020 to determine the smoke and dust CADR of the air cleaner test unit. AHAM AC–1–2020 is also

referenced in several sections of AHAM AC–7–2022 Draft that DOE proposes to reference in its test procedure.

These standards are reasonably available from AHAM (*www.aham.org/AHAM/AuxStore*).

IEC 62301 Ed. 2.0 is an international standard that specifies methods of measurement of electrical power consumption of household appliances in standby mode(s) and other low power modes, as applicable. The proposed new appendix FF references AHAM AC–7–2022 Draft, to specify the standby mode power consumption test method, which further references IEC 62301 Ed. 2.0 for the measurement of air cleaners standby power consumption. IEC 62301 Ed. 2.0 is reasonably available from IEC (*webstore.ansi.org*).

ASTM E741–11(2017) specifies techniques using tracer gas dilution for determining a single zone's air change with the outdoors, as induced by weather conditions and by mechanical ventilation. The proposed new appendix FF references AHAM AC–7–2022 Draft to specify the test chamber air exchange rate, which further references ASTM E741–11(2017) as the method to measure test chamber air exchange rate. ASTM E741–11(2017) is reasonably available from ASTM (*www.astm.org*).

V. Public Participation

A. Participation in the Webinar

The time and date of the webinar meeting are listed in the **DATES** section at the beginning of this document. If no participants register for the webinar, it will be cancelled. Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's website: *www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=77&action=viewlive.* Participants are responsible for ensuring their systems are compatible with the webinar software.

B. Procedure for Submitting Prepared General Statements for Distribution

Any person who has an interest in the topics addressed in this document, or who is representative of a group or class of persons that has an interest in these issues, may request an opportunity to make an oral presentation at the webinar. Such persons may submit requests to speak by email to: *ApplianceStandardsQuestions@ee.doe.gov.* Persons who wish to speak should include with their request a computer file in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format that briefly describes the nature of their interest in this rulemaking and the topics they wish to discuss. Such persons should also provide a daytime telephone number where they can be reached.

DOE requests persons selected to make an oral presentation to submit an advance copy of their statements at least two weeks before the webinar. At its discretion, DOE may permit persons who cannot supply an advance copy of their statement to participate, if those persons have made advance alternative arrangements with the Building Technologies Office. As necessary, requests to give an oral presentation should ask for such alternative arrangements.

C. Conduct of the Webinar

DOE will designate a DOE official to preside at the webinar and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with section 336 of EPCA (42 U.S.C. 6306). A court reporter will be present to record the proceedings and prepare a transcript. DOE reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the webinar. There shall not be discussion of proprietary information, costs or prices, market share, or other commercial matters regulated by U.S. anti-trust laws. After the webinar and until the end of the comment period, interested parties may submit further comments on the proceedings and any aspect of the rulemaking.

The webinar will be conducted in an informal, conference style. DOE will provide a general overview of the topics addressed in this rulemaking, allow time for prepared general statements by participants, and encourage all interested parties to share their views on issues affecting this rulemaking. Each participant will be allowed to make a general statement (within time limits determined by DOE), before the discussion of specific topics. DOE will permit, as time permits, other participants to comment briefly on any general statements.

At the end of all prepared statements on a topic, DOE will permit participants to clarify their statements briefly. Participants should be prepared to answer questions by DOE and by other participants concerning these issues. DOE representatives may also ask questions of participants concerning other matters relevant to this proposed rulemaking. The official conducting the webinar/public meeting will accept additional comments or questions from those attending, as time permits. The presiding official will announce any further procedural rules or modification of the above procedures that may be needed for the proper conduct of the webinar.

A transcript of the webinar will be included in the docket, which can be viewed as described in the *Docket* section at the beginning of this document and will be accessible on the DOE website. In addition, any person may buy a copy of the transcript from the transcribing reporter.

D. Submission of Comments

DOE will accept comments, data, and information regarding this proposed rule before or after the public meeting, but no later than the date provided in the **DATES** section at the beginning of this proposed rule.[43] Interested parties may submit comments, data, and other information using any of the methods described in the **ADDRESSES** section at the beginning of this document.

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

[43] DOE has historically provided a 75-day comment period for test procedure NOPRs pursuant to the North American Free Trade Agreement, U.S.-Canada-Mexico (''NAFTA''), Dec. 17, 1992, 32 I.L.M. 289 (1993); the North American Free Trade Agreement Implementation Act, Public Law 103–182, 107 Stat. 2057 (1993) (codified as amended at 10 U.S.C.A. 2576) (1993) (''NAFTA Implementation Act''); and Executive Order 12889, ''Implementation of the North American Free Trade Agreement,'' 58 FR 69681 (Dec. 30, 1993). However, on July 1, 2020, the Agreement between the United States of America, the United Mexican States, and the United Canadian States (''USMCA''), Nov. 30, 2018, 134 Stat. 11 (*i.e.,* the successor to NAFTA), went into effect, and Congress's action in replacing NAFTA through the USMCA Implementation Act, 19 U.S.C. 4501 *et seq.* (2020), implies the repeal of E.O. 12889 and its 75-day comment period requirement for technical regulations. Thus, the controlling laws are EPCA and the USMCA Implementation Act. Consistent with EPCA's public comment period requirements for consumer products, the USMCA only requires a minimum comment period of 60 days. Consequently, DOE now provides a 60-day public comment period for test procedure NOPRs.

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

Do not submit to *www.regulations.gov* information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information (''CBI'')). Comments submitted through *www.regulations.gov* cannot be claimed as CBI. Comments received through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

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

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Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via postal mail or hand delivery/courier, please provide all items on a CD, if feasible, in which case it is not necessary to submit printed copies. No telefacsimiles (''faxes'') will be accepted.

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

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

Confidential Business Information. Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email two well-marked copies: one copy of the document marked ''confidential'' including all the information believed to be confidential, and one copy of the document marked ''non-confidential'' with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

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

E. Issues on Which DOE Seeks Comment

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

(1) DOE requests comment on its proposal to define the scope of the proposed air cleaner test procedure as those air cleaners that meet the definition of a conventional room air cleaner as defined in Section 2.1.1 of AHAM AC–7–2022 Draft.

(2) DOE requests comment on its proposal to reference Sections 2.1.1, 2.1.3.1, and 2.1.3.2 of AHAM AC–7–2022 Draft in 10 CFR 430.2 for the definitions of conventional room air cleaner, portable conventional room air cleaner, and fixed conventional room air cleaner, respectively.

(3) DOE requests comment on whether it should reference Section 2 of AHAM AC–1–2020, which specifies that the standard is applicable for air cleaners only within rated CADR ranges of 10 to 600 cfm for dust and cigarette smoke. Additionally, DOE requests comment on whether this CADR range should be specified for $PM_{2.5}$ CADR instead of for dust CADR and smoke CADR.

(4) DOE requests comment on its proposal to adopt the substantive provisions of AHAM AC–7–2022 Draft with certain modifications.

(5) DOE requests comment on its proposal to incorporate by reference AHAM AC–1–2020, which is referenced in AHAM AC–7–2022 Draft, as well as to specify provisions related to the measurement of pollen CADR, smoke CADR, and dust CADR.

(6) DOE also requests comment on whether it should consider specifying that KCl is an allowable alternate to cigarette smoke in the measurement of smoke CADR, even if AHAM AC–1–2022 Draft is not published by the time DOE publishes its final rule. DOE requests data and information on the implications of using cigarette smoke and KCl interchangeably when performing air cleaner performance tests. DOE requests data and information on how a CADR value obtained using KCl compares to the CADR value obtained using cigarette smoke.

(7) DOE requests comment on its proposal to reference IEC 62301 Ed. 2.0, which is referenced in AHAM AC–7–2022 Draft for the instrumentation and testing provisions for measuring standby mode power consumption.

(8) DOE requests comment on its proposal to reference ASTM E741–11(2017), which is referenced in AHAM AC–7–2022 Draft for determining the test chamber air exchange rate.

(9) DOE requests comment on whether the m-CADR value specified in AHAM AC–5–2022 would change, and if so, how, if a different type of microorganism was used for testing from the same general microorganism category (*e.g.,* using MS–2 vs. Phi X 174 for bacteriophage testing).

(10) DOE requests comment on whether measurements taken every 2 minutes for a duration of 10 minutes, as specified in Section 7.3 of AHAM AC–5–2022, is sufficient to determine m-CADR. DOE also requests comment on the duration for which a sample must be collected for each measurement point.

(11) Additionally, if stakeholders indicate that operating the test unit for 10 minutes is sufficient, DOE requests comment on whether the natural decay test should also be conducted for only 10 minutes. DOE also requests comment on whether it is reasonable for the natural decay curve for microorganisms to be increasing during the first 10–15 minutes of the test, and if not, how should DOE mitigate this issue.

(12) DOE requests comment on its proposal to include definitions for the aforementioned terms, via reference to AHAM AC–7–2022 Draft, in the proposed new appendix FF. Should the AHAM task force consider any changes to any of these definitions or include definitions for additional terms that would be relevant to DOE's proposed test procedure, DOE requests comment on such changes and the justification for DOE to consider including them in its test procedure for air cleaners.

(13) DOE requests comment on its proposal to reference Section 3.1 of AHAM AC–7–2022 Draft for the electrical supply requirements for active mode and standby mode power measurement.

(14) DOE requests comment on its proposal to reference Section 3.6.1 of AHAM AC–7–2022 Draft for the air cleaner conditioning requirements.

(15) DOE requests comment on whether the 48 hour burn-in time for air cleaners with UV lights is sufficient or if the burn-in time duration should be increased.

(16) DOE requests comment on its proposal to reference Section 3.6.2 of AHAM AC–7–2022 Draft, which references Section 4.6 of AHAM AC–1–2020 for the test unit placement instructions.

(17) DOE also requests comment on whether it should consider including the requirement from IEC 63086–1 that specifies that if the placement of the air cleaner is not specified by the manufacturer and the air cleaner's height is less than 28 inches, then the unit must be tested on the table. Specifically, DOE requests comment on whether the language in AHAM AC–7–2022 Draft which states that, ''if the air cleaner is not a floor model'' is clear to follow, without any ambiguity, or whether a quantitative metric such as unit height would be better to ensure consistent test setup.

(18) DOE also requests comment on whether it should include any placement instructions for air cleaners shipped with casters.

(19) DOE requests comment on its proposal to reference Section 3.6.3 of AHAM AC–7–2022 Draft regarding network connection requirements during active mode and standby mode tests. DOE also requests comment on the impact on repeatability and reproducibility when testing air cleaners with network functionality while connected to a network.

(20) DOE requests comment on whether the software update requirements are adequately specified or whether DOE should explicitly state that software updates must always be executed prior to running the tests.

(21) DOE requests comment on its proposal to reference Sections 3.1 to 3.6 of AHAM AC–7–2022 Draft for the test conditions and setup. Should AHAM AC–7–2022 Draft change any of these requirements between publication of this NOPR and publication of the final version of AHAM AC–7–2022, DOE requests comment on these changes, the reasons for these changes, and the impact of these changes on the overall air cleaners test procedure.

(22) DOE requests comment on its proposal to incorporate by reference Section 4 of AHAM AC–7–2022 Draft regarding instrumentation requirements, including the applicable provisions from relevant sections of IEC 62301 Ed. 2.0. Should AHAM AC–7–2022 Draft change any of these requirements between publication of this NOPR and publication of the final version of AHAM AC–7–2022, DOE requests comment on these changes, the reasons for these changes, and the impact of these changes on the overall air cleaner test procedure.

(23) DOE requests comment on the Joint Stakeholders' recommendation of using dust CADR as calculated in Section 6 of AHAM AC–1–2020 as an alternative for calculating $PM_{2.5}$ CADR. DOE also requests comment on its proposal to allow the same alternative for the smoke CADR value used in the $PM_{2.5}$ CADR calculation.

(24) DOE requests feedback on its proposal to incorporate by reference Section 2.9 of AHAM AC–7–2022 Draft to calculate $PM_{2.5}$ CADR based on measurements of smoke CADR and dust CADR. DOE also requests comment on its proposal to allow the use of smoke CADR and dust CADR calculated according to Sections 5 and 6 of AHAM AC–1–2020.

(25) DOE also requests comment on its proposal to reference Sections 5 and 6 of AHAM AC–1–2020 to specify the test methods for determining smoke CADR and dust CADR, respectively.

(26) DOE requests comment on its proposal to reference Section 5.3 of AHAM AC–7–2022 Draft to test units in maximum performance mode.

(27) DOE requests comment on its proposal to reference Sections 5.4 and 5.5 of AHAM AC–7–2022 Draft to specify the configuration of secondary functions and control functions during active mode testing.

(28) DOE requests comment on its proposal to reference Sections 5.7.1 through 5.7.4 of AHAM AC–7–2022 Draft, which specify methods for measuring active mode power at the same time as the smoke or dust CADR test when the test unit is operating within the chamber and measuring the power consumption during a supplemental power test outside of a test chamber, respectively.

(29) DOE requests comment on its proposal to reference Section 7 of AHAM AC–1–2020 for the pollen CADR measurement test.

(30) DOE requests comment and data on the relationship between the pollen CADR measurement and the energy use of the air cleaner.

(31) DOE requests comment on whether it should reference Section 2 of AHAM AC–1–2020, which specifies that the standard is applicable for air cleaners with pollen CADR of 25 to 450 cfm, for pollen CADR testing.

(32) DOE also requests comment on whether it should specify measurement of active mode power consumption when conducting the pollen CADR measurement test.

(33) DOE requests comment on whether it should consider specifying a pollen CADR/W metric and whether such a metric should be based on active mode power consumption or include energy consumption in both active mode and standby mode.

(34) DOE requests comment on its proposal to reference Section 5.7.4 of AHAM AC–7–2022 Draft, which specifies the calculation of active mode energy consumption using an estimated 5,840 hours per year in active mode.

(35) DOE requests feedback on its proposal to reference Section 6 of AHAM AC–7–2022 Draft to determine annual combined low power mode energy consumption.

(36) DOE requests comment on its proposal to reference Section 7 of AHAM AC–7–2022 Draft for the AEC and IEF calculations. Should AHAM AC–7–2022 Draft specify a different method to calculate AEC and/or IEF, DOE requests comment on the new methodology, the reasons for adopting this new methodology, and the impact, if any, of using the new methodology compared to the equations proposed in this document.

(37) DOE requests comment on its proposal to include a calculation from AHAM AC–1–2020 for the effective room size that can be serviced by an air cleaner. DOE requests comment on whether it is appropriate to use smoke CADR as the metric to calculate effective room size or if it should be based on $PM_{2.5}$ CADR instead. If stakeholders indicate the use of $PM_{2.5}$ CADR, DOE requests comment on whether multiplying $PM_{2.5}$ CADR by 1.55 to determine effective room size in square feet is appropriate or if a

different constant would need to be used instead.

(38) DOE seeks comment on the proposed sampling plan and rounding requirements for smoke CADR, dust CADR, $PM_{2.5}$ CADR, AEC, and IEF.

(39) DOE requests comment on its initial determination of the costs for testing according to the proposed new air cleaner test procedure. DOE also requests comment on the potential impact to manufacturers from the proposed new air cleaner test procedure.

(40) DOE requests comments on the benefits and burdens of referencing the identified industry standards in the proposed new test procedure for air cleaners.

(41) DOE requests comments on its finding that there are five small, domestic OEMs of air cleaners. DOE also requests comment on its findings that costs are small relative to annual revenue for small manufacturers that currently make voluntary representations.

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this notice of proposed rulemaking and request for comment.

List of Subjects

10 CFR Part 429

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Intergovernmental relations, Reporting and recordkeeping requirements, Small businesses.

10 CFR Part 430

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

Signing Authority

This document of the Department of Energy was signed on September 28, 2022, by Francisco Alejandro Moreno, Acting 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 September 30, 2022.

Treena V. Garrett,

Federal Register Liaison Officer, U.S. Department of Energy.

For the reasons stated in the preamble, DOE is proposing to further amend 10 CFR parts 429 and 430 (as proposed at 87 FR 14622, March 15, 2022) as set forth below:

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

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

Authority: 42 U.S.C. 6291–6317, 28 U.S.C. 2461 note.

§§ 429.64–429.65 [Added and Reserved]

■ 2. Add and reserve §§ 429.64 and 429.65.

■ 3. Add § 429.67 to read as follows:

§ 429.67 Air cleaners.

(a) *Sampling plan for selection of units for testing.* (1) The requirements of § 429.11 are applicable to air cleaners; and

(2) For each basic mode of air cleaners, a sample of sufficient size shall be randomly selected and tested to ensure that—

(i) Any represented value of annual energy consumption or other measure of energy consumption of a basic mode for which consumers would favor lower values shall be greater than or equal to the higher of:

(A) The mean of the sample:

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

Where:

$\bar{x}$ is the sample mean;
n is the number of samples; and,
x_i is the ith sample.

Or,

(B) The upper 95 percent confidence limit (UCL) of the true mean divided by 1.10:

$$UCL = \bar{x} + t_{0.95}\left(\frac{s}{\sqrt{n}}\right)$$

Where:

$\bar{x}$ is the sample mean;
s is the sample standard deviation;
n is the number of samples; and,
$t_{0.95}$ is the t statistic for a 95 percent one-tailed confidence interval with $n-1$ degrees of freedom (from appendix A).

And

(ii) Any represented value of the integrated energy factor or other measure of energy consumption of a basic mode for which consumers would favor higher values shall be less than or equal to the high:

(A) The mean of the sample:

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

Where:

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

Or,

(B) The lower 95 percent confidence limit (LCL) of the true mean divided by 0.90:

$$LCL = \bar{x} - t_{0.95}\left(\frac{s}{\sqrt{n}}\right)$$

Where:

$\bar{x}$ is the sample mean;
s is the sample standard deviation;
η is the number of samples; and,
$t_{0.95}$ is the t statistic for a 95 percent one-tailed confidence interval with n-1 degrees of freedom (from appendix A).

And

(3) Any represented value of the pollen, smoke, dust, and $PM_{2.5}$ clean air delivery rate (CADR) of a basic model must be the mean of the CADR for each tested unit of the basic model. Round the mean clean air delivery rate value to the nearest whole number.

(4) Any represented value of the effective room size, in square feet, of a basic model must be calculated as the product of 1.55 and the represented smoke CADR value of the basic model as determined in paragraph (a)(3) of this section. Round the value of the effective room size, in square feet, to the nearest whole number.

(5) Round the value of the annual energy consumption of a basic model to the nearest 0.1 kWh/year.

(6) Round the value of the integrated energy factor of a basic model to the nearest 0.1 CADR/W.

(b) [Reserved]

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

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

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

■ 5. Amend § 430.2 by adding in alphabetical order the definition for ''Conventional room air cleaner'' to read as follows:

§ 430.2 Definitions.

* * * * *

Conventional room air cleaner means an air cleaner as defined in Section 2.1.1 of AHAM AC–7–2022 Draft (incorporated by reference; see § 430.3). With respect to the term *conventional room air cleaner*—

(1) The term *portable* is as defined in Section 2.1.3.1 of AHAM AC–7–2022 Draft; and

(2) The term *fixed* is as defined in Section 2.1.3.2 of AHAM AC–7–2022 Draft.

* * * * *

■ 6. Section 430.3 is amended by:

a. Redesignating paragraphs (i)(1) through (6) as (i)(3) through (8);

b. Adding new paragraphs (i)(1) and (2) and paragraph (j)(4); and

c. Revising paragraph (p)(7).

The additions and revision read as follows:

§ 430.3 Materials incorporated by reference.

* * * * *

(i) * * *

(1) ANSI/AHAM AC–1–2020 (''AHAM AC–1–2020''), *Method for Measuring Performance of Portable Household Electric Room Air Cleaners,* approved December 14, 2020; IBR approved for appendix FF to subpart B.

(2) AHAM AC–7–2022 Draft, *Energy Test Method for Consumer Room Air Cleaners,* approved 2022; IBR approved for § 430.2 and appendix FF to subpart B.

* * * * *

(j) * * *

(4) ASTM E741–11 (Reapproved 2017) (''ASTM E741–11(2017)''), *Standard Test Method for Determining Air Change in a Single Zone Means of a Tracer Gas Dilution,* Reapproved September 1, 2017; IBR approved for appendix FF to subpart B.

* * * * *

(p) * * *

(7) IEC 62301, *Household electrical appliances—Measurement of standby power,* Edition 2.0, 2011–01; IBR approved for appendices C1, D1, D2, F, G, H, I, I1, J, J2, N, O, P, Q, U, X, X1, Y, Y1, Z, BB, CC, and FF to subpart B.

* * * * *

■ 7. Amend § 430.23 by adding paragraph (hh) to read as follows:

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

* * * * *

(hh) *Air Cleaners.* (1) The pollen clean air delivery rate (CADR), smoke CADR, and dust CADR, expressed in cubic feet per minute (cfm), for conventional room air cleaners shall be measured in accordance with section 5 of appendix FF of this subpart.

(2) The $PM_{2.5}$ CADR, expressed in cfm, for conventional room air cleaners, shall be measured in accordance with section 5 of appendix FF of this subpart.

(3) The active mode and standby mode power consumption, expressed in watts, shall be measured in accordance with sections 5 and 6, respectively, of appendix FF of this subpart.

(4) The annual energy consumption, expressed in kilowatt-hours per year, and the integrated energy factor, expressed in CADR per watts (CADR/W), for conventional room air cleaners, shall be measured in accordance with section 7 of appendix FF of this subpart.

(5) The estimated annual operating cost for conventional room air cleaners, expressed in dollars per year, shall be determined by multiplying the following two factors:

(i) The annual energy consumption as calculated in accordance with section 7 of appendix FF of this subpart, and

(ii) A representative average unit cost of electrical energy in dollars per kilowatt-hour as provided by the Secretary, the resulting product then being rounded off to the nearest dollar per year.

■ 8. Appendix FF to subpart B of part 430 is added to read as follows:

Appendix FF to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Air Cleaners

Note: Beginning [*date 180 days after date of publication of a final rule in the* **Federal Register**], any representations made with respect to the energy use or efficiency of air cleaners must be made in accordance with the results of testing pursuant to this appendix.

0. Incorporation by Reference

DOE incorporated by reference in § 430.3 the entire standard for AHAM AC–1–2020, AHAM AC–7–2022 Draft, ASTM E741–11(2017), and IEC 62301. However, only enumerated provisions of AHAM AC–1–2020, AHAM AC–7–2022 Draft, and IEC 62301 apply to this appendix, as follows:

0.1 AHAM AC–1–2020

(a) Sections 4.2 through 4.6 as specified in section 3 of this appendix;

(b) Sections 5 through 7 as specified in section 5 of this appendix;

(c) Section 8.1 as specified in section 5 of this appendix;

(d) Annex A as specified in section 3 of this appendix;

(e) Annex I as specified in section 2 of this appendix.

0.2 AHAM AC–7–2022 Draft

(a) Sections 2.2 and 2.3, sections 2.4.1 through 2.4.2.4, and sections 2.6 through 2.8 as referenced in section 2 of this appendix;

(b) Section 2.9 as referenced in section 2 and section 5.3 of this appendix;

(c) Sections 3.1 through 3.6.3 as specified in section 3 of this appendix;

(d) Section 4, excluding section 4.1.4, as specified in section 4 of this appendix;

(e) Sections 5.3 through 5.7.4 as specified in section 5 of this appendix;

(f) Section 6 as specified in section 6 of this appendix;

(g) Section 7 as specified in section 7 of this appendix.

0.3 IEC 62301: Household Electrical Appliances—Measurement of Standby Power

(a) Sections 4.4.1 through 4.4.3 as specified in section 4 of this appendix;

(b) Section 5.3 as specified in section 6 of this appendix.

1. Scope of Coverage

This appendix contains the test requirements to measure the energy performance of a conventional room air cleaner, as defined at § 430.2.

2. Definitions

The definitions in Sections 2.2, 2.3, 2.4.1 through 2.4.2.4, 2.6 through 2.8, and 2.9 of AHAM AC–7–2022 Draft apply to this test procedure, including the applicable provisions of AHAM AC–1–2020 as referenced in Section 2.9 of AHAM AC–7–2022 Draft.

3. Test Conditions

Testing conditions shall be as specified in Sections 3.1 through 3.6.3 of AHAM AC–7–2022 Draft, including the applicable provisions of AHAM AC–1–2020 as referenced in Sections 3.2.1, 3.3, 3.4, 3.5, and 3.6.2 of AHAM AC–7–2022 Draft and the applicable provisions of ASTM E 741–11(2017) as referenced in Section 3.3 of AHAM AC–7–2022 Draft.

4. Instrumentation

Test instruments shall be as specified in Section 4 of AHAM AC–7–2022 Draft, including the applicable provisions of IEC 62301 Ed. 2.0, except Section 4.1.4 of AHAM AC–7–2022 Draft.

5. Active Mode CADR and Power Measurement

Measurement of smoke CADR, dust CADR, and pollen CADR shall be as specified in Sections 5 through 7 of AHAM AC–1–2020, respectively. Measurement of active mode power shall be as specified in Sections 5.3 through 5.7.4 of AHAM AC–7–2022 Draft, including the applicable provisions of AHAM AC–1–2020 as referenced in Section 5.7.1 of AHAM AC–7–2022 Draft. Additionally, the following requirement is also applicable:

5.1. *Calculation of $PM_{2.5}$ CADR.*

5.1.1. $PM_{2.5}$ CADR is calculated as specified in Section 2.9 of AHAM AC–7–2022 Draft.

5.1.2. $PM_{2.5}$ CADR may alternately be calculated using the smoke CADR and dust CADR values determined according to

Sections 5 and 6, respectively, of AHAM AC–1–2020, according to the following equation:

$$PM_{2.5}CADR = \sqrt{Smoke\ CADR\ (0.1 - 1\ \mu m) \times Dust\ CADR\ (0.5 - 3\ \mu m)}$$

6. Standby Mode Power Measurement

Standby mode power consumption shall be measured as specified in Section 6 of AHAM AC–7–2022 Draft, including the applicable provisions of IEC 62301 Ed. 2.0.

7. Total Energy Calculation

Annual energy consumption, expressed in kilowatt-hours per year, and integrated energy factor, expressed in CADR per watt, shall be calculated as specified in Section 7 of AHAM AC–7–2022 Draft.

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