[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Parts 429 and 430

[Docket No. EERE-2013-BT-TP-0050]

RIN 1904-AD10

Energy Conservation Program: Test Procedures for Ceiling Fans

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

ACTION: Supplemental notice of proposed rulemaking.

SUMMARY: In this supplemental notice of proposed rulemaking (SNOPR), the U.S. Department of Energy (DOE) proposes a number of changes to the proposed test procedure rule published on October 17, 2014. Specifically, DOE proposes to clarify that a ceiling fan is not subject to the test procedure if the plane of rotation of the ceiling fan's blades cannot be within 45 degrees of horizontal, rather than exempt air circulators (or air-circulating fan heads) from the test procedure. DOE also proposes to test high-volume small-diameter ceiling fans according to test procedures based on the current DOE test procedure for ceiling fans, rather than the Air Movement and Control Association International, Inc. (AMCA) 230 test procedure. All ceiling fans larger than seven feet in diameter would still be tested according to a test procedure based on the AMCA 230 test procedure, but all ceiling fans less than seven feet in diameter would be tested according to test procedures based on the current DOE test procedure. DOE also proposes that the test require mounting all ceiling fans with blade spans less than or equal to seven feet to the real ceiling, rather than a false ceiling, during testing. The proposed test method would also

increase the number of speeds at which ceiling fans with blade spans greater than seven feet are tested, and clarify the weighting associated with each tested speed in the energy efficiency metric and update the test room dimensions for ceiling fans with blade spans greater than seven feet. Finally, DOE proposes to clarify the effective date corresponding to the NOPR proposal to reinterpret the statutory definition of a ceiling fan to include hugger ceiling fans.

DATES: DOE will accept comments, data, and information regarding this SNOPR until [**DATE**]. See section V, "Public Participation," for details.

ADDRESSES: Any comments submitted must identify the SNOPR for Test Procedures for Ceiling Fans, and provide docket number EERE-2013-BT-TP-0050 and/or regulatory information number (RIN) number 1904-AD10. Comments may be submitted using any of the following methods:

1. Federal eRulemaking Portal: www.regulations.gov. Follow the instructions for submitting comments.
2. E-mail: CF2013TP0050@ee.doe.gov. Include the docket number and/or RIN in the subject line of the message.
3. Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. If possible, please submit all items on a CD. It is not necessary to include printed copies.

4. Hand Delivery/Courier: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC, 20024. Telephone: (202) 586-2945. If possible, please submit all items on a CD. It is not necessary to include printed copies.

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

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

A link to the docket web page can be found at: http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx/ruleid/101. This web page will contain a link to the docket for this notice on the regulations.gov site. The regulations.gov web page contains simple instructions on how to access all documents, including public comments, in the docket. See section V for information on how to submit comments through regulations.gov.

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

FOR FURTHER INFORMATION CONTACT:

Ms. Lucy deButts, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE-2J, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-1604. E-mail: ceiling_fans@ee.doe.gov.

Ms. Elizabeth Kohl, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586-7796. E-mail: elizabeth.kohl@hq.doe.gov.

SUPPLEMENTARY INFORMATION:

DOE intends to incorporate by reference the following industry standard into 10 CFR part 430: ANSI/AMCA 230-12 ("AMCA 230"), Air Movement and Control Association Laboratory Methods of Testing Air Circulating Fans for Rating and Certification. Copies of ANSI/AMCA 230-12 can be obtained from the American National Standards Institute, 25 W. 43rd Street, 4th Floor, New York, NY 10036, 212-642-4900, or go to http://www.ansi.org.

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I. Authority and Background

Title III of the Energy Policy and Conservation Act (42 U.S.C. 6291, et seq.; "EPCA" or, "the Act") sets forth a variety of provisions designed to improve energy efficiency. (All references to EPCA refer to the statute as amended through the EPS Service Parts Act of 2014, Pub. L. 113-263 (Dec. 18, 2014)). Part B of title III, which for editorial reasons was redesignated as Part A upon incorporation into the U.S. Code (42 U.S.C. 6291–6309), establishes the "Energy Conservation Program for Consumer Products Other Than Automobiles."

Under EPCA, this energy conservation program consists essentially of four parts: (1) testing; (2) labeling; (3) Federal energy conservation standards; and (4) certification and enforcement procedures. The testing requirements consist of test procedures that manufacturers of covered products must use as the basis for certifying to DOE that their products comply with

the applicable energy conservation standards adopted pursuant to EPCA and for making other representations about the efficiency of those products. (42 U.S.C. 6293(c) and 6295(s)) Similarly, DOE must use these test requirements to determine whether the products comply with any relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

II.Synopsis of the Supplemental Notice of Proposed Rulemaking

After careful consideration of comments received on the NOPR, DOE is issuing this SNOPR to propose that manufacturers are not required to test ceiling fans pursuant to the test procedure if the plane of rotation of the ceiling fan's blades cannot be within 45 degrees of horizontal. This approach replaces that in the proposed rule issued on October 17, 2014 (79 FR 62521) (October 2014 NOPR), where DOE proposed to exempt ceiling fans from the test procedure based on the potentially ambiguous terms “air circulator” or “air-circulating fan head”. DOE also proposes test procedures for high-volume small-diameter ceiling fans based on the current DOE ceiling fan test procedure and require all ceiling fans with blade spans less than or equal to seven feet to be mounted directly to the real ceiling during testing. In addition, for ceiling fans with blade spans greater than seven feet, DOE proposes to increase the number of speeds at which the fans are tested and clarify the weighting associated with each speed in the proposed energy efficiency metric, as well as update the test room dimensions.

This SNOPR summarizes and addresses comments received on the NOPR that are related to the changes proposed in this SNOPR. DOE received comments on the NOPR regarding a number of other topics that are not addressed in this SNOPR; these comments will be addressed

in the final rule. The following paragraphs summarize the proposed changes in this SNOPR, with further detail provided in Section III, Discussion.

Ceiling fans for which the plane of rotation of the ceiling fan's blades cannot be within 45 degrees of horizontal are not subject to the test procedure

DOE proposes that manufacturers not be required to test a ceiling fan pursuant to the test procedure if the plane of rotation of the ceiling fan's blades cannot be within 45 degrees of horizontal. This proposal would replace DOE's NOPR proposal that the test procedure does not apply to air circulators (or air-circulating fan heads), thereby removing any ambiguity associated with the terms "air circulator" or "air-circulating fan heads." This proposal ensures that only those ceiling fans whose performance the test procedure was designed to evaluate will be subject to the test procedure.

Update test procedures for high-volume small-diameter ceiling fans

DOE proposes to test high-volume small-diameter ceiling fans according to test procedures based on the current DOE test procedure for ceiling fans, rather than the Air Movement and Control Association International, Inc. (AMCA) 230 test procedure. As a result, all ceiling fans with blade spans less than or equal to seven feet would be tested according to the test procedures for low-volume ceiling fans proposed in the NOPR, with the distinction that high-volume small-diameter ceiling fans would be tested only at high speed, whereas low volume ceiling fans would be tested at both high speed and low speed, as proposed in the NOPR.

Mount all ceiling fans with blade spans less than or equal to seven feet to the real ceiling for testing

DOE proposes to test all ceiling fans with blade spans less than or equal to seven feet with the ceiling fan mounted to the real ceiling, rather than a false ceiling, while maintaining the required vertical distance between the air velocity sensor heads and the bottom of the ceiling fan blades. This would provide a better representation of ceiling fan efficiency and would likely incur less test burden than testing with the ceiling fan mounted to a false ceiling.

Test ceiling fans with blade spans greater than seven feet at five speeds

DOE proposes to test all ceiling fans with blade spans greater than seven feet at five speeds spaced equally over the range of available speeds: 20%, 40%, 60%, 80%, and 100% of the measured maximum speed revolutions per minute (rpm). DOE also proposes to clarify the weighting associated with each tested speed in the energy efficiency metric.

Update test room dimensions for ceiling fans with blade spans greater than seven feet

DOE proposes to update the test room dimensions for all ceiling fans with blade spans greater than seven feet. The updates represent potential increases to the required test room dimensions relative to those dimensions proposed in the NOPR for high-volume ceiling fans.

III.Discussion

A. Ceiling fans for which the plane of rotation of the ceiling fan's blades cannot be within 45 degrees of horizontal are not subject to the test procedure

In the NOPR, DOE stated that the proposed test procedures would not apply to air circulators (or air-circulating fan heads) that are typically mounted on a pedestal but could also include wall, ceiling, or I-beam mounting brackets. DOE then referenced section 5.1.1 of

AMCA 230-12 for the definition of an air circulator. In response, DOE received comments from Fanimation, Matthews Fan Company, and BAS requesting clarification of the definition of the term "air circulator," as the language in AMCA 230 is ambiguous. (Fanimation, Public Meeting Transcript, No. 83 at p. 21; Matthews Fan Company, Public Meeting Transcript, No. 83 at pp. 22-23; Big Ass Solutions, Public Meeting Transcript, No. 83 at pp. 23-24) ALA further requested that DOE clarify if a fan head assembly consisting of a motor, impeller, and guard mounted on a downrod classified as an air circulator. (American Lighting Association, No. 8 at pp. 4-5)

Per suggestion by BAS to review other sections of AMCA 230 for a clearer definition of an air circulator, DOE reviewed AMCA 230-12 for more specific language, but only found potentially ambiguous language. DOE's intention in excluding air circulators from the test procedure was to ensure that only ceiling fans that could be properly assessed with the test procedure were subject to the test procedure. For example, DOE intended to exclude ceiling fans that only moved air horizontally, rather than primarily downward, as the test procedure is not designed to provide accurate performance data for such fans. In this supplemental proposal, DOE proposes that if the plane of rotation of a ceiling fan's blades cannot be within 45 degrees of horizontal, the ceiling fan is not subject to the test procedure. In this way, DOE is not specifically excluding "air circulators"; instead, DOE is excluding from the test procedure only ceiling fans that do not have the majority of their airflow directed vertically downward.

B. Update Test Procedures for High-Volume Small-Diameter Ceiling Fans

In the NOPR, DOE proposed different test methods for low-volume ceiling fans and high-volume, small-diameter ceiling fans. Specifically, DOE proposed to test low-volume

ceiling fans according to a modified version of the current DOE test procedure, which is based on the "Energy Star Testing Facility Guidance Manual: Building a Testing Facility and Performing the Solid State Test Method for ENERGY STAR Qualified Ceiling Fans, Version 1.1." In contrast, DOE proposed to test all high-volume ceiling fans (including high-volume small-diameter ceiling fans) according to the test procedure set forth in AMCA 230-12, but subject to the proposed test room dimensions set forth in the NOPR. These two test procedures are fundamentally different, as the NOPR low-volume ceiling fan test procedure determines airflow based on air velocity measurements, whereas the NOPR high-volume ceiling fan test procedure determines airflow based on load differential measured using a load cell.

Data presented by Big Ass Solutions (BAS) at the November 19, 2014 public meeting shows that the AMCA 230 test procedure results in a decrease in the measured performance for the same fan as compared to the NOPR test procedure for low-volume ceiling fans. (BAS, Public Meeting Transcript, No. 5 at pp. 63-64)[1] Given this, BAS expressed that there may be instances where a small-diameter fan has a large enough measured airflow under the NOPR low-volume test procedure to move it into the high-volume category, but when tested according to the NOPR high-volume test procedure, the measured airflow would be too low for the fan to qualify for the high-volume category. Id. BAS added that the decrease in rated performance of the high-volume small-diameter fan according to the NOPR test procedure could lead to a consumer selecting a less-efficient product when choosing between a low-volume and high-volume small-diameter ceiling fans based on NOPR test method results. Id. BAS suggested that all ceiling fans with

[1] A notation in this form provides a reference for information that is in the docket of DOE's rulemaking to develop test procedures for ceiling fans (Docket No. EERE–2013–BT–TP–0050), which is maintained at www.regulations.gov. This notation indicates that the statement preceding the reference is document number 5 in the docket for the ceiling fan and ceiling fan light kits energy conservation standards rulemaking and appears at pages 63-64 of that document.

blade spans less than or equal to seven feet be tested according to the same test method, based on DOE's current test procedure for ceiling fans, and ceiling fans with blade spans of more than seven feet be tested according to AMCA 230. (BAS, Public Meeting Transcript, No. 5 at p. 64) Emerson Electric Company (Emerson), Westinghouse Lighting (Westinghouse), Hunter Fan Company (Hunter), Fanimation, and Minka Group all agreed with BAS' suggestion. Furthermore, the American Lighting Association (ALA) stated that manufacturers are more familiar with the ENERGY STAR test procedure and prefer it for measuring the performance of all ceiling fans with blade spans less than or equal to seven feet. (ALA, No. 8 at pp. 7-8) In particular, ALA expressed concern about the repeatability and test burden associated with load-cell testing of high-volume ceiling fans with blade spans less than or equal to seven feet (as required in AMCA 230). (Id.)

DOE recognizes the concerns put forth by BAS et al. According to ALA, manufacturers are already accustomed to testing ceiling fans with blade spans less than or equal to seven feet according to the current ENERGY STAR test procedure which, along with the current DOE test procedure and the test procedures proposed in the NOPR for low-volume ceiling fans, is based on "Energy Star Testing Facility Guidance Manual: Building a Testing Facility and Performing the Solid State Test Method for ENERGY STAR Qualified Ceiling Fans, Version 1.1." DOE prefers to harmonize with the accepted industry test procedures where appropriate. Proposing test procedures for high-volume small-diameter ceiling fans based on the test procedures proposed in the NOPR for low-volume ceiling fans is more consistent with this objective.

In the NOPR, DOE proposed a different test procedure for all high-volume ceiling fans (including those with blade spans less than or equal to seven feet) in part because some large-

diameter ceiling fans (i.e., those ceiling fans with blade spans greater than seven feet) are too large to be tested in current low-volume ceiling fan test facilities, and testing with a single load cell is more practical than testing with numerous air velocity sensors for large-diameter fans. For ceiling fans with blade spans less than or equal to seven feet, however, these experimental concerns are significantly less compelling. In the NOPR, DOE assumed that high-volume small-diameter and high-volume large-diameter ceiling fans were substitutes for one another (for example an array of high-volume small-diameter ceiling fans substituting for a single high-volume large diameter ceiling fan) and proposed the same test procedure for all high-volume ceiling fans to allow for comparison. Feedback from stakeholders indicates that industry practice is to use an ENERGY STAR style test procedure for high-volume small-diameter ceiling fans and that high-volume small-diameter ceiling fans may be substitutes for low-volume ceiling fans. Consequently, DOE agrees with interested parties that a test procedure for high-volume small-diameter fans based on the NOPR test procedure for low-volume ceiling fans would be more appropriate.

Therefore, DOE proposes to test all ceiling fans with blade spans less than or equal to seven feet according to the low-volume ceiling fan test procedures proposed in the NOPR, except that, as in the NOPR, high-volume small-diameter ceiling fans would be tested at only high speed while low-volume ceiling fans would be tested at both high and low speed. A further modification to the NOPR test procedure for low-volume ceiling fans and high-volume small-diameter ceiling fans is discussed in section III.C. High-volume small-diameter ceiling fans would be tested at only high speed because, as discussed in the NOPR, high-volume small-diameter ceiling fans typically do not have discrete speeds so speeds other than high may not be well defined. Additionally, DOE does not have enough information to estimate a distribution of

time spent at speeds other than high speed for the efficiency metric for high-volume small diameter ceiling fans.

C. Mount All Ceiling Fans With Blade Spans Less Than Or Equal To Seven Feet To The Real Ceiling For Testing

In the NOPR, DOE proposed to mount all low-volume ceiling fans to a false ceiling for testing. Using an adjustable-height false ceiling would allow the air velocity sensor height to remain constant, while the ceiling fan mounting height could be adjusted to obtain the required distance between the bottom of the ceiling fan blades and the air velocity sensors. The NOPR proposal was based on an assumption that mounting the ceiling fans to an adjustable-height false ceiling for testing would be less burdensome than adjusting the height of the air velocity sensors.

In response to the NOPR, at the November 2014 public meeting, BAS presented test results indicating a decrease in measured efficiency performance when a ceiling fan is mounted to a false ceiling rather than a real ceiling. (BAS, Public Meeting Transcript, No. 5 at pp. 125-126) BAS also stated that testing with the ceiling fan mounted to a real ceiling is more representative of actual use, and Fanimation and Minka Group agreed with Big Ass Solution's comments. (Id.; Fanimation, Public Meeting Transcript, No. 5 at p. 129; Minka Group, Public Meeting Transcript, No. 5 at p. 129) In regard to test burden, BAS indicated that keeping the false ceiling level and in correct position during testing is more burdensome than adjusting the height of the air velocity sensors. (BAS, Public Meeting Transcript, No. 5 at p. 131) Hunter Fan Company suggested that their lab uses a different air velocity sensor mounting system, and therefore it could be more burdensome to adjust the height of the air velocity sensors. (Hunter Fan Company, Public Meeting Transcript, No. 5 at p. 131)

DOE agrees with BAS that testing with the ceiling fan mounted to the real ceiling is more representative of actual use. DOE further acknowledges the concerns put forth by BAS—and the potential counterpoint provided by Hunter Fan Company—and has reviewed the proposal to mount all low-volume and high-volume small-diameter ceiling fans to a false ceiling during testing. DOE reviewed the data provided by BAS and noted a decrease in airflow efficiency of approximately 10% across the range of speeds tested when testing with a false ceiling rather than the real ceiling compelling. Additionally, DOE received test cost estimates from two test labs that show that testing with a false ceiling may be more financially burdensome than testing with the ceiling fan mounted to the real ceiling and adjusting the height of the air velocity sensors. The cost estimates received indicate a cost of $600-$1,800 for testing with a false ceiling, as opposed to $725-$1,500 for testing with the real ceiling. The minimum expected cost for testing with a real ceiling is higher than for testing with a false ceiling due to the one-time cost associated with implementing a change to the experimental set up to allow for the adjustment of the height of the air velocity sensors. The average variable test costs for testing with the real ceiling, however, are lower compared to testing with a false ceiling. DOE approximates the fixed costs for the one-time modification to be $2000 or less. DOE expects that test labs will be able to amortize the fixed costs over many tests. Consequently, the total average costs for testing with the real ceiling are lower than testing with a false ceiling.

Therefore, DOE proposes to mount all ceiling fans with blade spans less than or equal to seven feet to the real ceiling, rather than a false ceiling, for testing. DOE also clarifies that with this proposal to mount the ceiling fan to the real ceiling, the height of the air velocity sensors must be adjusted to achieve the specified vertical distance (43 inches) between the bottom of the

fan blades and the air velocity sensor heads for each mounting configuration in which the ceiling fan is tested.

D. Test Ceiling Fans with Blade Spans Greater than Seven Feet At Five Speeds

DOE proposed to test all high-volume ceiling fans—regardless of blade span—at high speed in the NOPR. DOE proposed testing only at a single speed because high-volume ceiling fans are often equipped with a speed controller that is continuously adjustable rather than having discrete speeds (e.g., low, medium, and high). In response to the NOPR proposal, DOE received several comments from stakeholders. MacroAir and the AMCA Committee indicated that an upcoming revision of AMCA 230 would contain a requirement to test at five speeds (20%, 40%, 60%, 80%, and 100% of the maximum achievable speed) and suggested DOE harmonize with this approach. (MacroAir, No. 6 at p. 5; AMCA, No. 84[2] at pp. 2-3) MacroAir also suggested that the overall efficiency of the ceiling fan should be calculated by taking performance data at each of the five speeds and then calculating a weighted average of those data based on the estimated operating hours at each speed. Id.

DOE believes it is preferable to align the DOE ceiling fan test procedure with the accepted industry test procedures—in this case AMCA 230—as much as possible. DOE also notes that testing at five speeds rather than just at high speed may provide a more holistic representation of a ceiling fan's performance over a range of service levels, which may in turn facilitate easier comparisons for consumers. Finally, MacroAir supported testing at five speeds. (MacroAir, No. 6 at p. 6) Given these points, DOE proposes in this SNOPR to test all ceiling

[2] This document was submitted to the docket of DOE's rulemaking to develop energy conservation standards for ceiling fans (Docket No. EERE-2012-BT-STD-0045).

fans with blade spans greater than seven feet at five equally-spaced speeds: 20%, 40%, 60%, 80%, and 100% of the rpm of the maximum achievable speed. DOE clarifies that these speed settings are to be based on actual rpm measurements, and also notes that this proposal has no effect on ceiling fans with blade spans less than or equal to seven feet, as set forth in III.B.

DOE is unaware of any ceiling fan with blade span greater than seven feet in diameter that does not have a speed controller that is continuously adjustable. DOE seeks comment and information on whether there are any ceiling fans with blade spans greater than seven feet for which the proposed test procedure in this SNOPR could not be applied (i.e., any ceiling fans larger than seven feet in diameter that could not achieve the five speeds specified).

The equation and daily operating hours proposed in the NOPR to calculate the efficiency of ceiling fans larger than seven feet in diameter would need to be updated to enable testing these fans at five speeds. In the NOPR, DOE proposed the following efficiency equation for all high-volume ceiling fans to be tested at only high speed:

$$Ceiling\ Fan\ Efficiency\ (CFM/W) = \frac{CFM_H \times OH_A}{W_{Sb} \times OH_{Sb} + W_H \times OH_A}$$

where:

CFM_H = airflow at high speed,
OH_A = operating hours in active mode,
W_H = power consumption at high speed,
OH_{Sb} = operating hours in standby mode, and
W_{Sb} = power consumption in standby mode.

Based on the proposal to test all ceiling fans with blade spans greater than seven feet at five speed settings, DOE proposes to use the following equation to calculate the weighted ceiling fan efficiency for these ceiling fans:

$$Ceiling\ Fan\ Efficiency\ (CFM/W) = \frac{\sum_i (CFM_i \times OH_i)}{W_{Sb} \times OH_{Sb} + \sum_i (W_i \times OH_i)}$$

where:

CFM_i = airflow at speed *i*,
OH_i = operating hours at speed *i*,
W_i = power consumption at speed *i*,
OH_{Sb} = operating hours in standby mode, and
W_{Sb} = power consumption in standby mode.

The daily operating hours at each of the five speeds are an input to this equation. In the NOPR, DOE proposed the following daily operating hours for all high-volume ceiling fans: 12 hours of active mode and 12 hours of non-active mode. In response to the proposed operating hours, MacroAir and BAS separately provided breakdowns of daily operating hours for large-diameter ceiling fans by speed setting (Table 1). (MacroAir, No. 6 at p. 5; BAS, No. 88[3] at pp. 37, 39)

Table 1. Manufacturer-Suggested Daily Operating Hours by Speed Setting for Large-Diameter Ceiling Fans

	Daily Operation by Speed Setting (h)						
Manufacturer	**100%**	**80%**	**60%**	**40%**	**25%**	**20%**	**Off/Standby**
MacroAir	3	4	6	4	--	1	6
Big Ass Solutions	0.6	3	1.2	--	7.2	--	12

[3] This document was submitted to the docket of DOE's rulemaking to develop energy conservation standards for ceiling fans (Docket No. EERE-2012-BT-STD-0045)

In their comments, BAS did not provide this breakdown in daily operating hours explicitly; instead, BAS presented an alternative hours of use analysis in which they presented annual hours of operation at each of four speeds. In this alternative analysis, BAS did not alter DOE's proposed 12 hours of active use per day, so DOE assumes BAS agreed with this value.

To account for both daily operating hours breakdowns, DOE calculated a simple average of the proposed operating hours by speed setting (in calculating this average, DOE mapped the 7.2 h at 25% speed suggested by BAS to the 20% speed setting). Using this simple average, DOE proposes in this SNOPR to use the daily operating hours in Table 2 for all ceiling fans with blade spans greater than seven feet for use in the efficiency calculation.

Table 2. Daily Operating Hours by Speed Setting for Ceiling Fans with Blade Spans Greater than Seven Feet

Setting	No Standby	With Standby
100% (Max) Speed	1.8	1.8
80% Speed	3.5	3.5
60% Speed	3.6	3.6
40% Speed	2.0	2.0
20% Speed	4.1	4.1
Standby Mode	0.0	9.0
Off Mode	9.0	0.0

E. Update Test Room Dimensions for Ceiling Fans with Blade Spans Greater than Seven Feet

In the NOPR, DOE proposed to test all high-volume ceiling fans, including ceiling fans larger than seven feet in diameter, using a test procedure based on AMCA 230-12. Because AMCA 230-12 is only applicable to ceiling fans with blade spans of six feet or less, DOE proposed to modify the specified room dimensions to allow for the testing of larger ceiling fans. The NOPR proposed a test procedure with the following modifications to the room dimensions

in AMCA 230-12: (1) The minimum distance between the ceiling and the blades of a ceiling fan being tested is 44 inches for all blade diameters, (2) ceiling fans larger than 6 feet in diameter must have a 20 foot clearance between the floor and the blades of the fan being tested, and (3) for ceiling fans larger than 6 feet in diameter, the minimum distance between the centerline of a ceiling fan being tested and walls and large obstructions all around is half the ceiling fan blade span plus 10 feet.

BAS stated during the public meeting that AMCA 230 is currently being revised and suggested that the test room dimensions proposed by DOE and the updated version of AMCA 230 be harmonized. (BAS, Public Meeting Transcript, No. 5 at pp. 141-142) BAS specifically disagreed with the proposed clearance above the ceiling fan blades. (BAS, Public Meeting Transcript, No. 5 at p. 143) Westinghouse did not comment on the clearance height above the ceiling fan blades, but did express acceptance of the ten feet of lateral clearance from the fan blade tips that DOE proposed. (Westinghouse, Public Meeting Transcript, No. 5 at p. 144)

AMCA has yet to release the updated version of AMCA 230, but the test room dimensions currently being considered by the AMCA Committee for the updated standard have been made publicly available. The AMCA Committee is currently considering the following test room dimensions for the updated standard: 1) Minimum distance between the ceiling and the blades of a ceiling fan being tested shall be 40% of the ceiling fan blade span; 2) Minimum distance between the floor and the blades of the fan shall be the larger of 80% of the ceiling fan

blade span or 15 feet; and 3) Minimum distance between the centerline of a ceiling fan and walls and/or large obstructions is 150% of the ceiling fan blade span. (AMCA, No. 84[4] at p. 2)

DOE considered whether the room dimension requirements expected to be included in the updated version of AMCA 230 would limit any manufacturers' access to a test facility large enough to meet the proposed test procedure requirements. DOE notes that, for ceiling fans with blade spans greater than or equal to 10 feet, the minimum distance between the ceiling and the top of the blades and the minimum distance between the centerline of the ceiling fan and walls or large obstructions is greater for the dimensions suggested by MacroAir and the AMCA Committee than for the dimensions proposed in the NOPR. However, DOE does not believe that access to test facilities for ceiling fan manufacturers is significantly decreased by the increased test room dimensions proposed in this SNOPR relative to the test room dimensions proposed in the NOPR. Therefore, this SNOPR proposes that the test room dimensions for ceiling fans with blade spans larger than seven feet meet the following criteria: 1) Minimum distance between the ceiling and the blades of a ceiling fan being tested shall be 40% of the ceiling fan blade span; 2) Minimum distance between the floor and the blades of the fan shall be the larger of 80% of the ceiling fan blade span or 15 feet; and 3) Minimum distance between the centerline of a ceiling fan and walls and/or large obstructions is 150% of the ceiling fan blade span. DOE intends to review the final published version of AMCA 230 when it is available. If the test room dimensions specified in the final version are identical in substance to the test procedure test room requirements DOE has proposed for high-volume ceiling fans, DOE will consider incorporating AMCA 230 by reference in the rule. Alternatively, DOE may also decide to incorporate it by

[4] This document was submitted to the docket of DOE's rulemaking to develop energy conservation standards for ceiling fans (Docket No. EERE-2012-BT-STD-0045).

reference, but with modifications. DOE notes that in accordance with the proposal in section III.B of this SNOPR, the room dimensions would only apply to ceiling fans with blade spans greater than seven feet.

IV.Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

The Office of Management and Budget has determined that test procedure rulemakings do not constitute "significant regulatory actions" under section 3(f) of Executive Order 12866, "Regulatory Planning and Review," 58 FR 51735 (Oct. 4, 1993). Accordingly, this regulatory action was not subject to review under the Executive Order by the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget (OMB).

B. Review under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 et seq.) requires preparation of a regulatory flexibility analysis (RFA) 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 (Aug. 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 (Feb. 19, 2003)). DOE has made its procedures and policies available on the Office of the General Counsel's Web site: http://energy.gov/gc/office-general-counsel.

DOE reviewed today's proposed rule under the provisions of the Regulatory Flexibility Act (RFA) and the policies and procedures published on February 19, 2003. The proposed rule prescribes test procedure amendments that would be used to determine compliance with any amended energy conservation standards that DOE may prescribe for ceiling fans. DOE has prepared an initial regulatory flexibility analysis (IRFA) for this rulemaking. The IRFA describes potential impacts on small businesses associated with ceiling fan testing requirements. DOE seeks comment on the discussion below and will develop a final regulatory flexibility analysis (FRFA) for any final test procedures developed in this test procedure rulemaking.

DOE has transmitted a copy of this IRFA to the Chief Counsel for Advocacy of the Small Business Administration for review.

(1) Description of the reasons why action by the agency is being considered.

A description of the reasons why DOE is considering this test procedure is provided elsewhere in the preamble and not repeated here.

(2) Succinct statement of the objectives of, and legal basis for, the proposed rule.

The objectives of and legal basis for the proposed rule are stated elsewhere in the preamble and not repeated here.

(3) Description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply.

For the manufacturers of the covered ceiling fan products, the Small Business Administration (SBA) has set a size threshold, which defines those entities classified as "small businesses" for the purposes of the statute. DOE used the SBA's small business size standards to determine whether any small entities would be subject to the requirements of the rule. 13 CFR part 121. The size standards are listed by North American Industry Classification System (NAICS) code and industry description and are available at: http://www.sba.gov/sites/default/files/Size_Standards_Table.pdf. Ceiling fan manufacturing is classified under NAICS code 335210, "Small Electrical Appliance Manufacturing" or NAICS code 333412, "Industrial and Commercial Fan and Blower Manufacturing." The SBA sets a threshold for NAICS classification for 335210 and 333412 of 750 employees or less and 500 employees or less, respectively. [5] DOE reviewed ALA's list of ceiling fan manufacturers,[6] the ENERGY STAR Product Databases for Ceiling Fans,[7] the California Energy Commission's Appliance Database for Ceiling Fans,[8] and the Federal Trade Commission's Appliance Energy Database for Ceiling Fans.[9] Based on this review, using data on the companies for which DOE was able to obtain information on the numbers of employees, DOE estimates that there are between 25 and 35 small business manufacturers of low-volume ceiling fans. To determine the number of small business manufacturers of high-volume ceiling fans, DOE reviewed SBA's Web site, high-volume ceiling fan manufacturers Web sites, and company reports from Hoovers.com,

[5] U.S. Small Business Administration, Table of Small Business Size Standards (August 22, 2008) (Available at: http://www.sba.gov/sites/default/files/Size_Standards_Table.pdf).
[6] The American Lighting Association, list of Manufacturers & Representatives (Available at: http://www.americanlightingassoc.com/Members/Resources/Manufacturers-Representatives.aspx).
[7] The U.S. Environmental Protection Agency and the U.S. Department of Energy, ENERGY STAR Ceiling Fans—Product Databases for Ceiling Fans (Available at: http://www.energystar.gov/products/certified-products/detail/ceiling-fans).
[8] The California Energy Commission, Appliance Database for Ceiling Fans (Available at: http://www.appliances.energy.ca.gov/QuickSearch.aspx).
[9] The Federal Trade Commission, Appliance Energy Databases for Ceiling Fans (Available at: http://www.ftc.gov/bcp/conline/edcams/eande/appliances/ceilfan.htm).

in addition to speaking with industry experts. Based on this review, DOE estimates that there are between 5 and 10 small business manufacturers of high-volume small-diameter ceiling fans and DOE estimates there are between 10 and 15 small business manufacturers of high-volume large-diameter fans. DOE invites interested parties to comment on the estimated number of small business manufacturers of ceiling fans.

(4) Description of the projected compliance requirements of the proposed rule.

In the test procedure NOPR, DOE proposed to reinterpret the statutory definition of a ceiling fan to include hugger ceiling fans. DOE also proposed that high-volume fans meet the definition of a ceiling fan. The proposed changes in interpretation of the ceiling fan definition discussed above would result in the applicability of the design standards set forth in EPCA at 42 U.S.C. 6295(ff)(1) to the following types of fans 30 days after the publication of any final test procedure adopting such changes in interpretation:

1. Fans suspended from the ceiling using a downrod or other means of suspension such that the fan is not mounted directly to the ceiling;

2. Fans suspended such that they are mounted directly or close to the ceiling;

3. Fans sold with the option of being suspended with or without a downrod; and

4. Fans capable of producing large volumes of airflow.

DOE research indicates that all ceiling fans currently on the market, including hugger ceiling fans and high-volume ceiling fans, appear to meet the EPCA design standards. DOE conducted an analysis of Hansen Wholesale, an online wholesaler that sells over 2000 models of ceiling fans, including a wide variety of ceiling fan brands. Hansen Wholesale provides product specifications on its Web site, including the number of speeds and whether a ceiling fan is reversible. DOE examined all of the ceiling fans that were self-identified as hugger ceiling fans and found that they all had fan controls separate from lighting controls, were capable of being operated at more than one speed, and were capable of being operated in reverse.

For high-volume ceiling fans, DOE searched for product specifications on the Web sites of manufacturers of high-volume large-diameter ceiling fans and from Web sites of retailers of high-volume small-diameter ceiling fans. Only one high-volume ceiling fan model was found with a light kit, and the fan controls were separate from the lighting controls for that fan. All high-volume ceiling fans appeared to be capable of operating at more than one speed (typically with an adjustable speed control). High-volume ceiling fans are primarily sold for industrial purposes and are therefore not subject to the requirement to be capable of operating in reverse.

Based on this research, DOE does not expect any cost of complying with the design requirements for manufacturers of hugger or high-volume ceiling fans.

DOE proposes measures to limit the burden of testing on all manufacturers, including small business manufacturers, while providing a representative measurement of ceiling fan efficiency for consumers. Low-volume ceiling fans (excluding hugger fans) are currently required to test at high speed due to FTC's labeling requirement for ceiling fans. As discussed in

more detail in the TP NOPR, DOE proposed to specify that low speed is to be tested as well as high speed to have a test procedure that is representative of typical use. DOE estimates that the cost to test at low speed, in addition to high speed, represents an average additional cost of $87.5 (or $175 per basic model) above the high-speed test cost.

DOE notes that if the concurrent rulemaking regarding energy conservation standards for ceiling fans results in efficiency performance standards, DOE would require testing for certification of two ceiling fans per basic model, the minimum sample size required by 10 CFR 429.11. To determine the potential cost of the proposed test procedure on small ceiling fan manufacturers under a potential energy conservation standard for ceiling fans, DOE estimated the cost of testing two ceiling fans. The cost of testing was then multiplied over the estimated number of basic models produced by a small manufacturer. The estimated cost of testing is discussed in further detail below.

In the test procedure NOPR, DOE proposed to: (1) reinterpret the statutory definition of a ceiling fan such that it would include hugger ceiling fans; the proposed test method for hugger ceiling fans would be the same as the proposed test method for all other low volume ceiling fans; (2) clarify that low-volume ceiling fans should be tested at low and high speeds; (3) eliminate the requirement to use a test cylinder; and (4) add a test method for power consumption in standby mode.

In today's SNOPR, DOE proposes to: (1) not require testing of a ceiling fan if the plane of rotation of the ceiling fan's blades cannot be within 45 degrees of horizontal; (2) test high-volume small-diameter ceiling fans based on the current DOE ceiling fan test procedure; (3)

require all ceiling fans with blade spans less than or equal to seven feet be mounted directly to the real ceiling during testing; (4) increase the number of speeds at which ceiling fans with blade spans greater than seven feet are tested, and also clarify the weighting associated with each speed in the energy efficiency metric; and (5) update the test room dimensions for all ceiling fans with blade spans greater than seven feet.

DOE estimated the cost to test a low-volume ceiling fan based on estimates from third-party testing facilities of the cost to perform the current ENERGY STAR test procedure for ceiling fans, which is similar to DOE's proposed test procedure, and the changes in cost associated with the key differences between the two test procedures. DOE's proposed test procedure for low-volume ceiling fans differs from the current ENERGY STAR test procedure in that it (1) requires testing at only two fan speeds instead of three, (2) requires mounting the ceiling fan to the real ceiling, (3) does not require the use of a test cylinder, (4) requires less warm up time before testing at low speed, (5) requires adjusting the height of the air velocity sensors, and (6) requires standby-mode testing.

In aggregate, DOE estimates that these differences will result in a lower test cost for the proposed DOE test procedure for low-volume ceiling fans when compared to the ENERGY STAR test procedure for ceiling fans. Testing at only two speeds instead of three yields a total test time that is approximately 35 minutes shorter than the ENERGY STAR test procedure. The proposed test procedure would also require mounting ceiling fans to the real ceiling, which would involve a one-time lab cost for a mechanism that allows for the adjustment of the height of the air velocity sensors to keep the distance between the bottom of the fan blades and the air velocity sensor heads at a specified vertical distance (43 inches). Based on the materials

employed and test quotes from third-party labs, DOE estimates the one-time cost to construct a mechanism to allow for the adjustment of the height of the air velocity sensors is less than $2000. Once the mechanism is constructed, it can be used to test all low-volume ceiling fans, and therefore would not add substantial test cost thereafter.

DOE's proposed test procedure, which would not require use of a test cylinder, also eliminates any potential costs associated with purchasing new test cylinders. If the test procedure required the use of test cylinders, then a new cylinder would be necessary to test any ceiling fan with a diameter that does not correspond to one of the cylinders in a test lab's existing inventory. Based on discussions with third-party testing facilities, DOE estimates that new test cylinders would cost approximately $2000-3000 per cylinder. By not using a cylinder, these costs will be avoided. Not requiring a test cylinder also shortens the test time of DOE's proposed test procedure relative to ENERGY STAR's test procedure for all low-volume ceiling fans, because time is not required to put a test cylinder in place for each test (estimated to take 15 minutes). Additionally, DOE's proposed test procedure only requires 15 minutes of warm up time before testing at low speed compared to 30 minutes in the ENERGY STAR test procedure, further reducing the relative amount of time required for DOE's proposed test procedure by 15 minutes. In total, DOE estimates that the typical time to perform the proposed test procedure will be shorter by 65 minutes compared to ENERGY STAR's test procedure.

The test procedure NOPR proposed to add a requirement for standby-mode testing for ceiling fans with standby functionality. A study performed by Lawrence Berkeley National

Laboratory found that 7.4% of low-volume ceiling fans have standby capability.[10] Using the quotes provided by third-party testing facilities, DOE estimates that the standby test for all ceiling fans with standby functionality will cost $200 per basic model.

Based on all of the differences between the test procedure proposed and the ENERGY STAR test procedure, and estimates from third-party testing facilities of the labor costs associated with these differences, DOE estimates that the test procedure proposed for standard, hugger and multi-head ceiling fans will cost $1500 on average per basic model, once the mechanism for the adjustment of the height of the air velocity sensors is constructed. Therefore, DOE estimates that the total weighted average test cost for the proposed test procedure and standby testing for standard, hugger and multi-head ceiling fans will be $1515. For multi-mount ceiling fans, DOE estimates that the test cost will be approximately double the cost for standard, hugger and multi-head ceiling fans.

For the approximately 25-35 small business manufacturers of low-volume ceiling fans that DOE identified, the number of basic models produced per manufacturer varies significantly from one to approximately 80. DOE notes that standard, hugger and multi-head ceiling fans represent about 95% of basic models for low-volume ceiling fans and multi-mount ceiling fans represent about 5% of basic models for low-volume ceiling fans. Therefore, based on the test cost per ceiling fan basic model, the weighted average testing cost in the first year would range from approximately $1515 to $127,243 for small manufacturers of ceiling fans. DOE expects

[10] Kantner, C. L. S., S. J. Young, S. M. Donovan, and K. Garbesi. *Ceiling Fan and Ceiling Fan Light Kit Use in the U.S.—Results of a Survey on Amazon Mechanical Turk*. 2013. Lawrence Berkeley National Laboratory: Berkeley, CA. Report No. LBNL-6332E. http://www.escholarship.org/uc/item/3r67c1f9.

this cost to be lower in subsequent years because only new or redesigned ceiling fan models would need to be tested.

The proposed test method for ceiling fans with blade span less than or equal to seven feet is also applicable to high-volume small-diameter ceiling fans. The key differences between the proposed test method for low-volume ceiling fans and high-volume small-diameter ceiling fans are that high-volume small-diameter ceiling fans require testing at only one fan speed instead of two speeds. DOE estimates that the test costs for high-volume small-diameter fans are reduced by $175 per basic model due to testing at one speed. Therefore a typical test for a single-headed high-volume small-diameter ceiling fan would cost approximately $1325 per basic model. DOE did not find accurate data on the percentage of high-volume small-diameter fans with standby capability, though DOE located some high-volume small-diameter fans without standby capability in web searches. To provide a conservative cost estimate, DOE made the assumption that all high-volume small-diameter fans should be tested for standby power. DOE estimates that the total test cost for the proposed test procedure and standby testing for a single-headed high-volume small-diameter ceiling fans will be $1525.

For the approximately 10-15 small business manufacturers of high-volume small-diameter ceiling fans that DOE identified, the number of basic models produced per manufacturer varies significantly from one to approximately 30. Therefore, based on the test cost per ceiling fan basic model, the testing cost in the first year would range from approximately $1525 to $45,750 for small manufacturers of high-volume small-diameter ceiling fans. DOE expects this cost to be lower in subsequent years because only new or redesigned ceiling fan models would need to be tested.

DOE estimated the cost to test a high-volume large-diameter ceiling fan based on discussions with testing facilities capable of performing the AMCA 230 test procedure as well as cost estimates based on the time and labor costs necessary to perform the proposed test procedure on high-volume large-diameter ceiling fans. DOE estimates that the one-time cost for a lab to buy a load-cell, a fabricated load-cell frame, power meter, and one air velocity sensor is approximately $4500. DOE estimates that the test procedure proposed in this SNOPR for high-volume large-diameter ceiling fans will cost manufacturers on average $7500 per basic model. Hence, DOE estimates that the total test cost for the proposed test procedure and standby testing for a high-volume large-diameter ceiling fans will be $7700.

For the approximately 5-10 small business manufacturers of high-volume large-diameter ceiling fans that DOE identified, the number of basic models produced per manufacturer varies from one to 30. Therefore, based on the test cost per ceiling fan basic model, the testing cost in the first year would range from approximately $7700 to $231,000 for small manufacturers of high-volume large-diameter ceiling fans. DOE expects this cost to be lower in subsequent years because only new or redesigned ceiling fan models would need to be tested.

DOE used company reports from Hoovers.com, information from manufacturers' Web sites and feedback from manufacturers to estimate the revenue for the small business manufacturers of low and high-volume ceiling fans identified. The median revenue of the small business manufacturers of low-volume ceiling fans is approximately $15M. Relative to the median revenue for a small business manufacturer, the total testing cost ranges from 0.01 percent to 0.85 percent of the median revenue. The median revenue of the small business manufacturers of high-volume small-diameter ceiling fans is approximately $11M. Relative to the median

revenue for a small business manufacturer of high-volume ceiling fans, the total testing cost ranges from 0.01 percent to 0.42 percent of the median revenue. The median revenue of the small business manufacturers of high-volume large-diameter ceiling fans is approximately $9M. Relative to the median revenue for a small business manufacturer of high-volume ceiling fans, the total testing cost ranges from 0.09 percent to 2.6 percent of the median revenue.

For both low and high-volume ceiling fans, DOE does not expect that small manufacturers would necessarily have fewer basic models than large manufacturers, because ceiling fans are highly customized throughout the industry. A small manufacturer could have the same total cost of testing as a large manufacturer, but this cost would be a higher percentage of a small manufacturer's annual revenues. DOE requests comments on its analysis of burden to small businesses for testing ceiling fans according to the proposed test procedure.

(5) Relevant Federal rules which may duplicate, overlap or conflict with the proposed rule.

DOE is not aware of any other Federal rules that would duplicate, overlap or conflict with the rule being proposed.

(6) Description of any significant alternatives to the proposed rule.

DOE considered a number of industry and governmental test procedures that measure the efficiency of ceiling fans to develop the proposed test procedure in today's rulemaking. There appear to be two common approaches to testing ceiling fans: An approach based on using air

velocity sensors to calculate airflow, such as the current DOE test procedure for ceiling fans, ENERGY STAR's test procedure, and CAN/CSA-C814-10, and an approach based on using a load cell to measure thrust, such as AMCA 230.

In principle, either approach could be used to measure the airflow efficiency of all ceiling fans, but maintaining consistency with industry practice would minimize test burden for all ceiling fan manufacturers. Though a load-cell based approach appears to be a potentially simpler method of estimating airflow efficiency, in industry, low-volume ceiling fans have historically been tested according to the air-velocity sensor based approach. High-volume large-diameter ceiling fans, on the other hand, have historically been tested according to the load-cell based approach. It also appears to be cost-prohibitive to scale up the air-velocity sensor based approach to the high-volume large-diameter ceiling fans currently on the market given the number of sensors that would be required to cover ceiling fans 24 feet in diameter and the cost of constructing an appropriate rotating sensor arm.

DOE seeks comment and information on any alternative test methods that, consistent with EPCA requirements, would reduce the economic impact of the rule on small entities. DOE will consider the feasibility of such alternatives and determine whether they should be incorporated into the final rule.

C. Review Under the Paperwork Reduction Act of 1995

All collections of information from the public by a Federal agency must receive prior approval from OMB. DOE has established regulations for the certification and recordkeeping requirements for covered consumer products and industrial equipment. 10 CFR part 429, subpart

B. Currently, the certification requirement for ceiling fans only addresses design standards.[11] In an application to renew the OMB information collection approval for DOE's certification and recordkeeping requirements, DOE included an estimated burden for manufacturers of ceiling fans in case DOE ultimately issues a coverage determination and sets energy conservation standards for these products. OMB has approved the revised information collection for DOE's certification and recordkeeping requirements. 80 FR 5099 (January 30, 2015). DOE estimated that it will take each respondent approximately 30 hours total per company per year to comply with the certification and recordkeeping requirements based on 20 hours of technician/technical work and 10 hours clerical work to actually submit the Compliance and Certification Management System (CCMS) templates. This rulemaking would include recordkeeping requirements on manufacturers that are associated with executing and maintaining the test data for these products. DOE notes that the certification requirements would be established in a final rule establishing energy conservation standards for ceiling fans. DOE recognizes that recordkeeping burden may vary substantially based on company preferences and practices. DOE requests comment on this burden estimate.

D. Review Under the National Environmental Policy Act of 1969

In this proposed rule, DOE proposes test procedure amendments that it expects will be used to develop and implement future energy conservation standards for ceiling fans. 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

[11] DOE collects fan performance information through its Compliance Certification Management System (CCMS) on behalf of the Federal Trade Commission (FTC); however, that data collection is covered under an OMB Control Number issued to FTC.

implementing regulations at 10 CFR part 1021. Specifically, this proposed rule would amend the existing test procedures without affecting the amount, quality, or distribution of energy usage, and, therefore, would not result in any environmental impacts. Thus, this rulemaking is covered by Categorical Exclusion A5 under 10 CFR part 1021, subpart D, which applies to any rulemaking that interprets or amends an existing rule without changing the environmental effect of that rule. 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. 10, 1999), imposes certain requirements on Federal 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 (Mar. 14, 2000)). DOE has examined this proposed rule and has tentatively 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. Regarding the review required by section 3(a), 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 tentatively 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 them. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. (62 FR 12820 (Mar. 18, 1997)). (This policy is also available at http://energy.gov/gc/office-general-counsel.) DOE examined this proposed rule according to UMRA and its statement of policy and has tentatively determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector, of $100 million or more in any year. Accordingly, no further assessment or analysis is required under UMRA.

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 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

Pursuant to Executive Order 12630, "Governmental Actions and Interference with Constitutionally Protected Property Rights," 53 FR 8859 (Mar. 18, 1988), DOE has determined 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 Federal agencies to review most disseminations of information to the public under information quality 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). 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 OIRA at 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 promulgates or is expected to lead to promulgation of a final rule, and that: (1) Is a significant regulatory action under Executive Order 12866, or any successor order; and (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.

Today's regulatory action to amend the test procedure for measuring the energy efficiency of ceiling fans is not a significant regulatory action under Executive Order 12866 or any successor order. 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 for this rulemaking.

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 et seq.), DOE must comply with all laws applicable to the former Federal Energy Administration, including section 32 of the Federal Energy Administration Act of 1974 (Pub. L. 93-275), as amended by the Federal Energy Administration Authorization Act of 1977 (Pub. L. 95-70). (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 FTC concerning the impact of the commercial or industry standards on competition.

This proposed rule would incorporate testing methods contained in the following commercial standard: ANSI/AMCA Standard 230-12, "Laboratory Methods of Testing Air Circulating Fans for Rating and Certification." The Department has evaluated this standard and is unable to conclude whether it fully complies with the requirements of section 32(b) of the FEAA, (i.e., that it was developed in a manner that fully provides for public participation, comment, and review). DOE will consult with the Attorney General and the Chairman of the FTC concerning the impact on competition of requiring manufacturers to use the test methods contained in this standard prior to prescribing a final rule.

M. Description of Material Incorporated by Reference

In this SNOPR, DOE proposes to incorporate by reference the test standard published by ANSI/AMCA, titled "Air Movement and Control Association Laboratory Methods of Testing Air Circulating Fans for Rating and Certification," ANSI/AMCA 230-12. ANSI/AMCA 230-12 is an industry accepted test standard that specifies test methods for ceiling fans with blade spans less than six feet (and other air circulating fans) and is applicable to products sold in North America. The test procedures proposed in this SNOPR reference ANSI/AMCA 230-12 for the test apparatus and instructions for testing ceiling fans, as specified in Section 3 ("Units of Measurement"), Section 4 ("Symbols and Subscripts"), Section 5 ("Definitions"), Section 6 ("Instruments and Methods of Measurement"), and Section 7 ("Equipment and Setups") of ANSI/AMCA 230-12. ANSI/AMCA 230-12 is readily available on AMCA's website at http://www.amca.org/store/.

DOE also proposes to incorporate by reference the test standard published by IEC, titled "Household electrical appliances—Measurement of standby power," IEC 62301 (Edition 2.0). IEC 62301 is an industry accepted test standard that specifies methods for measuring the standby mode power of electrical products and is applicable to products sold in North America. The test procedures proposed in this SNOPR reference sections of IEC 62301 that address test conditions and procedures for measuring the standby mode power of ceiling fans capable of standby mode operation. IEC 62301 is readily available on IEC's website at http://webstore.iec.ch/.

V. Public Participation

A. Submission of Comments

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

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

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

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

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

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

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

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

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

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

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

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

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

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

B. Issues on Which DOE Seeks Comment

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

1. Instead of specifically defining "air circulator" and exempting air circulators from the test procedure, DOE proposes to not subject a ceiling fan to the test procedure if the plane of rotation of the ceiling fan's blades cannot be within 45 degrees of horizontal. DOE requests comment on this approach.

2. DOE seeks comment on its proposal to test high-volume small-diameter ceiling fans based on the low-volume ceiling fans test procedures proposed in the NOPR, with the distinction that high-volume small-diameter ceiling fans would be tested at only high speed.

3. DOE seeks comment and any available data on average daily hours of use, fan speeds utilized, and fraction of time spent at each speed for high-volume small-diameter ceiling fans.

4. DOE seeks comment on the percentage of high-volume small diameter ceiling fans that come with standby capability.

5. DOE seeks comment on its proposal to mount all ceiling fans with blade spans less than or equal to seven feet to the real ceiling during testing.

6. DOE seeks comment on its proposal to test all ceiling fans with blade spans greater than seven feet at five equally-spaced speeds, specifically 20%, 40%, 60%, 80% and 100% of maximum speed achievable. DOE also specifically seeks information on whether there are any ceiling fans with blade spans greater than seven feet for which the proposed test procedure in this SNOPR could not be applied (i.e., any ceiling fans larger than seven feet in diameter that could not achieve the five speeds specified).

7. DOE seeks comment on the proposed daily hours of use for ceiling fans larger than seven feet in diameter.

8. DOE seeks comment on its proposal to harmonize the test room dimensions for testing high-volume large-diameter ceiling fans with the dimensions expected to be set forth in an updated version of AMCA 230.

VI. Approval of the Office of the Secretary

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

List of Subjects

10 CFR Part 429

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

10 CFR Part 430

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

Issued in Washington, DC, on May 26, 2015.

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

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

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

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

Authority: 42 U.S.C. 6291-6317.

2. Section 429.32 is amended by revising paragraph (a) to read as follows:

§429.32 Ceiling fans.

(a) *Determination of represented value*. Manufacturers must determine the represented value, which includes the certified rating, for each basic model of ceiling fan by testing, in conjuction with the following sampling provisions:

(1) The requirements of §429.11 are applicable to ceiling fans; and

(2) For each basic model of ceiling fan selected for testing, a sample of sufficient size shall be randomly selected and tested to ensure that—

(A) Any represented value of the efficiency or airflow shall be less than or equal to the lower of:

(1) The mean of the sample, where:

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

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

(2) The lower 90 percent confidence limit (LCL) of the true mean divided by 0.9, where:

$$LCL = \bar{x} - t_{0.90}(\frac{s}{\sqrt{n}})$$

And $\bar{x}$ is the sample mean; s is the sample standard deviation; n is the number of samples; and $t_{0.90}$ is the t statistic for a 90% one-tailed confidence interval with n-1 degrees of freedom (from Appendix A to subpart B); and

(B) Any represented value of the wattage shall be greater than or equal to the higher of:

(1) The mean of the sample, where:

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

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

(2) The upper 95 percent confidence limit (UCL) of the true mean divided by 1.1, where:

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

And $\bar{x}$ 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% one-tailed confidence interval with n-1 degrees of freedom (from Appendix A to subpart B).

* * * * *

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

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

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

4. Section 430.2 is amended by adding the definitions for “high-volume ceiling fan,” “hugger ceiling fan,” “low-volume ceiling fan,” “multi-mount ceiling fan,” and “standard ceiling fan” in alphabetical order to read as follows:

§430.2 Definitions.

*** * * * ***

High-volume ceiling fan means a ceiling fan that:

(1) Is greater than 7 feet in diameter; or

(2) Has a blade thickness of less than 3.2 mm at the edge or a maximum tip speed that exceeds the threshold in the table in the definition of low-volume ceiling fan in this section and has a maximum airflow volume greater than 5,000 CFM.

* * * * *

Hugger ceiling fan means a ceiling fan where the lowest point on the fan blades is no more than ten inches from the ceiling.

* * * * *

Low-volume ceiling fan means a ceiling fan that:

(1) Is less than or equal to 7 feet in diameter; and

(2) Has a blade thickness greater than or equal to 3.2 mm at the edge and a maximum tip speed less than or equal to the limit in the table in this definition, or has a maximum airflow volume less than or equal to 5,000 CFM.

Low-Volume Ceiling Fans, 7 Feet or Less in Diameter

Airflow	Thickness (t) of Edges of Blades	Maximum Speed at Tip of Blades

Direction	mm	inch	m/s	feet per minute
Downward-only	$4.8 > t \geq 3.2$	$3/16 > t \geq 1/8$	16.3	3,200
Downward-only	$t \geq 4.8$	$t \geq 3/16$	20.3	4,000
Reversible	$4.8 > t \geq 3.2$	$3/16 > t \geq 1/8$	12.2	2,400
Reversible	$t \geq 4.8$	$t \geq 3/16$	16.3	3,200

* * * * *

Multi-mount ceiling fan means a ceiling fan that can be mounted in both the standard and hugger ceiling fan configurations.

* * * * *

Standard ceiling fan means a ceiling fan where the lowest point on the fan blades is more than ten inches from the ceiling.

* * * * *

5. Section 430.3 is amended by:

a. Adding paragraph (d)(20); and

b. Removing in paragraph (p)(4), "and X to subpart B" and adding in its place, "U and X to subpart B of this part".

The addition reads as follows:

§430.3 Materials incorporated by reference.

*** * * * ***

(d) *** * ***

(20) ANSI/AMCA 230-12 ("AMCA 230"), Air Movement and Control Association Laboratory Methods of Testing Air Circulating Fans for Rating and Certification, approved February 22, 2012, IBR approved for appendix U to subpart B of this part.

*** * * * ***

6. Section 430.23 is amended by revising paragraph (w) to read as follows:

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

*** * * * ***

(w) *Ceiling fans.* The efficiency of a ceiling fan, expressed in cubic feet per minute per watt (CFM/watt), shall be measured in accordance with sections 2.3, 2.5, 2.6 and 3 of appendix U to subpart B of this part.

*** * * * ***

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

APPENDIX U TO SUBPART B OF PART 430—UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF CEILING FANS

Prior to [DATE 180 DAYS AFTER PUBLICATION OF THE FINAL RULE IN THE FEDERAL REGISTER], manufacturers must make any representations with respect to the energy use or efficiency of ceiling fans, except hugger ceiling fans, multi-mount ceiling fans in the hugger configuration, and high-volume ceiling fans, as defined in 10 CFR 430.2 in accordance with the results of testing pursuant to this Appendix U or the procedures in Appendix U as it appeared at 10 CFR part 430, subpart B, Appendix U, in the 10 CFR parts 200 to 499 edition revised as of January 1, 2015. On or after [DATE 180 DAYS AFTER DATE OF PUBLICATION OF THE FINAL RULE], manufacturers of ceiling fans must make any representations with respect to energy use or efficiency in accordance with the results of testing pursuant to this appendix.

1. Definitions:

1.1. *Airflow* means the rate of air movement at a specific fan-speed setting expressed in cubic feet per minute (CFM).

1.2. *Ceiling fan efficiency* means the ratio of the total airflow to the total power consumption, in units of cubic feet per minute per watt (CFM/W).

1.3. *High speed* means the highest available ceiling fan speed.

1.4. *20% speed* means the ceiling fan speed at which the blade revolutions per minute (RPM) are measured to be 20% of the blade RPM measured at high speed.

1.5. *40% speed* means the ceiling fan speed at which the blade RPM are measured to be 40% of the blade RPM measured at high speed.

1.6. *60% speed* means the ceiling fan speed at which the blade RPM are measured to be 60% of the blade RPM measured at high speed.

1.7. *80% speed* means the ceiling fan speed at which the blade RPM are measured to be80% of the blade RPM measured at high speed.

1.8. *Low speed* means the lowest available ceiling fan speed.

1.9. *Multi-head ceiling fan* means a ceiling fan with more than one fan head, i.e., more than one set of rotating fan blades.

1.10. *Total airflow* means the sum of the product of airflow and hours of operation at all tested speeds.

2. General Instructions, Test Apparatus, and Test Measurement:

General instructions apply to characterizing the energy performance of both low-volume and high-volume ceiling fans. The test apparatus and test measurement used to characterize energy performance depend on the ceiling fan's blade span and, if the blade span is less than or equal to

seven feet, whether the ceiling fan is low-volume or high-volume. If the plane of rotation of a ceiling fan's blades is not less than or equal to 45 degrees from horizontal, or cannot be adjusted based on the manufacturer's specifications to be less than or equal to 45 degrees from horizontal, the ceiling fan is not subject to these test procedures.

2.1. General instructions

Record measurements at the resolution of the test instrumentation. Round off calculations to the same number of significant digits as the previous step. Round the final ceiling fan efficiency value to the nearest whole number as follows:

2.1.1. A fractional number at or above the midpoint between the two consecutive whole numbers shall be rounded up to the higher of the two whole numbers; or

2.1.2. A fractional number below the midpoint between the two consecutive whole numbers shall be rounded down to the lower of the two whole numbers.

For multi-head ceiling fans, the effective blade span is the blade span of an individual fan head, if all fan heads are the same size. If the fan heads are of varying sizes, the effective blade span is the blade span of the largest fan head.

2.2. Test apparatus for ceiling fans with a blade span less than or equal to seven feet:

All instruments are to have tolerances within ±1% of reading, except for the air velocity sensors, which should have tolerances within ±5% of reading. Equipment is to be calibrated at least once a year to compensate for variation over time.

2.2.1. <u>Air Delivery Room Requirements</u>

The air delivery room dimensions are to be 20 ±0.75 ft. x 20 ±0.75 ft. with an 11 ±0.75 ft. high ceiling. The control room shall be constructed external to the air delivery room.

The ceiling shall be constructed of sheet rock or stainless plate. The walls shall be of adequate thickness to maintain the specified temperature and humidity during the test. The paint used on the walls, as well as the wall material, must be of a type that minimizes absorption of humidity and that keeps the temperature of the room constant during the test (e.g., oil-based paint).

The room shall have no ventilation other than an air conditioning and return system used to control the temperature and humidity of the room. The construction of the room must ensure consistent air circulation patterns within the room. Vents must have electronically-operated damper doors controllable from a switch outside of the testing room.

2.2.2. Equipment Set-Up

Hang the ceiling fan to be tested directly from the ceiling, according to the manufacturer's installation instructions. All standard and hugger ceiling fans shall be hung in the fan configuration that minimizes the distance between the ceiling and the fan blades. Multi-mount fans shall be hung and tested in two configurations: in the configuration that meets the definition of a standard ceiling fan, while minimizing the distance the ceiling and the lowest part of the fan blades; and in the configuration that meets the definition of a hugger ceiling fan, while minimizing the distance between the ceiling and the lowest part of the fan blades.

With the ceiling fan installed, adjust the height of the air velocity sensors to ensure the vertical distance between the lowest point on the ceiling fan blades and the air velocity sensors is 43 inches.

Either a rotating sensor arm or four fixed sensor arms can be used to take airflow measurements along four axes, labeled A-D. Axes A, B, C, and D are at 0, 90, 180, and 270 degree positions. Axes A – D can be designated either by using the four walls or four corners of the room. See Figure 1 of this appendix.

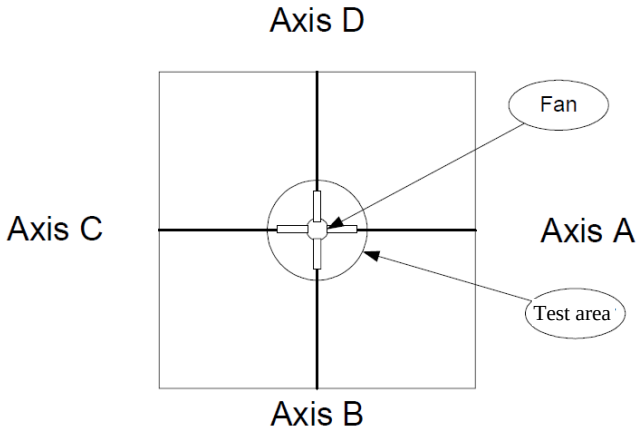

Figure 1 to Appendix U to Subpart B of Part 430: Testing Room and Sensor Arm Axes

The amount of exposed wiring must be minimized. All sensor lead wires must be stored under the floor, if possible.

The sensors shall be placed at exactly 4-inch intervals along a sensor arm, starting with the first sensor at the point where the four axes intersect. Do not touch the actual sensor prior to testing. Enough sensors shall be used to record air delivery within a circle 8 inches larger in diameter than the blade span of the ceiling fan being tested. A proper experimental set-up is shown in Figure 2 of this appendix.

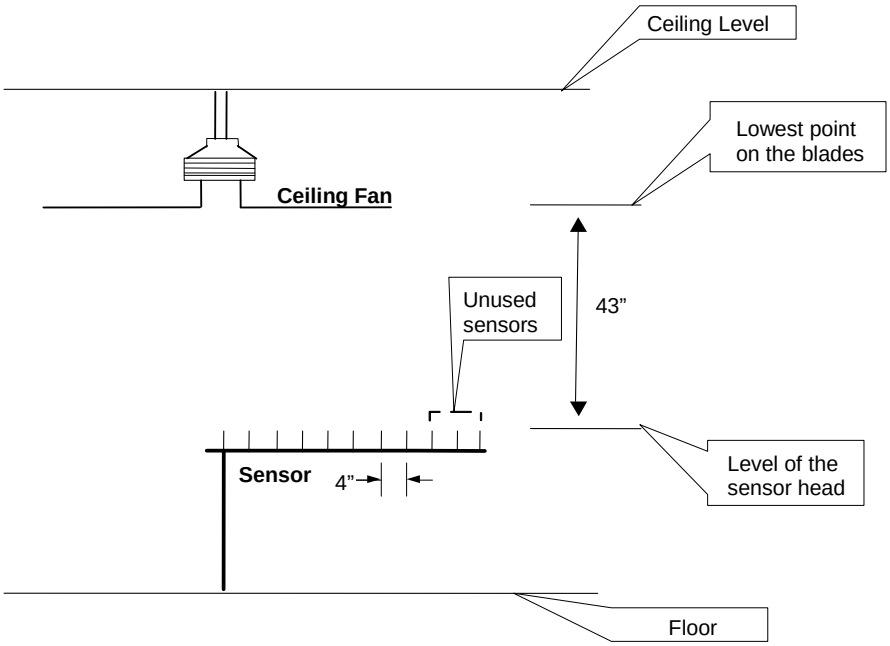

Figure 2 to Appendix U to Subpart B of Part 430: Air Delivery Room Set-Up for Ceiling Fans with Blade Spans Less than or Equal to Seven Feet

Table 1 of this appendix shows the appropriate number of sensors needed per each of four axes (including the first sensor at the intersection of the axes) for each fan size.

Table 1 to Appendix U to Subpart B of Part 430: Sensor Selection Guide

Fan Blade Span* (inches)	Number of sensors
36	6
42	7
44	7
48	7
52	8
54	8
56	8
60	9
72	10

*The fan sizes listed are intended simply to be illustrative and do not restrict which ceiling fan sizes can be tested.

An RPM (revolutions per minute) meter, or tachometer, should be installed so that the RPM of the ceiling fan blades can be measured during testing.

Use an RMS sensor capable of measuring power with an accuracy of ±1% to measure ceiling fan power consumption. Prior to testing, the test laboratory must verify the performance of the sensor and sensor software to be used during the test.

2.2.3. Multi-Head Ceiling Fan Test Set-Up

Multi-headed ceiling fans are to be hung from the ceiling such that one of the ceiling fan heads is directly over sensor 1 (*i.e.*, at the intersection of axes A, B, C, and D). The distance between the lowest point on the fan blades of the centered fan head and the air velocity sensors is to be such that it is the same as for all other low-volume ceiling fans (see Figure 2 of this appendix). Switching on only the centered fan head, the airflow measurements are to be made in the same

manner as for all other ceiling fans with blade spans less than or equal to seven feet. The power consumption measurements are to be made separately, with all fan heads on.

2.2.4. Test Set-Up for Ceiling Fans with Airflow Not Directly Downward

For ceiling fans where the airflow is not directly downward, the ceiling fan head is to be adjusted such that the airflow is as vertical as possible prior to testing. The distance between the lowest point on the blades and the air velocity sensors should be the same as for all other low-volume ceiling fans (43 inches). For ceiling fans where a fully vertical orientation of airflow cannot be achieved, the ceiling fan is to be oriented such that any remaining tilt is aligned along one of the four sensor axes. Instead of measuring the air velocity for only those sensors directly beneath the ceiling fan, the air velocity is to be measured at all sensors along that axis, as well as the axis oriented 180 degrees with respect to that axis. For example, if the tilt is oriented along axis A, air velocity measurements are to be taken for all sensors along the A-C axis. No measurements would need to be taken along the B-D axis in this case.

2.3. Active mode test measurement for ceiling fans with blade spans less than or equal to seven feet.

2.3.1. Test conditions to be followed when testing:

- The temperature and humidity setting shall be 76 degrees ±2 degrees Fahrenheit and 50% ±5% relative humidity. These shall be held constant during the entire test process.
- Allow the sensors to be turned on and the fan to run for 15 minutes at each fan speed/setting before taking readings.
- If present, the ceiling fan light fixture is to be installed but turned off during testing.
- If present, any heater is to be installed but turned off during testing.

- The tests shall be conducted with the fan connected to a supply circuit with a voltage of (a) 120 V for fans rated on the nameplate from 105 to 125 V; and (b) 240 V for fans rated on the nameplate from 208 to 250 V. The test voltage shall not vary by more than ±1% during the tests.
- The test shall be conducted with the fan connected to a supply circuit at the rated frequency.
- Air conditioning vents shall be closed during testing.

2.3.2. Airflow and Power Consumption Testing Procedure:

Measure the airflow (CFM) and power consumption (watt) for low-volume ceiling fans at high and low speed. For high-volume ceiling fans with blade spans less than or equal to seven feet, measure the airflow and power consumption only at high speed.

Step 1: Make sure the transformer power is off. Hang fan and connect wires as directed by manufacturer's wiring instructions. Note: Assemble fan prior to the test; lab personnel must follow the instructions provided by the fan manufacturer. The fan blade assembly shall be balanced in accordance with the manufacturer's instructions to avoid excessive vibration of the motor assembly (at any speed) during operation.

Step 2: Adjust the height of the air-velocity sensors such that the lowest point on the fan blades is 43 inches above the height of the sensor heads.

Step 3: Set the first sensor arm (if using four fixed arms) or single sensor arm (if using a single rotating arm) to the 0 degree Position (Axis A). If necessary, use marking as reference. If using

a single rotating arm, adjust the sensor arm alignment until it is at the 0 degree position by remotely controlling the antenna rotator.

Step 4: Set software up to read and record air velocity, expressed in feet per minute (FPM) in 1 second intervals. (Temperature does not need to be recorded in 1 second intervals.) Record current barometric pressure.

Step 5: Allow test fan to run 15 minutes at rated voltage and at high speed. Turn off all environmental conditioning equipment entering the chamber (*e.g.*, air conditioning), close all doors and vents, and wait an additional 3 minutes prior to starting test session.

Step 6: Begin recording readings. Take 100 readings (100 seconds run-time) and save these data.

Step 7: Similarly, take 100 readings (100 seconds run-time) for Axes B, C, and D; save these data as well. If using four fixed sensor arms, the readings for all sensor arms should be taken simultaneously.

Step 8: Repeat steps 3 through 7 above on low fan speed for low-volume ceiling fans. Note: Ensure that temperature and humidity readings are held within the required tolerances for the duration of the test (all tested speeds). It may be helpful to turn on environmental conditioning equipment between test sessions to ready the room for the following speed test.

Step 9: If testing a multi-mount ceiling fan, repeat steps 1 through 8 with the ceiling fan hung in the configuration (either hugger or standard) not already tested.

If a multi-head ceiling fan includes more than one type of ceiling fan head, then test at least one of each unique type. A fan head with different construction that could affect air movement or power consumption, such as housing, blade pitch, or motor, would constitute a different type of fan head.

Measure power input at a point that includes all power-consuming components of the ceiling fan (but without any attached light kit or heater energized). Measure power continuously at the rated voltage that represents normal operation over the time period for which the airflow test is conducted for each speed, and record the average value of the power measurement at that speed in watts (W).

Measure ceiling fan power consumption simultaneously with the airflow test, except for multi-head ceiling fans. For multi-head ceiling fans, measure power consumption at each speed continuously for 100 seconds with all fan heads turned on, and record the average value at each speed in watts (W).

2.4. Test apparatus for ceiling fans with blade spans greater than seven feet:

The test apparatus and instructions for testing ceiling fans with blade spans greater than seven feet shall conform to the requirements specified in Section 3 ("Units of Measurement"), Section 4 ("Symbols and Subscripts"), Section 5 ("Definitions"), Section 6 ("Instruments and Methods of Measurement"), and Section 7 ("Equipment and Setups") of the Air Movement and Control Association (AMCA) International's "AMCA 230: Laboratory Methods of Testing Air Circulating Fans for Rating and Certification," February 22, 2012 (incorporated by reference, see §430.3), with the following modifications:

2.4.1. The test procedure is applicable to ceiling fans up to 24 feet in diameter.

2.4.2. A “ceiling fan” is defined as in 10 CFR 430.2.

2.4.3. For all ceiling fans, the minimum distance between the ceiling and the blades of a ceiling fan being tested is 40% of the ceiling fan blade span.

2.4.4. For all ceiling fans, the minimum distance between the floor and the blades of a ceiling fan being tested is the larger of: 1) 80% of the ceiling fan blade span, and 2) 15 feet.

2.4.5. For all ceiling fans, the minimum distance between the centerline of a ceiling fan being tested and walls and/or large obstructions is 150% of the ceiling fan blade span.

2.5. Active mode test measurement for ceiling fans with blade spans greater than seven feet: Calculate the airflow (CFM) and measure the power consumption (watt) for ceiling fans at high speed, 80% speed, 60% speed, 40% speed, and 20% speed. When testing at speeds other than high speed (i.e., X% speed where X is 80. 60, 40, or 20), ensure the average measured RPM corresponds to X% ± 1% of the average RPM at high speed (e.g., For testing at 80% speed, the average measured RPM should be between 79% and 81% of the average measured RPM during testing at high speed). If the average measured RPM falls outside of this tolerance, adjust the ceiling fan speed and repeat the test. Calculate the airflow and measure the power consumption in accordance with the test requirements specified in Section 8 (“Observations and Conduct of Test”) and Section 9 (“Calculations”) of AMCA 230 (incorporated by reference, see §430.3), with the following modifications:

2.5.1. Measure power consumption at a point that includes all power-consuming components of the ceiling fan (but without any attached light kit or heater energized).

2.5.2. Measure power consumption continuously at the rated voltage that represents normal operation over the time period for which the load differential test is conducted.

2.6. Test measurement for standby power consumption

Standby power consumption must be measured for all ceiling fans that offer one or more of the following user-oriented or protective functions:

- The ability to facilitate the activation or deactivation of other functions (including active mode) by remote switch (including remote control), internal sensor, or timer.
- Continuous functions, including information or status displays (including clocks), or sensor-based functions.

Standby power consumption must be measured after completion of active mode testing and after the active mode functionality has been switched off (i.e., the rotation of the ceiling fan blades is no longer energized). The ceiling fan must remain connected to the main power supply and be in the same configuration as in active mode (i.e., any ceiling fan light fixture should still be attached). Measure standby power consumption according to IEC 62301 (incorporated by reference, see §430.3) with the following modifications:

2.6.1. Allow 3 minutes between switching off active mode functionality and beginning the standby power test. (No additional time before measurement is required.)

2.6.2. Measure power consumption continuously for 100 seconds, and record the average value of the standby power measurement in watts (W).

3. Calculation of Ceiling Fan Efficiency from the Test Results:

The efficacy of a ceiling fan is the *ceiling fan efficiency* (as defined in section 1 of this appendix). Two ceiling fan efficiencies will be calculated for low-volume multi-mount ceiling fans: One efficiency will correspond to the ceiling fan being mounted in the hugger configuration, and the other efficiency will correspond to the ceiling fan being mounted in the standard configuration.

Using the airflow and power consumption measurements from section 2 (high and low speed for low-volume ceiling fans, only high speed for high-volume ceiling fans with blade spans less than or equal to seven feet) and section 3 (for all tested settings for ceiling fans with blade spans greater than seven feet) calculate the efficiency for any ceiling fan as follows:

$$\boldsymbol{Ceiling\ Fan\ Efficiency\ (CFM/W)} = \frac{\sum_i (\boldsymbol{CFM_i} \times \boldsymbol{OH_i})}{\boldsymbol{W_{Sb}} \times \boldsymbol{OH_{Sb}} + \sum_i (\boldsymbol{W_i} \times \boldsymbol{OH_i})} \qquad \textbf{Eq. 1}$$

Where:

CFM_i = airflow at speed *i*,

OH_i = operating hours at speed *i*,

W_i = power consumption at speed *i*,

OH_{Sb} = operating hours in standby mode, and

W_{Sb} = power consumption in standby mode.

Table 2 of this appendix specifies the daily hours of operation to be used in calculating ceiling fan efficiency:

Table 2 to Appendix U to Subpart B of Part 430: Daily Operating Hours for Calculating Ceiling Fan Efficiency

Daily Operating Hours for Low-Volume Ceiling Fans		
	No Standby	With Standby
High Speed	4.2	4.2
Low Speed	2.2	2.2
Standby Mode	0.0	17.6
Off Mode	17.6	0.0
Daily Operating Hours for High-Volume Ceiling Fans with Blade Spans Less than or Equal to Seven Feet		
	No Standby	With Standby
High Speed	12.0	12.0
Standby Mode	0.0	12.0
Off Mode	12.0	0.0
Daily Operating Hours for Ceiling Fans with Blade Spans Greater than Seven Feet		
	No Standby	With Standby
High Speed	1.8	1.8
80% Speed	3.5	3.5
60% Speed	3.6	3.6
40% Speed	2.0	2.0
20% Speed	4.1	4.1
Standby Mode	0.0	9.0
Off Mode	9.0	0.0

The effective area corresponding to each sensor used in the test method for ceiling fans with blade spans less than or equal to seven feet is to be calculated with the following equations:

For sensor 1, the sensor located directly underneath the center of the ceiling fan, the effective width of the circle is 2 inches, and the effective area is:

$$\boldsymbol{Effective\ Area\ (sq.ft.) = \pi\left(\frac{2}{12}\right)^2 = 0.0873} \qquad \textbf{Eq. 2}$$

For the sensors between sensor 1 and the last sensor used in the measurement, the effective area has a width of 4 inches. If a sensor is a distance *d*, in inches, from sensor 1, then the effective area is:

$$\boldsymbol{Effective\ Area\ (sq.ft.) = \pi\left(\frac{d+2}{12}\right)^2 - \pi\left(\frac{d-2}{12}\right)^2} \qquad \textbf{Eq. 3}$$

For the last sensor, the width of the effective area depends on the horizontal displacement between the last sensor and the point on the ceiling fan blades furthest radially from the center of the fan. The total area included in an airflow calculation is the area of a circle 8 inches larger in diameter than the ceiling fan blade span.

Therefore, for example, for a 42-inch ceiling fan, the last sensor is 3 inches beyond the end of the ceiling fan blades. Because only the area within 4 inches of the end of the ceiling fan blades is included in the airflow calculation, the effective width of the circle corresponding to the last sensor would be 3 inches. The calculation for the effective area corresponding to the last sensor would then be:

$$\boldsymbol{Effective\ Area\ (sq.ft.) = \pi\left(\frac{d+1}{12}\right)^2 - \pi\left(\frac{d-2}{12}\right)^2 = \pi\left(\frac{24+1}{12}\right)^2 - \pi\left(\frac{24-2}{12}\right)^2 = 3.076} \qquad \textbf{Eq. 4}$$

For a 46-inch ceiling fan, the effective area of the last sensor would have a width of 5 inches, and the effective area would be:

$$\boldsymbol{Effective\ Area\ (sq.ft.) = \pi\left(\frac{d+3}{12}\right)^2 - \pi\left(\frac{d-2}{12}\right)^2 = \pi\left(\frac{24+3}{12}\right)^2 - \pi\left(\frac{24-2}{12}\right)^2 = 5.345} \qquad \textbf{Eq. 5}$$

3.1.1. Ceiling fan efficiency calculations for multi-head ceiling fans

To determine the airflow at a given speed for a multi-head ceiling fan, measure the airflow for each fan head. Repeat for each fan head. Testing of each fan head is not required if the fan heads are essentially identical (i.e., do not have differences in construction such as housing, blade pitch, or motor could affect air movement or power consumption); instead, the measurements for one fan head can be used for each essentially identical fan head. Sum the measured airflow for each fan head included in the ceiling fan. The power consumption is the measured power consumption with all fan heads on.

Using the airflow and power consumption measurements from section 2 of this appendix, calculate ceiling fan efficiency for a multi-head ceiling fan as follows:

$$\boldsymbol{Ceiling\ Fan\ Efficiency\ (CFM/W) = \frac{\sum_i (CFM_i \times OH_i)}{W_{Sb} \times OH_{Sb} + \sum_i (W_i \times OH_i)}} \qquad \textbf{Eq. 1}$$

Where:

CFM_i = sum of airflow at a given speed for each head,

OH_i = operating hours at a given speed,

W_i = total power consumption at a given speed,

OH_{Sb} = operating hours in standby mode, and

W_{Sb} = power consumption in standby mode.

3.1.2. Ceiling fan efficiency calculations for ceiling fans with airflow not directly downward

Using a set of sensors that cover the same diameter as if the airflow were directly downward, the airflow at each speed should be calculated based on the continuous set of sensors with the largest air velocity measurements. This continuous set of sensors should be along the axis that the ceiling fan tilt is directed in (and along the axis that is 180 degrees from the first axis). For example, a 42-inch fan tilted toward axis A may create the pattern of air velocity shown in Figure 3 of this appendix. As shown in Table 1 of this appendix, a 42-inch fan would normally require 7 active sensors. However because the fan is not directed downward, all sensors must record data. In this case, because the set of sensors corresponding to maximum air velocity are centered 3 sensor positions away from the sensor 1 along the A axis, substitute the air velocity at A axis sensor 4 for the average air velocity at sensor 1. Take the average of the air velocity at A axis sensors 3 and 5 as a substitute for the average air velocity at sensor 2, take the average of the air velocity at A axis sensors 2 and 6 as a substitute for the average air velocity at sensor 3, etc. Lastly, take the average of the air velocities at A axis sensor 10 and C axis sensor 4 as a substitute for the average air velocity at sensor 7. Any air velocity measurements made along the B-D axis are not included in the calculation of average air velocity.

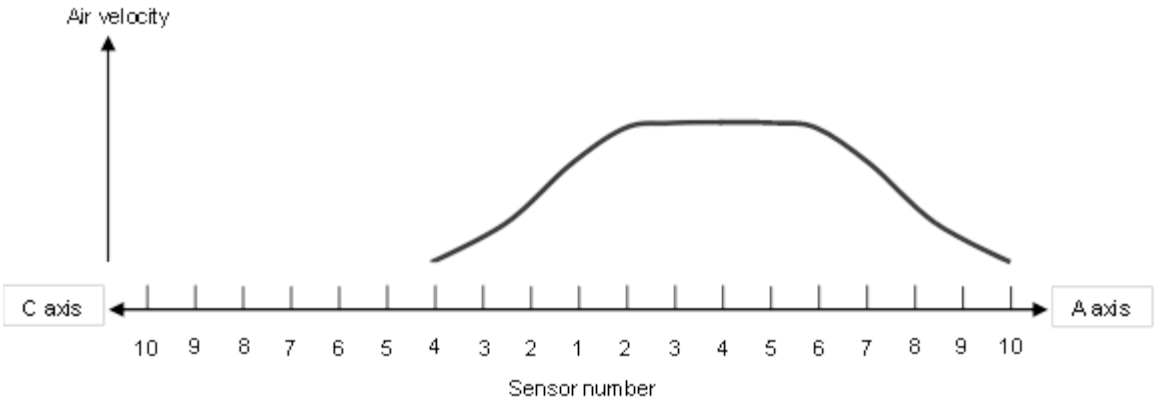

Figure 3: Example Air Velocity Pattern for Airflow Not Directly Downward