AMCA Members-Only Webinar: Review of Proposed U.S. Energy-Conservation Standards for Fans and Blowers

Participation Guidelines

- Audience members will be muted during the webinar.
- Questions can be submitted via the GoTo Webinar platform at any time and will be answered following the presentation.
- Reminder: This webinar is being recorded. The recording will be posted to the members-only section of the AMCA website within 48 hours.
- A link to a post-webinar survey will be e-mailed within a day. Please take a moment to complete.
- PDH credits are not available for today's webinar.

Q&A

To submit questions:

- On the attendee panel, select “Questions.”
- Type your question in the box, indicating the speaker your question is for.
- Click “Send.”

Questions will be answered at the end of the program.

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- Responsible for air movement product certifications and supporting standards, codes and regulatory activities
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Overview of Regulation and Schedule

Outline

- DOE Draft Energy Standard: Status, Future Steps
- Fan Energy Index: Levels and Calculations
- Tolerances and Surveillance Testing
- Air Circulating Fans
- Summary & Call to Action
- Q&A
- Bonus Slides for Discretionary Review

Status of Fan Regulations

- DOE Test Procedure
  - Published May 1, 2023
  - Corrected August 20, 2023
  - Took effect October 30, 2023
  - 34 manufacturers have extension to April 29, 2024
- California Title 20
  - Completed Nov. 22, 2022
  - Original effective date of Nov 22, 2023
  - Now updating language to adopt DOE test procedure
  - New effective date of April 29, 2024
  - Staff will communicate other changes when CEC finalizes language
  - Manufacturers can voluntarily file in compliance database; several already have
    - Bonus Slides has info on CEC Title 20 database

Status of Fan Regulations

- DOE Energy Standard “Notice of Proposed Rule” (NOPR)
  - Pre-publication sent Dec. 30, 2023
  - Official Federal Register publication Jan. 19
  - Live/Remote hearing on Feb. 21
  - Deadline for comments on March 19
  - Expected to be completed in 2024
  - Expected to take effect in 2029
  - Covers General Fans and Blowers (commercial/industrial fans/blowers)
  - Covers Air Circulating Fans (that are not ceiling fans)

Critical Links to DOE Websites

- DOE “Home Page” for Fan Regulation
  - **http://tinyurl.com/yckavb97**
  - **Has links to everything, including dockets**
- DOE test procedure:
  - General Fans and Blowers: Appendix A to Subpart J of 10 CFR Part 431
  - Circulating Fans: Appendix B to Subpart J of 10 CFR Part 431
- Draft Energy Standard (Notice of Proposed Rule – NOPR)
  - Text (HTML) version
  - PDF *Federal Register* version (after clicking on link, do File Save As…)
  - Has instructions for attending Feb. 21 hearing live or online
  - Has instructions for submitting comments directly to DOE

DOE Regulation: Two Parts

- **Test Procedure**
  - Definitions
  - Scope
  - Method of Test
  - Sampling Plan
  - Ratings Calculation
  - Penalties for Noncompliance
  - Deadline (90 days)

  - Final Rule: May 2023
  - Correction: August 2023
  - Effective date; October 30, 2023

- **Energy Standard**
  - Scope
  - Minimum Performance Requirements
  - Labeling (optional)
  - Certification (optional)
  - Surveillance
  - Penalties for Noncompliance
  - Deadline (5 years)

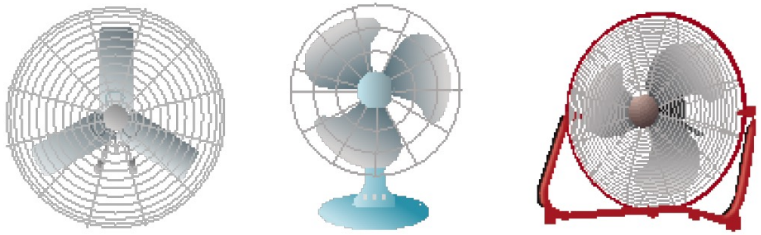
  - Draft currently under public review
  - Will complete in 2024
  - Take effect in 2029

Scope: Fan Sizes and Types

- General Fans and Blowers
  - Fan Size: 1 HP (motor) ≤ 150 HP (air power)
  - Regulatory Metric: Fan Energy Index (FEI)
  - Classes/Types
    - Radial housed fan
    - Centrifugal housed fan
    - Centrifugal inline fan
    - Centrifugal unhoused fan
    - Centrifugal power roof ventilator exhaust fan
    - Centrifugal power roof ventilator supply fan
    - Axial inline fan
    - Axial panel fan
    - Axial power roof ventilator fan

Scope: Fan Sizes and Types

- Air Circulating Fans



Unhoused Axial

Housed Axial

Covered if ≥ 125 W electrical input power at maximum speed

Housed centrifugal ACF are exempt from energy standard

- Carpet drying fans, for example

Scope Exclusions

- GFBs are not:

  (i) A radial housed unshrouded fan with blade diameter at tip less than 30 inches or a blade width of less than 3 inches;

  (ii) A safety fan;

  (iii) An induced flow fan;

  (iv) A jet fan;

  (v) A cross-flow fan;

  (vi) A fan manufactured exclusively to be powered by internal combustion engines;

  (vii) A fan that create a vacuum of 30 inches water gauge or greater;

  (viii) A fan that is designed and marketed to operate at or above 482 degrees Fahrenheit (250 degrees Celsius); or

See bonus slides for exclusions pertaining to fans embedded in equipment

Scope Differences from California Title 20

- DOE includes Embedded Fans as GFB
  - See Bonus Slides for specific inclusions and exclusions

- DOE includes Air Circulating Fans (ACF)
  - Ceiling fans covered by separate rule
  - Electrical input power ≥ 125 W at maximum speed

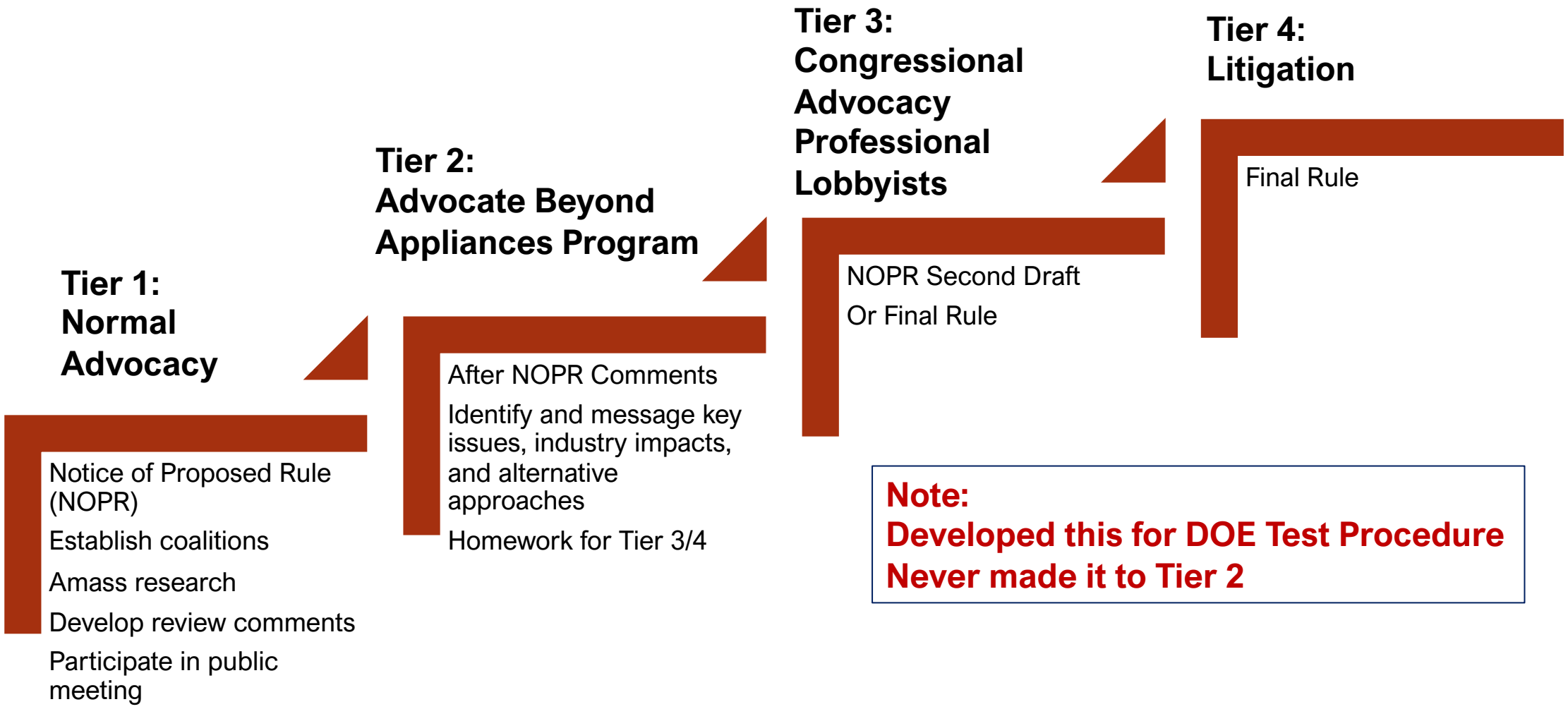
- Scope differences will likely remain after CEC changes Title 20

AMCA Response to NOPR

- Engaged committees:
  - N.A. Air Movement and Code Action Review Committee (AMCARC)
    - Energy Efficiency Subcommittee
  - Fan Engineering Committee
  - Marketing Committee

- Consultants
  - Tom Catania, Esq. – regulatory affairs
  - Nate Baker, Cadeo – Project planning; Fan Shipment Database Analyses
  - Tim Mathson, Retired – Fan engineering and FEI nuances

Tiered Advocacy Approach



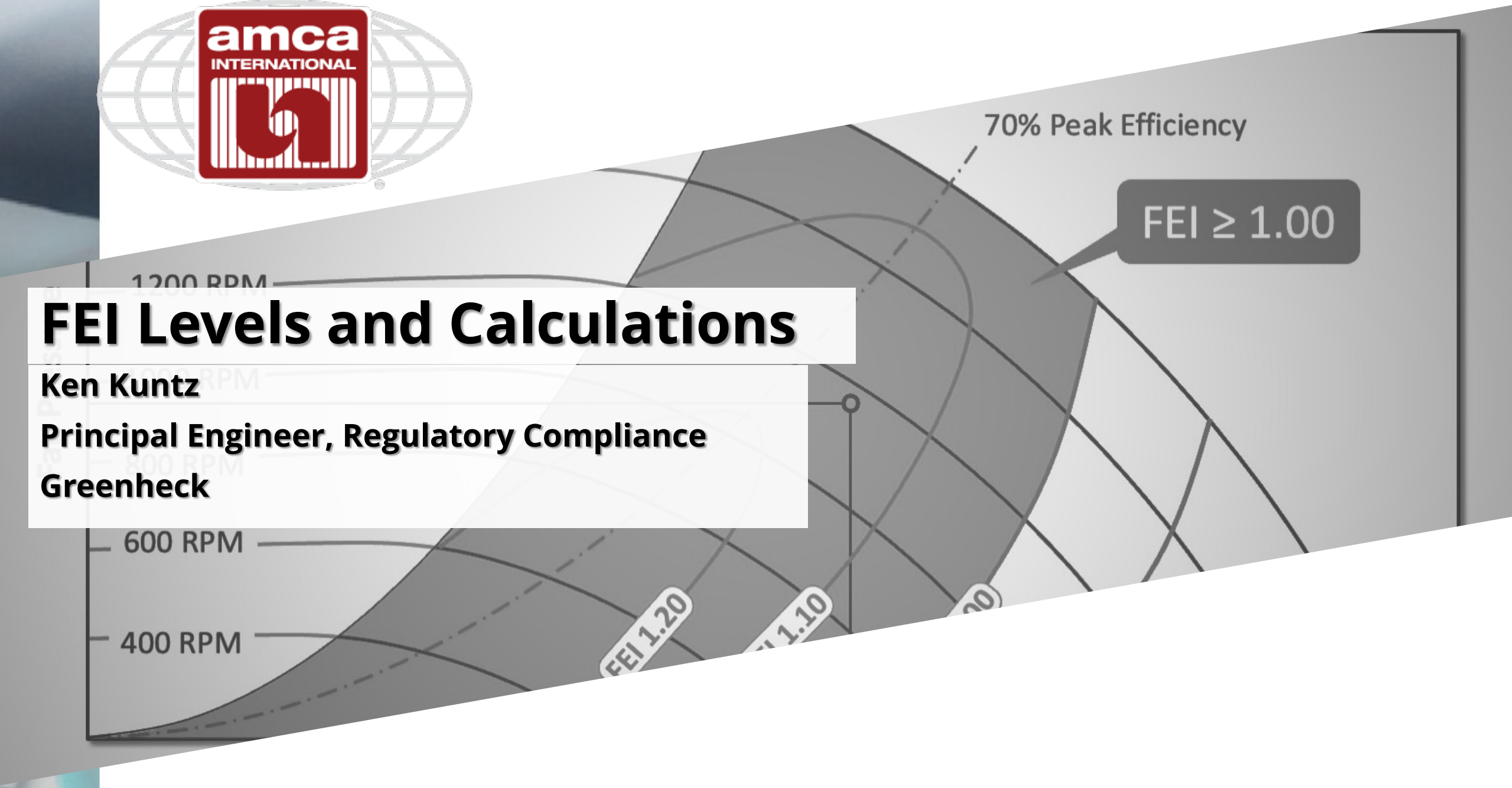
Note:
Developed this for DOE Test Procedure
Never made it to Tier 2

FEI Levels and Calculations

Ken Kuntz

Principal Engineer, Regulatory Compliance

Greenheck



Discussion Objective

- Review Equipment Classes designated by DOE
- Review minimum required FEI levels for each equipment class
- Overview of FEI modification coefficients
  - Example calculation

Equipment Classes

Table I-1 Proposed Energy Conservation Standards for GFBs

Equipment Class
Axial Inline
Axial Panel
Axial Power Roof Ventilator
Centrifugal Housed
Centrifugal Unhoused
Centrifugal Inline
Radial Housed
Centrifugal Power Roof Ventilator - Exhaust
Centrifugal Power Roof Ventilator - Supply

-9 basic equipment classes as defined in the test standard and follow AMCA 214 fan types

Equipment Classes

Table I-1 Proposed Energy Conservation Standards for GFBs

Equipment Class	With or Without Motor Controller
Axial Inline	Without
Axial Panel	Without
Axial Power Roof Ventilator	Without
Centrifugal Housed	Without
Centrifugal Unhoused	Without
Centrifugal Inline	Without
Radial Housed	Without
Centrifugal Power Roof Ventilator - Exhaust	Without
Centrifugal Power Roof Ventilator - Supply	Without
Axial Inline	With
Axial Panel	With
Axial Power Roof Ventilator	With
Centrifugal Housed	With
Centrifugal Unhoused	With
Centrifugal Inline	With
Radial Housed	With
Centrifugal Power Roof Ventilator - Exhaust	With
Centrifugal Power Roof Ventilator - Supply	With

-9 basic equipment classes as defined in the test standard

-9 additional equipment classes for fans with motor controllers

-Motor controller is any technology which allows motor speed control

Minimum FEI Requirements

Table I-1 Proposed Energy Conservation Standards for GFBs

Equipment Class	With or Without Motor Controller	Fan Energy Index (FEI)*
Axial Inline	Without	1.18
Axial Panel	Without	1.48
Axial Power Roof Ventilator	Without	0.85
Centrifugal Housed	Without	1.31
Centrifugal Unhoused	Without	1.35
Centrifugal Inline	Without	1.28
Radial Housed	Without	1.17
Centrifugal Power Roof Ventilator - Exhaust	Without	1.00
Centrifugal Power Roof Ventilator - Supply	Without	1.19
Axial Inline	With	1.18
Axial Panel	With	1.48
Axial Power Roof Ventilator	With	0.85
Centrifugal Housed	With	1.31
Centrifugal Unhoused	With	1.35
Centrifugal Inline	With	1.28
Radial Housed	With	1.17
Centrifugal Power Roof Ventilator - Exhaust	With	1.00
Centrifugal Power Roof Ventilator - Supply	With	1.19

-Minimum FEI values vary between equipment classes

-Range between 0.85 to 1.48

Multiplier Coefficient “A”

Table I-1 Proposed Energy Conservation Standards for GFBs

Equipment Class	With or Without Motor Controller	Fan Energy Index (FEI)*
Axial Inline	Without	1.18 * A
Axial Panel	Without	1.48 * A
Axial Power Roof Ventilator	Without	0.85 * A
Centrifugal Housed	Without	1.31 * A
Centrifugal Unhoused	Without	1.35 * A
Centrifugal Inline	Without	1.28 * A
Radial Housed	Without	1.17 * A
Centrifugal Power Roof Ventilator - Exhaust	Without	1.00 * A
Centrifugal Power Roof Ventilator - Supply	Without	1.19 * A
Axial Inline	With	1.18 * A* B
Axial Panel	With	1.48 * A* B
Axial Power Roof Ventilator	With	0.85 * A* B
Centrifugal Housed	With	1.31 * A* B
Centrifugal Unhoused	With	1.35 * A* B
Centrifugal Inline	With	1.28 * A* B
Radial Housed	With	1.17 * A* B
Centrifugal Power Roof Ventilator - Exhaust	With	1.00 * A* B
Centrifugal Power Roof Ventilator - Supply	With	1.19 * A* B

*A is a constant representing an adjustment in FEI for motor hp, which can be found in Table I-2. B is a constant representing an adjustment in FEI for motor controllers, which can be found in Table I-2

-Coefficient ”A” is an adjustment based upon motor horsepower applied to all equipment classes

Table I-2 Constants for GFB Proposed Energy Conservation Standards

Constant	Condition	Value
A	Motor hp < 100 hp	$A = 1.00$
	Motor hp ≥ 100 hp and ≤ 250 hp	$A = \frac{\eta_{mtr,2023act}}{\eta_{mtr,2014ref}}$

Multiplier Coefficient “A”

Condition	Value
Motor hp $<$ 100 hp	$A = 1.00$
Motor hp $\geq$ 100 hp and $\leq$ 250 hp	$A = \frac{\eta_{mtr,2023act}}{\eta_{mtr,2014ref}}$

-Coefficient ”A” Value =1.00 for motor hp < 100

-Is a ratio of motor efficiency values for hp > 100

-Range is ~1.0031 to 1.0095

	2	2	4	4	6	6	8	8
HP	Enclosed	Open	Enclosed	Open	Enclosed	Open	Enclosed	Open
100	1.009564	1.009615	1.008386	1.008386	1.008421	1.008421	1.009615	1.009564
125	1.004211	1.004251	1.008386	1.008386	1.008421	1.008421	1.009564	1.009564
150	1.004211	1.004251	1.004175	1.004175	1.008386	1.004193	1.009564	1.009564
200	1.004193	1.004211	1.003119	1.004175	1.008386	1.004193	1.009524	1.009564
250	1.004175	1.004211	1.003119	1.004175	1.004175	1.004175	1.004211	1.004211

Multiplier Coefficient “B”

- Coefficient ”B” is an adjustment for fans with Motor Controllers
- Based upon FEPact

Table I-1 Proposed Energy Conservation Standards for GFBs

Equipment Class	With or Without Motor Controller	Fan Energy Index (FEI)*
Axial Inline	Without	1.18 * A
Axial Panel	Without	1.48 * A
Axial Power Roof Ventilator	Without	0.85 * A
Centrifugal Housed	Without	1.31 * A
Centrifugal Unhoused	Without	1.35 * A
Centrifugal Inline	Without	1.28 * A
Radial Housed	Without	1.17 * A
Centrifugal Power Roof Ventilator - Exhaust	Without	1.00 * A
Centrifugal Power Roof Ventilator - Supply	Without	1.19 * A
Axial Inline	With	1.18 * A* B
Axial Panel	With	1.48 * A* B
Axial Power Roof Ventilator	With	0.85 * A* B
Centrifugal Housed	With	1.31 * A* B
Centrifugal Unhoused	With	1.35 * A* B
Centrifugal Inline	With	1.28 * A* B
Radial Housed	With	1.17 * A* B
Centrifugal Power Roof Ventilator - Exhaust	With	1.00 * A* B
Centrifugal Power Roof Ventilator - Supply	With	1.19 * A* B

*A is a constant representing an adjustment in FEI for motor hp, which can be found in Table I-2. B is a constant representing an adjustment in FEI for motor controllers, which can be found in Table I-2

Table I-2 Constants for GFB Proposed Energy Conservation Standards

Constant	Condition		Value
B	With Motor Controller	FEPact of < 20 kW (26.8 hp)	$B = \frac{FEP_{act} - Credit}{FEP_{act}}$; where: $Credit = 0.03 \times FEP_{act} + 0.08$ [SI] $Credit = 0.03 \times FEP_{act} + 0.08 \times 1.341$ [IP]
		FEPact of ≥ 20 kW (26.8 hp)	$B = 0.966$

Multiplier Coefficient “B”

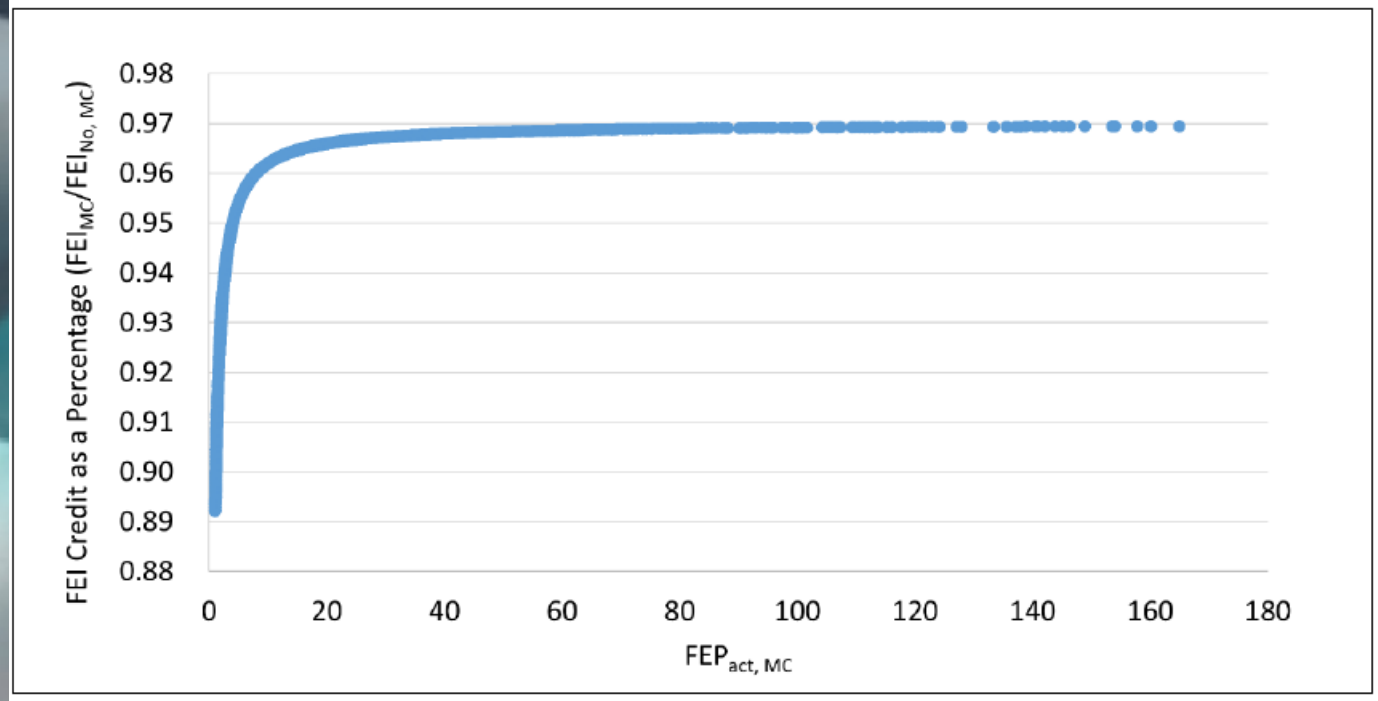


Figure 5.5.8 FEI Credit as a Percentage versus FEP_{act} for Fans Sold with a Motor Controller

-Adjustments range from ~0.88 to 0.966

- Constant 0.966 after 20kW or 26.8 hp

FEPact of < 20 kW (26.8 hp)	$B = \frac{FEP_{act} - Credit}{FEP_{act}}$; where: $Credit = 0.03 \times FEP_{act} + 0.08$ **[SI]** $Credit = 0.03 \times FEP_{act} + 0.08 \times 1.341$ **[IP]**
FEPact of ≥ 20 kW (26.8 hp)	$B = 0.966$

Example

Purchaser wants an axial panel fan at 6,000 cfm and 0.5” w.g.

- Software selection program returns a fan with
  - 2 hp motor
  - Non-synchronous speed (has speed control)
  - FEI = 1.35
  - FEPact = 1.02

Is this fan compliant?

Example – Determine “A” Coefficient

Customer wants a panel fan at 6,000 cfm and 0.5” w.g.

- Software selection program returns a fan with
  - 2 hp motor
  - Non-synchronous speed
  - FEI = 1.35
  - FEPact = 1.02

Use Requirements for fan with motor controller

Minimum Compliant FEI for an axial panel fan = 1.48 * A * B

Condition	Value
Motor hp $<$ 100 hp	$A = 1.00$
Motor hp $\geq$ 100 hp and $\leq$ 250 hp	$A = \frac{\eta_{mtr,2023act}}{\eta_{mtr,2014ref}}$

A=1.00 (below 100 hp) A=1.00

Example – Determine "B" Coefficient

Customer wants a panel fan at 6,000 cfm and 0.5" w.g.

- Software selection program returns a fan with
  - 2 hp motor
  - Non-synchronous speed
  - FEI = 1.35
  - FEPact = 1.02 kW

Minimum Compliant FEI for axial panel fan = 1.48 * A * B

A=1.00

B =

FEPact of < 20 kW (26.8 hp)	$B = \frac{FEP_{act} - Credit}{FEP_{act}}$; where: $Credit = 0.03 \times FEP_{act} + 0.08$ **[SI]** $Credit = 0.03 \times FEP_{act} + 0.08 \times 1.341$ **[IP]**
FEPact of ≥ 20 kW (26.8 hp)	$B = 0.966$

Credit = 0.03 X 1.02 + 0.08
=0.1106

B = (1.02 – 0.1106) / 1.02
=0.891

Example

Customer wants a panel fan at 6,000 cfm and 0.5” w.g.

- Software selection program returns a fan with
  - 2 hp motor
  - Non-synchronous speed (speed control)
  - FEI = 1.35
  - FEPact = 1.02 kW

Minimum Compliant FEI for axial panel fan = 1.48 * A * B
A =1.00
B = 0.891

= 1.48 * 1.00 * 0.891 = 1.318 required minimum FEI

1.35 > 1.318

Compliant fan!

Issue: DOE Proposed FEI Levels are High

Equipment Class	Fan Energy Index (FEI)
Axial Inline	1.18
Axial Panel	1.48
Axial Power Roof Ventilator	0.85
Centrifugal Housed	1.31
Centrifugal Unhoused	1.35
Centrifugal Inline	1.28
Radial Housed	1.17
Centrifugal Power Roof Ventilator - Exhaust	1.00
Centrifugal Power Roof Ventilator - Supply	1.19

*A if sold without a drive

*A*B if sold with a drive

A & B are adjustment parameters

Tolerances and Surveillance Testing

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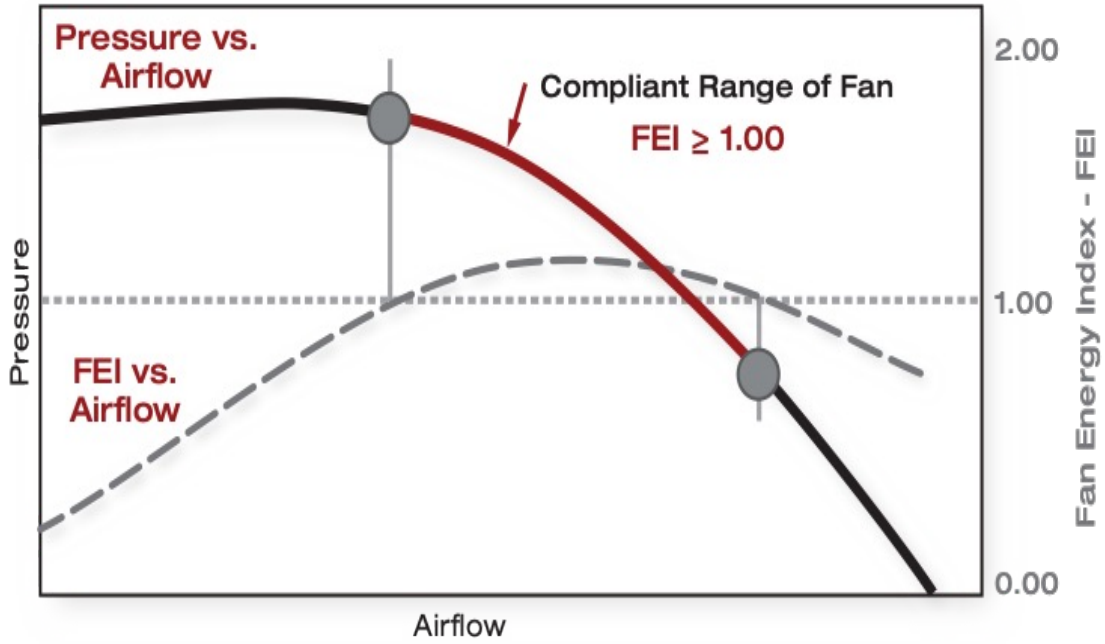
Director, Product Applications
Twin City Fan

Compliance per the DOE Test Procedure (TP)
10 CFR Parts 429, 430, 431, pages 27387 - 27394

- **§ 429.69 Fans and blowers.**
- (a) *Determination of represented values of fans and blowers other than air circulating fans.* A manufacturer must determine the represented values for each basic model, either by testing in conjunction with the applicable sampling provisions or by applying an AEDM as set forth in this section and in § 429.70(n). Manufacturers must update represented values to account for any change in the applicable motor standards in Table 5 of § 431.25.
- (iii) If only one unit is tested, at each duty point characterized by a flow and speed value, any represented value of fan energy index (''FEI''), or other measure of energy consumption of a basic model for which consumers would favor higher values shall be less than or equal to the tested value. Represented values must be rounded to the nearest hundredth.

27312 Federal Register / Vol. 88, No. 83 / Monday, May 1, 2023 / Rules and Regulations

DEPARTMENT OF ENERGY
10 CFR Parts 429 and 430
[EERE–2021–BT–TP–0021]
RIN 1904–AF17
Energy Conservation Program: Test Procedure for Fans and Blowers
AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.
ACTION: Final rule.



DOE TP: Departure from AMCA 214 FEI calculation for Motors + Controllers - page 27348

- Therefore, DOE is not allowing the use of section 6.4.2.4 of AMCA 214–21. Instead, DOE requires that fans with motor and controller be tested in accordance with section 6.1 of AMCA 214–21. (Wire to Air Testing). DOE notes that manufacturers would still be able to rely on a mathematical model (including the same mathematical model as described in section 6.4.2.4 of AMCA 214–21, (Combined motor-VFD efficiency) as long as the mathematical model meets the AEDM requirements discussed in Section III.I of this document) in lieu of testing to determine the FEI of a fan with a motor and controller.
- **Hence AEDM project is proceeding at AMCA…**

DOE NOPR: Introduced a baseline calculation for Motor + Controller (Baseline FEI Calcs) – pages 3874-3875

Federal Register / Vol. 89, No. 13 / Friday, January 19, 2024 / Proposed Rules

DEPARTMENT OF ENERGY

10 CFR Parts 429 and 431

[EERE–2022–BT–STD–0002]

RIN 1904–AF40

Energy Conservation Program: Energy Conservation Standards for Fans and Blowers

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

ACTION: Notice of proposed rulemaking and announcement of public meeting.

- *2.6. Calculation based on Shaft-to-air testing for Fans with Motors and Motor Controllers.* The provisions of section 6.4 of AMCA 214–21 apply except that the instructions in section 6.4.2.4.1 of AMCA 214–21 are replaced by section 2.6.1 of this appendix, and the instructions in section6.4.2.4.2. of AMCA 214–21 are replaced by section 2.6.2 of this appendix.
- *2.6.1 Motor efficiency if used in combination with a VFD.* This section replaces section 6.4.2.4.1 of AMCA 214–21 and provides methods to calculate the efficiency of the motor if it is combined with a VFD.

DOE NOPR, page 3771: Soliciting input on 211-22 Tolerances

- DOE requests comments on whether it should apply a correction factor to the analyzed efficiency levels to account for the tolerance allowed in AMCA 211–22 and if so, DOE requests comment on the appropriate correction factor. DOE requests comment on the potential revised levels as presented in Table IV– 12 for a 5% Tolerance.

- Additionally, DOE requests comments on whether it should continue to evaluate an FEI of 1.00 for all fan classes if it updates the databases used in its analysis to consider the tolerance allowed in AMCA 211–22.

Table IV-12 Summary of Efficiency Levels for All GFB Equipment Classes Considering a 5-percent AMCA 211-22 Tolerance Allowance

	EL0	EL1	EL2	EL3	EL4	EL5	EL6	EL7
Axial Inline	0.80	0.83	0.96	1.12	1.30	1.48	-	-
Panel	0.76	0.82	0.95	1.18	1.41	1.65	-	-
Axial PRV	0.63	0.67	0.69	0.72	0.82	0.95	1.19	1.42
Centrifugal PRV Exhaust	0.64	0.67	0.68	0.82	0.95	1.14	1.33	-
Centrifugal PRV Supply	0.65	0.68	0.72	0.83	0.95	1.13	1.29	-
Centrifugal Housed Main Path	0.60	0.90	0.96	1.09	1.24	1.39	-	-
Centrifugal Housed FC Path*	0.60	0.90	0.96	1.09	1.24	1.39	-	-
Centrifugal Unhoused	0.89	0.94	1.04	1.17	1.28	1.42	-	-
Centrifugal Inline	0.62	0.66	0.73	0.95	1.02	1.22	1.39	-
Radial	0.78	0.83	0.89	0.95	1.11	1.27	-	-

*Design option applied relative to baseline fan instead of previous EL.

§ 429.134 Product-specific enforcement provisions.
Page 3871

- When conducting enforcement testing, DOE proposes that it may choose to test either one fan at multiple duty points or multiple fans at one or more duty points to evaluate compliance of a certified basic model at each certified duty point.
- 2. *Verification of duty points:* At a given speed, the certified duty point will be considered valid only if the measured airflow is within five percent of the certified airflow and the measured static or total pressure is between *P* ∗ (1-0.05)^2 and *P* ∗ (1 +0.05)^2 where *P* is the certified static or total pressure.
- (i)(A) If the certified duty point is found to be valid, the certified duty point will be used as the basis for determining compliance. DOE will convert the measured fan shaft power or FEP at the measured airflow to the certified airflow using the following equations:
- Fan shaft power:

$$Converted\ fan\ shaft\ power = Measured\ fan\ shaft\ power \left(\frac{certified\ airflow}{Measured\ airflow}\right)^3$$

- Fan electrical power.

$$Converted\ FEP = Measured\ FEP \times \left(\frac{certified\ airflow}{Measured\ airflow}\right)^3$$

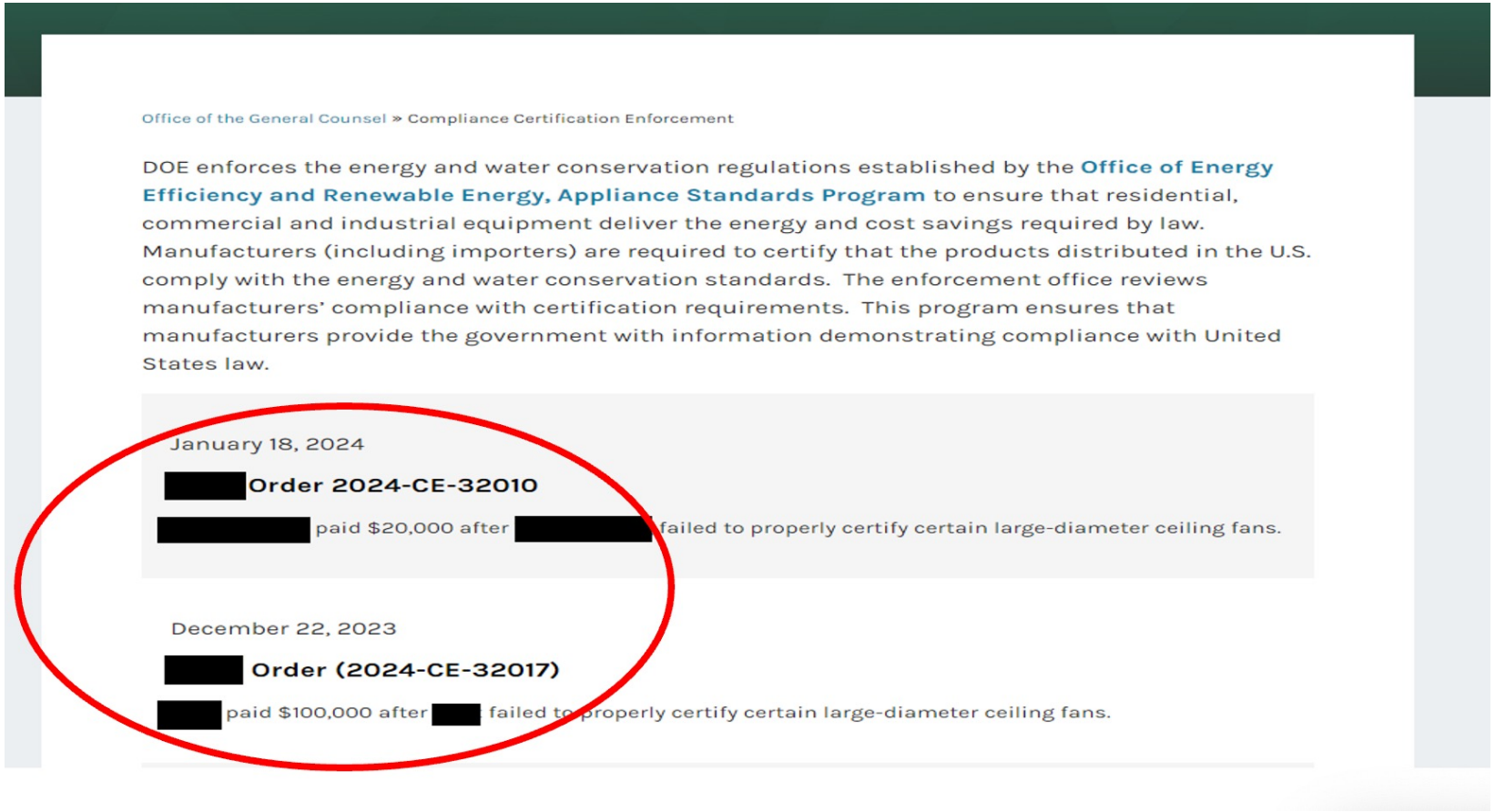
PART 429—CERTIFICATION, COMPLIANCE, AND ENFORCEMENT– page 3870

- **§ 429.110 Enforcement testing.**
- When testing a single unit, DOE will first determine either fan shaft input power or FEP, dependent on the test method specified by the manufacturer, for the range of certified duty points according to appendix A to subpart J of part 431 of this chapter. For each point in the certified operating range (*i.e.,* each certified duty point), DOE will conduct a verification of the duty points as described in § 429.134(bb)(2) and determine the FEI at the certified duty point or at the measured duty point. If the FEI calculated at the certified or measured duty point is greater than or equal to the minimum required FEI, then testing is complete and the certified or measured duty point is compliant. If the FEI calculated at a certified or measured duty point is less than the minimum required FEI, DOE may select additional units to test in accordance with this paragraph (e)(7)(ii) of this section.
- (ii) When testing more than one unit, DOE will select no more than three additional units of a certified basic model for testing and test each one at one or several duty points within the range of certified duty points. For each unit and at each certified duty point, DOE will conduct a verification of the duty points as described in§ 429.134(bb)(2) and determine the FEI at the certified duty point or at the measured duty point. In the case where the certified duty point can be verified, DOE will calculate the average FEI of all units tested for each certified duty point. If the duty point cannot be verified, DOE will follow the sampling procedures at § 429.69 to determine the average FEI of all units tested at the measured duty point. If the average FEI calculated at the certified or measured duty point is greater than or equal to the minimum required FEI, then testing is complete and the certified or measured duty point is compliant. If the average FEI calculated at a certified or measured duty point is less than the minimum required FEI, then testing is complete and the certified or measured duty point is not compliant.

Maximum Civil Penalty for Non-Compliance

- **§ 429.120 Maximum civil penalty.**
- Any person who knowingly violates any provision of § 429.102(a) may be subject to assessment of a civil penalty of no more than $560 for each violation. As to § 429.102(a)(1) with respect to failure to certify, and as to § 429.102(a)(2), (5) through (9), each unit of a covered product or covered equipment distributed in violation of such paragraph shall constitute a separate violation. For violations of § 429.102(a)(1), (3), and (4), each day of noncompliance shall constitute a separate violation for each basic model at issue.

Example: Failure to Certify (Register Product in Database)



Office of the General Counsel » Compliance Certification Enforcement

DOE enforces the energy and water conservation regulations established by the **Office of Energy Efficiency and Renewable Energy, Appliance Standards Program** to ensure that residential, commercial and industrial equipment deliver the energy and cost savings required by law. Manufacturers (including importers) are required to certify that the products distributed in the U.S. comply with the energy and water conservation standards. The enforcement office reviews manufacturers' compliance with certification requirements. This program ensures that manufacturers provide the government with information demonstrating compliance with United States law.

January 18, 2024

[redacted] **Order 2024-CE-32010**

[redacted] paid $20,000 after [redacted] failed to properly certify certain large-diameter ceiling fans.

December 22, 2023

[redacted] **Order (2024-CE-32017)**

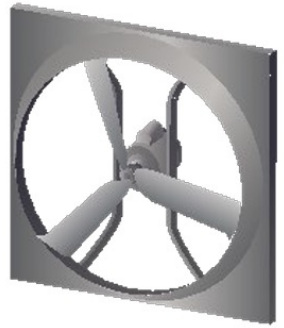
[redacted] paid $100,000 after [redacted] failed to properly certify certain large-diameter ceiling fans.

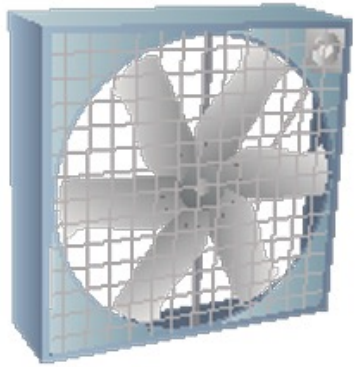
Air Circulating Fans

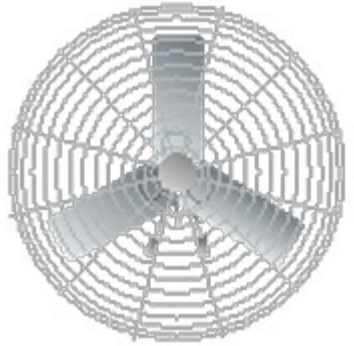
Christian Taber
Principal Engineer – Codes and Standards
Big Ass Fans

Circulating Fans – Test Procedure Review

- DOE Test Procedure - Appendix B to Subpart J of Part 431
- References ANSI/AMCA 230-23 as basis
- 125W or greater input power
- Air Circulating Fan Product Classes (Appendix B of AMCA 230)
  - Air circulating axial panel fan
  - Housed air circulating fan head
    - Box Fan
    - Cylindrical air circulating fan
    - Housed centrifugal air circulating fan
  - Unhoused air circulating fan head
- Efficiency metric is air circulating fan efficacy (Eff_{circ})
  - CFM/W at maximum speed mandatory
  - Other speeds optional ($Eff_{circ,XX}$)
- Appurtenances mandatory
- Effective date – October 30, 2023

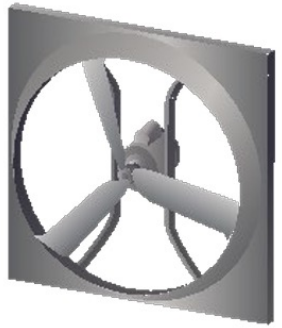


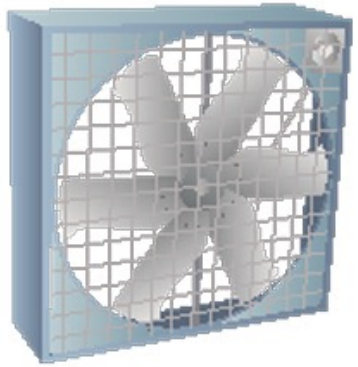


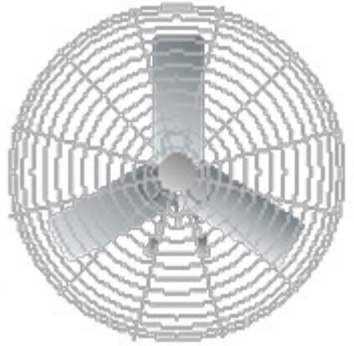


Circulating Fans – Test Procedure Divergence

- Test voltage, phase, frequency specified
- Stability requirements (120s intervals, 3x)
  - Fan speed 1% or 1 rpm
  - Input power 1% or 1 W
  - Load differential 1%
  - Slopes of trends for each (no three the same direction)
- Minimum of two samples - § 429.11
- Represented values determined statistically - § 429.69
- Effective date – October 30, 2023







Inputs into DOE Energy Standard Analysis

- Fan performance data (“combined database”)
  - BESS Lab performance database
  - Manufacturer catalogs
- Agricultural fan efficiency incentives (utility rebates)
- Product teardowns
  - Technologies
  - Construction
  - Cost data
- Markups
- Annual operating hours

ACF – Fan Models Analyzed by DOE

Equipment Class	Diameter (in)	EL	Airflow (cfm)	Power (w)
12" to 36" axial ACF	24	EL0	3,436	1,155
	24	EL1	3,436	1,155
	24	EL2	3,451	1,087
	24	EL3	3,614	589
	24	EL4	3,792	312
	24	EL5	3,926	196
	24	EL6	3,980	164
36" to 48" axial ACF	36	EL0	8,339	1,601
	36	EL1	8,347	1,412
	36	EL2	8,357	1,289
	36	EL3	8,385	834
	36	EL4	8,421	487
	36	EL5	8,447	336
	36	EL6	8,458	284
>48" axial ACF	52	EL0	20,487	2,442
	52	EL1	20,513	2,215
	52	EL2	20,541	1,931
	52	EL3	20,600	1,448
	52	EL4	20,684	962
	52	EL5	20,733	762
	52	EL6	20,757	674
Housed Cent ACF	11	EL0	953	717
	11	EL1	953	717
	11	EL2	958	666
	11	EL3	986	455
	11	EL4	1,023	280
	11	EL5	1,058	180
	11	EL6	1,072	153
Source		DOE NOPR ACF LCC (Equip Price)		

EL0	Baseline - Low Efficiency PSC motor + Belt Drive
EL1	Direct Drive
EL2	High Efficiency PSC motor
EL3	Aero Redesign 1 - EL2+(EL4-EL2)*0.33
EL4	Aero Redesign 2 - Ag Rebate Efficiency Levels
EL5	Aero Redesign 3 - Max efficiency in ACF database
EL6	EC Motor (20% better than IE4)

ACF – Summary of DOE Analysis

Equipment Class	Diameter (in)	EL	Airflow (cfm)	Power (w)	Thrust (lbf)	Efficiency (cfm/W)	Thrust Eff (lbf/kW)	Drive	Motor	Bare Shaft	Motor	Belt Drive	MPC	Annual kWh	Air Power (W)	W-T-A Efficiency
12" to 36" axial ACF	24	EL0	3,436	1,155	2.43	2.98	2.1	Direct	PSC (61.6%)	$73.70	$37.41	-	$111.11	1,284	30.1	2.6%
	24	EL1	3,436	1,155	2.43	2.98	2.1	Direct	PSC (61.6%)	$73.70	$37.41	-	$111.11	1,284	30.1	2.6%
	24	EL2	3,451	1,087	2.46	3.18	2.3	Direct	PSC (65.7%)	$73.70	$54.50	-	$129.29	1,283	30.5	2.8%
	24	EL3	3,614	589	2.69	6.14	4.6	Direct	PSC (65.7%)	$73.70	$54.50	-	$129.29	1,186	35.0	5.9%
	24	EL4	3,792	312	2.96	12.20	9.5	Direct	PSC (65.7%)	$73.70	$54.50	-	$129.29	827	40.4	13.0%
	24	EL5	3,926	196	3.18	20.00	16.2	Direct	PSC (65.7%)	$73.70	$54.50	-	$129.29	535	44.9	22.9%
	24	EL6	3,980	164	3.27	24.30	19.9	Direct	ECM (79.8%)	$73.70	$83.92	-	$159.99	449	46.7	28.5%
36" to 48" axial ACF	36	EL0	8,339	1,601	6.37	5.21	4.0	Belt (88.1%)	PSC (63.1%)	$164.60	$47.84	$62.50	$274.95	2,244	84.9	5.3%
	36	EL1	8,347	1,412	6.38	5.91	4.5	Direct	PSC (63.1%)	$164.60	$47.84	-	$212.86	2,217	85.2	6.0%
	36	EL2	8,357	1,289	6.40	6.48	5.0	Direct	PSC (69.2%)	$164.60	$65.00	-	$231.12	2,189	85.5	6.6%
	36	EL3	8,385	834	6.44	10.1	7.7	Direct	PSC (69.2%)	$164.60	$65.00	-	$231.12	1,977	86.3	10.4%
	36	EL4	8,421	487	6.50	17.3	13.3	Direct	PSC (69.2%)	$164.60	$65.00	-	$231.12	1,326	87.5	18.0%
	36	EL5	8,447	336	6.54	25.2	19.5	Direct	PSC (69.2%)	$164.60	$65.00	-	$231.12	915	88.3	26.3%
	36	EL6	8,458	284	6.55	29.8	23.1	Direct	ECM (81.8%)	$164.60	$97.17	-	$264.57	775	88.6	31.2%
>48" axial ACF	52	EL0	20,487	2,442	18.43	8.39	7.5	Belt (90.6%)	PSC (66.0%)	$266.58	$99.32	$63.73	$429.63	4,131	289.3	11.8%
	52	EL1	20,513	2,215	18.48	9.26	8.3	Direct	PSC (66.0%)	$266.58	$99.32	-	$366.35	4,091	290.4	13.1%
	52	EL2	20,541	1,931	18.53	10.6	9.6	Direct	PSC (75.8%)	$266.58	$126.60	-	$393.16	4,041	291.6	15.1%
	52	EL3	20,600	1,448	18.64	14.2	12.9	Direct	PSC (75.8%)	$266.58	$126.60	-	$393.16	3,696	294.1	20.3%
	52	EL4	20,684	962	18.79	21.5	19.5	Direct	PSC (75.8%)	$266.58	$126.60	-	$393.16	2,611	297.7	31.0%
	52	EL5	20,733	762	18.88	27.2	24.8	Direct	PSC (75.8%)	$266.58	$126.60	-	$393.16	2,072	299.8	39.3%
	52	EL6	20,757	674	18.92	30.8	28.1	Direct	ECM (85.8%)	$266.58	$164.95	-	$433.88	1,833	300.9	44.6%
Housed Cent ACF	11	EL0	953	717	0.89	1.33	1.2	Direct	PSC (62.4%)	$31.05	$31.63	-	$62.88	1,034	14.5	2.0%
	11	EL1	953	717	0.89	1.33	1.2	Direct	PSC (62.4%)	$31.05	$31.63	-	$62.88	1,034	14.5	2.0%
	11	EL2	958	666	0.90	1.44	1.4	Direct	PSC (67.6%)	$31.05	$59.39	-	$90.44	1,029	14.8	2.2%
	11	EL3	986	455	0.95	2.17	2.1	Direct	PSC (67.6%)	$31.05	$59.39	-	$90.44	899	16.1	3.5%
	11	EL4	1,023	280	1.03	3.65	3.7	Direct	PSC (67.6%)	$31.05	$59.39	-	$90.44	607	18.0	6.4%
	11	EL5	1,058	180	1.10	5.87	6.1	Direct	PSC (67.6%)	$31.05	$59.39	-	$90.44	395	19.9	11.0%
	11	EL6	1,072	153	1.13	7.02	7.4	Direct	ECM (80.8%)	$31.05	$85.06	-	$116.11	334	20.7	13.6%
Source		DOE NOPR ACF LCC (Equip Price)			AMCA 230-23 Eq 8.10	TSD Table 5.6.10	AMCA 230-23 Eq 8.17	TSD Table 5.6.4	TSD Table 5.6.7	TSD Table 5.7.4	TSD Table 5.7.6	TSD Table 5.7.5	TSD Table 5.7.7	TSD Table 7.2.12	AMCA 230-23 Eq 8.15	

Circulating Fans – EC NOPR

- Performance data per DOE test procedure
- Two Equipment Classes
  - Axial ACF (3 bins)
  - Housed Centrifugal ACF (No min)
- TSL 4 Selected (EL 4)

Table I-3 Proposed Energy Conservation Standards for ACFs

Equipment Class*	Efficacy at Maximum Speed (CFM/W)
Axial ACFs; 12 inches ≤ D < 36 inches	12.2
Axial ACFs; 36 inches ≤ D < 48 inches	17.3
Axial ACFs; 48 inches ≤ D	21.5
Housed Centrifugal ACFs	N/A

*D: Diameter in inches

N/A: Not applicable; DOE is not proposing to set a standard for this equipment class.

ACF Major Concerns - Part 1

- Is the combined database representative of the current market?
  - BESS Lab data?
  - Manufacturer catalog data?
  - Modification of published data to AMCA 230-23 data?
- Conversion of utility rebate lbf/W to cfm/W reasonable?
- Efficiency Levels (EL) reasonable?
  - Airflow, Power, Efficiency reasonable/representative of the market for each baseline fan (EL0)?
  - Does the selected technology achieve the increased efficiency (EL1-EL6)?
  - Manufacturer’s cost data reasonable (EL0-EL6)?

ACF Major Concerns - Part 2

- Markups reasonable?
- Annual operating hours reasonable?
- Equipment Class bins & associated cfm/W levels reasonable and equitable for all ACF classes? Can they be gamed?
  - Linear vs bins?
  - Too high or too low?
  - Separate efficacies by product class?

Summary of Issues and Call to Action

Mark Bublitz
Executive VP – Industry Affairs
New York Blower

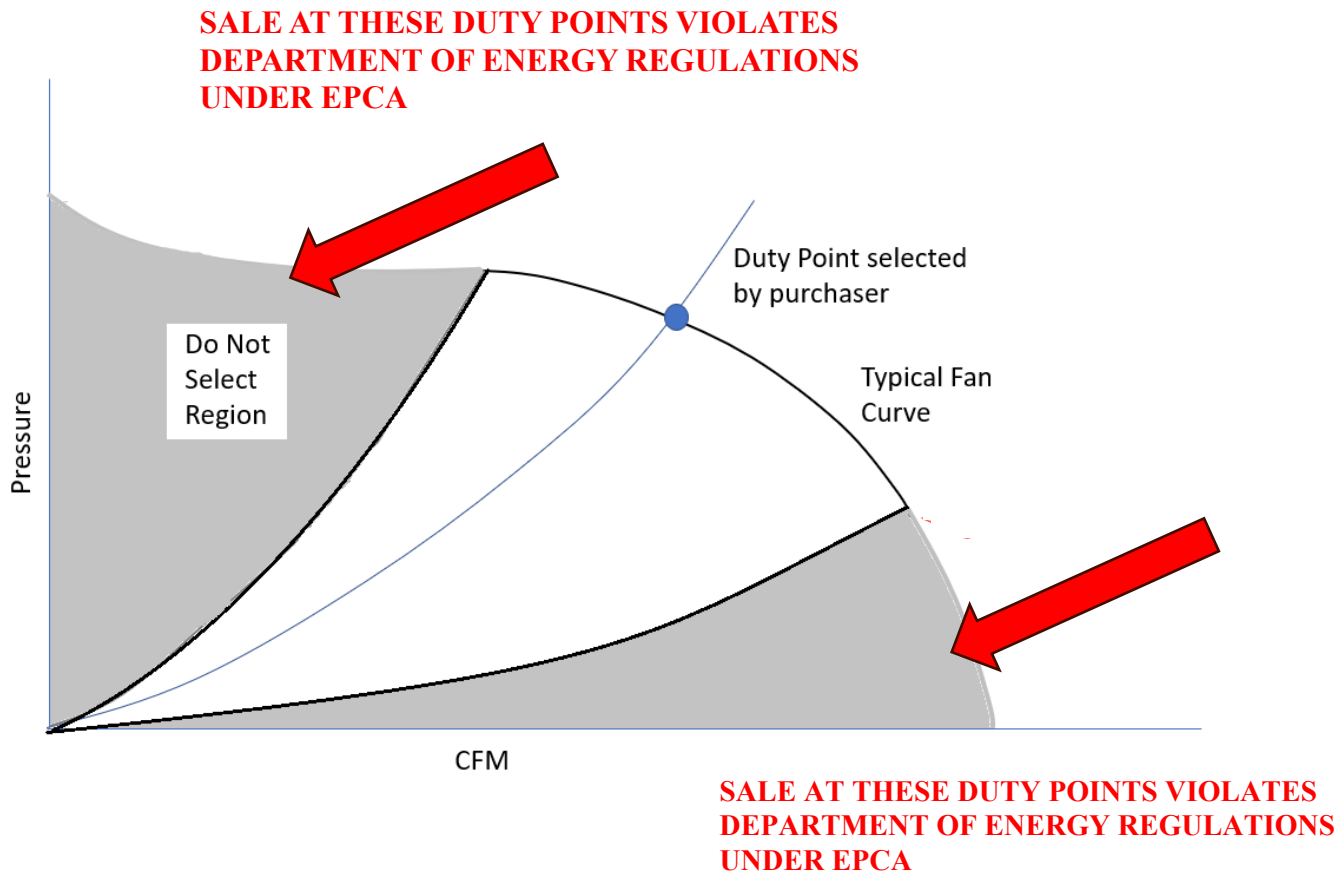
Review/Summary: Major Issues

- Air Circulating Fans (ACFs)
  - Market samples > Max Tech Analysis > Levels
- General Fans and Blowers (GFBs)
- Levels (levels, levels, levels!!!)
  - Market samples > Max Tech Analysis > Levels
- Credit for adjustable speed drives
  - Table I-2
- Complexity of the FEI calculation
- 211 Tolerances
- Representations

Representations

- (1) identified by the following disclaimer: “Sale at these duty points violates Department of Energy Regulations under EPCA” in all capital letters, red, and bold font; and
- (2) grayed out in any graphs or tables in which they are included."

GFB Representations including compliant and non-compliant points



Call to Action

- Take the regulations seriously: DOE fines can be ruinous
- Review NOPR and provide comments to DOE
- Engage customers to review and comment as well – provide Owner perspective
  - Industrial
  - Pharmaceutical
  - Severe, Risky, Mission-Critical Applications
    - Defense
    - Life-Safety
    - Nuclear
    - Heavy Industry
    - etc.

Call to Action

KEY RESOURCE: DOE Fans and Blowers Rulemaking "Home Page"

http://tinyurl.com/yckavb97

- Current announcements and hyperlinks to rulemakings and dockets
- Sign up for email alerts for updates
- Obtain copies of the NOPR
- Has links to dockets for energy standard and test procedure
- Register for Feb. 21 hearing, in person or remote
- Instructions for filing comments to DOE by March 19, 2024

Questions and Answers

Contact: Michael Ivanovich, mivanovich@amca.org

BONUS SLIDES

Resources for Today's Presentation

How to Get Certified FEI Ratings for Fans

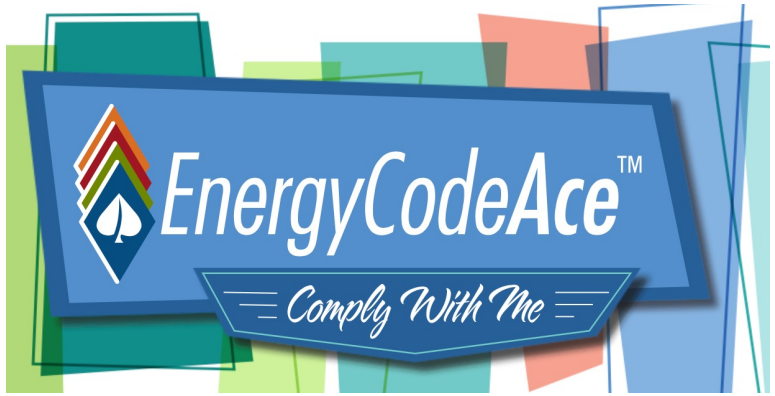
- Because of these complexities, AMCA recommends specifying AMCA-certified fans
  - www.amca.org/Find-FEI
  - 600+ fan models are certified
  - Get a hyperlinked list of manufacturers with certified software having FEI ratings
  - Download manufacturer software

AMCA Resources

- AMCA International: *www.amca.org*
- AMCA Certified FEI ratings: *www.amca.org/find-FEI*
- AMCA Standards 214, 230: *www.amca.org/store*
  (Available for purchase)
- AMCA microsite for FEI training, technical papers, PowerPoints, and regulatory status: *www.amca.org/fei*
- Other AMCA Web pages for webinars, papers, etc. on many other topics: *www.amca.org/educate*

Other Resources

- **CEC Title 20 Energy Code Ace**
  - www.energycodeace.com
  - Education, compliance, Q&A, regulatory language



- **DOE Fans and Blowers Rulemaking "Home Page"**
  - http://tinyurl.com/yckavb97
  - Current announcements and hyperlinks to rulemakings and dockets
  - Sign up for email alerts to changes
  - Obtain copies of the NOPR and supporting documents
  - Register for Feb. 21 hearing, in person or remote
  - See instructions for filing comments to DOE by March 19, 2024

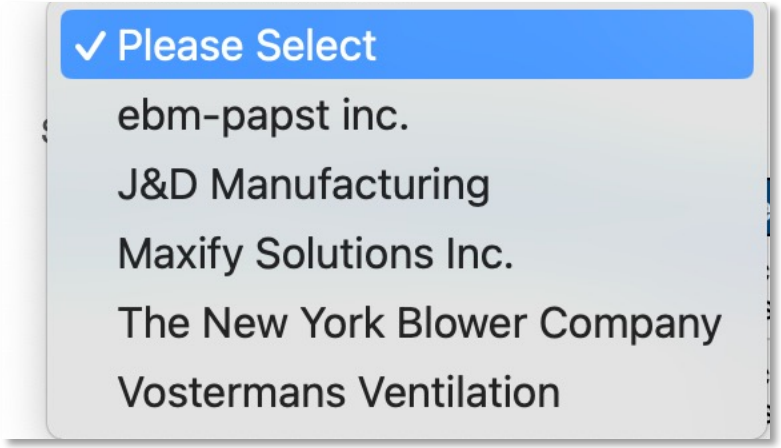
COMPLIANCE WITH CALIFORNIA TITLE 20

California Compliance Check: How to Find Fans

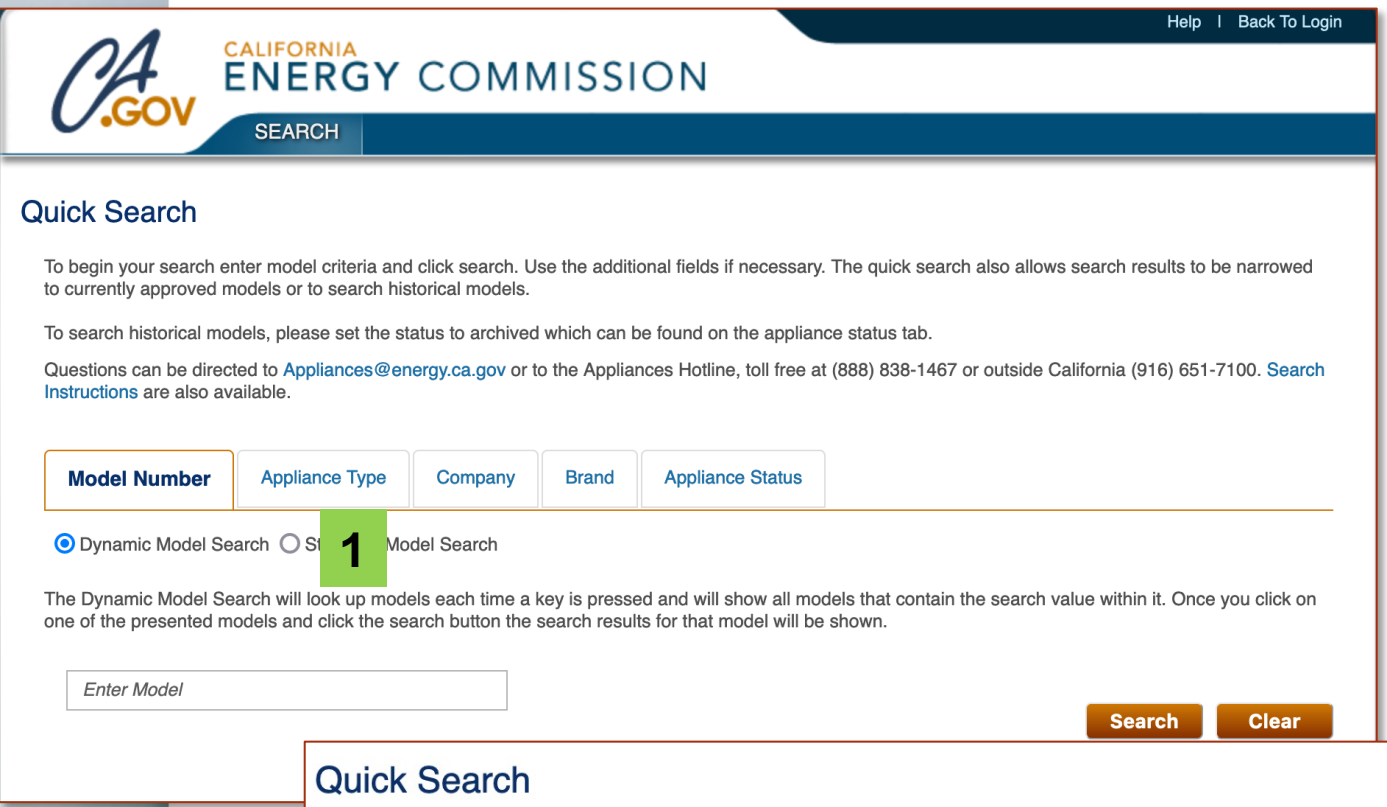
https://cacertappliances.energy.ca.gov/Pages/ApplianceSearch.aspx

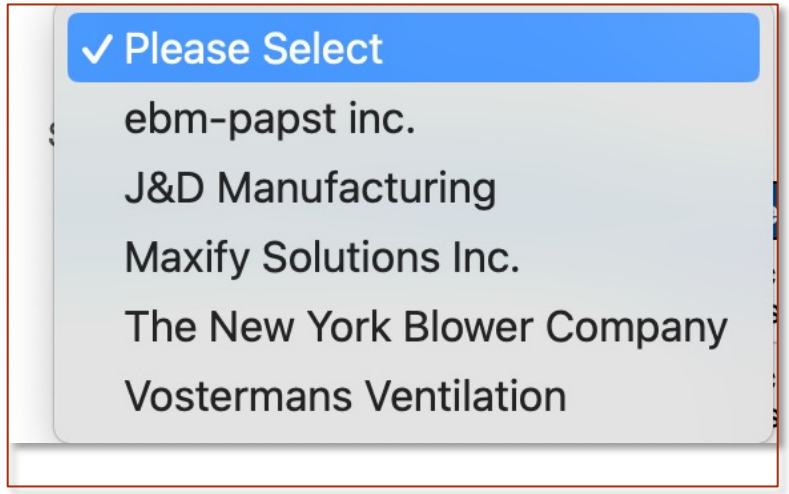
MAEDbS Quick Search for Manufacturers:

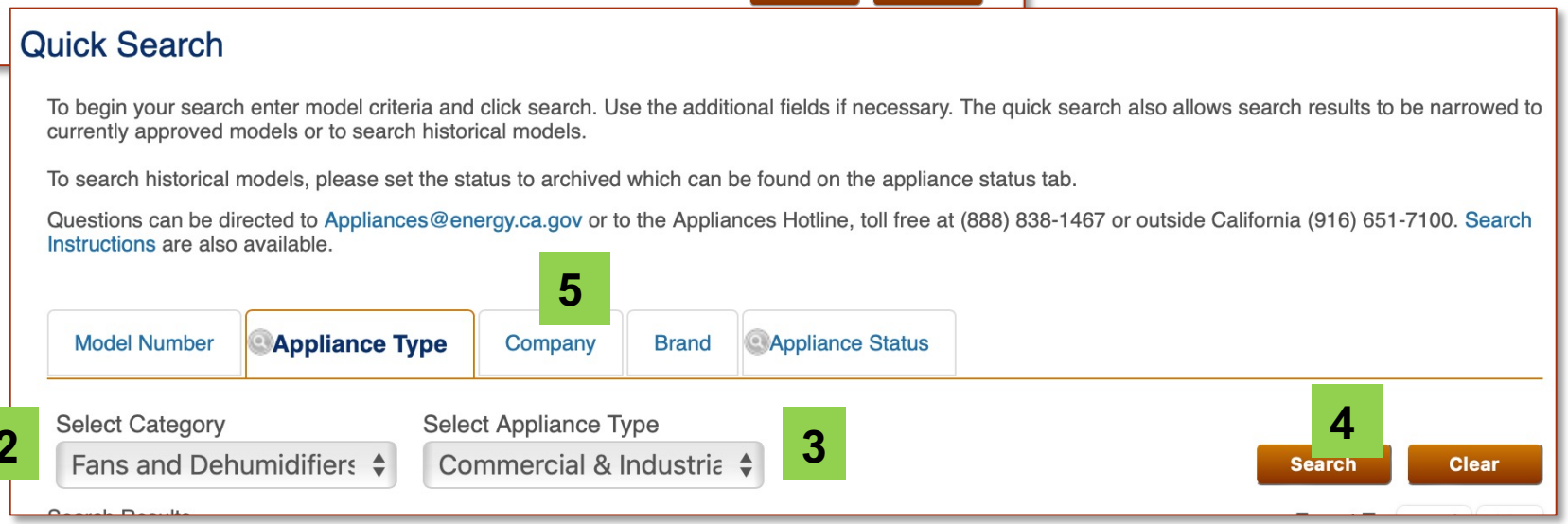
1. **Click on** Appliance Type
2. **Category Select:** Fans and Humidifiers
3. **Appliance Type Select:** Commercial and Industrial Fans and Blowers
4. **Click** Search
5. **Click** Company for list of companies that have provided data



Can also search by Model Number!


Help | Back To Login
CALIFORNIA
ENERGY COMMISSION
SEARCH
Quick Search
To begin your search enter model criteria and click search. Use the additional fields if necessary. The quick search also allows search results to be narrowed to currently approved models or to search historical models.
To search historical models, please set the status to archived which can be found on the appliance status tab.
Questions can be directed to Appliances@energy.ca.gov or to the Appliances Hotline, toll free at (888) 838-1467 or outside California (916) 651-7100. Search Instructions are also available.
Model Number
Appliance Type
Company
Brand
Appliance Status
Dynamic Model Search
1
Model Search
The Dynamic Model Search will look up models each time a key is pressed and will show all models that contain the search value within it. Once you click on one of the presented models and click the search button the search results for that model will be shown.
Enter Model
Search
Clear


Please Select
ebm-papst inc.
J&D Manufacturing
Maxify Solutions Inc.
The New York Blower Company
Vostermans Ventilation


Quick Search
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5
Model Number
Appliance Type
Company
Brand
Appliance Status
2
Select Category
Fans and Dehumidifiers
Select Appliance Type
Commercial & Industria
3
4
Search
Clear

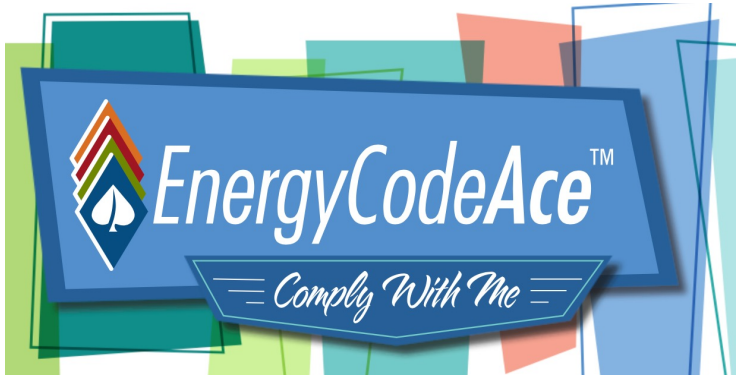
California Title 20 Permanent Label

- Part 1: Manufacturer, model, and date of manufacture
- Part 2: Fan Energy Index ≥ 1.00 Efficiency boundaries
  a. maximum air flow (SCFM);
  b. maximum fan speed (RPM);
  c. maximum pressure (inches water gauge).
  NOTE: Operation outside of these boundaries will result in an energy inefficient operation.
- Parts 1 and 2 do not have to be on the same label
- New: Labels must be “permanent” and legible: readable without removing parts and using visual aids

California Title 20 Resources

- **Energy Code Ace** www.energycodeace.com
  - Education, compliance, Q&A, regulatory language
  - Modules and fact sheets for manufacturers, designers
  - MAEDbS training
  - Recently updated training modules

  - Has resources for Title 24 energy code as well



Other Resources

Glossary of Acronyms and Abbreviations

• ASHRAE 90.1	ANSI/ASHRAE/IEC Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings*
• ASHRAE 189.1	ANSI/ASHRAE/IEC/USGBC Standard 189.1, *Standard for the Design of High-Performance Green Buildings*
• IECC	*International Energy Conservation Code*
• IGCC	*International Green Construction Code*
• IAPMO	International Association of Plumbing and Mechanical Officials
• UMC	*Uniform Mechanical Code*
• Title 20	*California Title 20 Appliance Efficiency Regulations*
• Title 24	*California Energy Code for Residential and Commercial Buildings*
• DOE	U.S. Department of Energy (Appliances and Equipment Standards Program)
• CFR	Code of Federal Regulations
• FEI	Fan Energy Index

Referenced AMCA Standards in Codes & Regulations

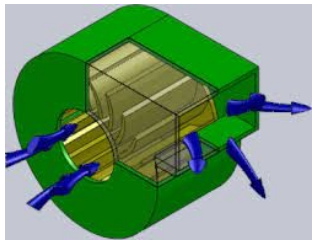
- Codes and Regulations typically reference standards for testing and/or rating calculations
- ANSI/AMCA Standard 210, Test standard for centrifugal, axial fans
  - DOE regulation for general fans and blowers
- ANSI/AMCA Standard 214, Test standard and ratings calculation for Fan Energy Index
  - DOE regulation for general fans and blowers
- ANSI/AMCA Standard 230, Test standard and ratings calculation for circulating fans, including ceiling fans
  - DOE regulations for large-diameter ceiling fans and air circulating fans
- ANSI/AMCA Standard 208, Rating calculation standard for FEI
  - Model and state energy codes

DOE Scope: Centrifugal Fan Types

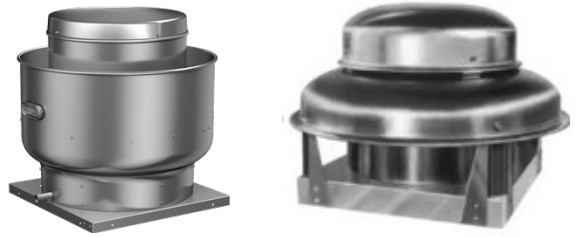
- Radial housed fan

- Centrifugal unhoused fan

- Centrifugal housed fan



- Centrifugal power roof ventilator exhaust fan



- Centrifugal inline fan

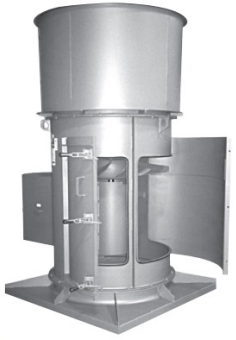
- Centrifugal power roof ventilator supply fan

DOE Scope: Axial Fan Types

- Axial inline fan

- Axial panel fan

- Axial power roof ventilator fan



Scope Exclusions

- GFBs are not:

  (i) A radial housed unshrouded fan with blade diameter at tip less than 30 inches or a blade width of less than 3 inches;

  (ii) A safety fan;

  (iii) An induced flow fan;

  (iv) A jet fan;

  (v) A cross-flow fan;

  (vi) A fan manufactured exclusively to be powered by internal combustion engines;

  (vii) A fan that create a vacuum of 30 inches water gauge or greater;

  (viii) A fan that is designed and marketed to operate at or above 482 degrees Fahrenheit (250 degrees Celsius); or

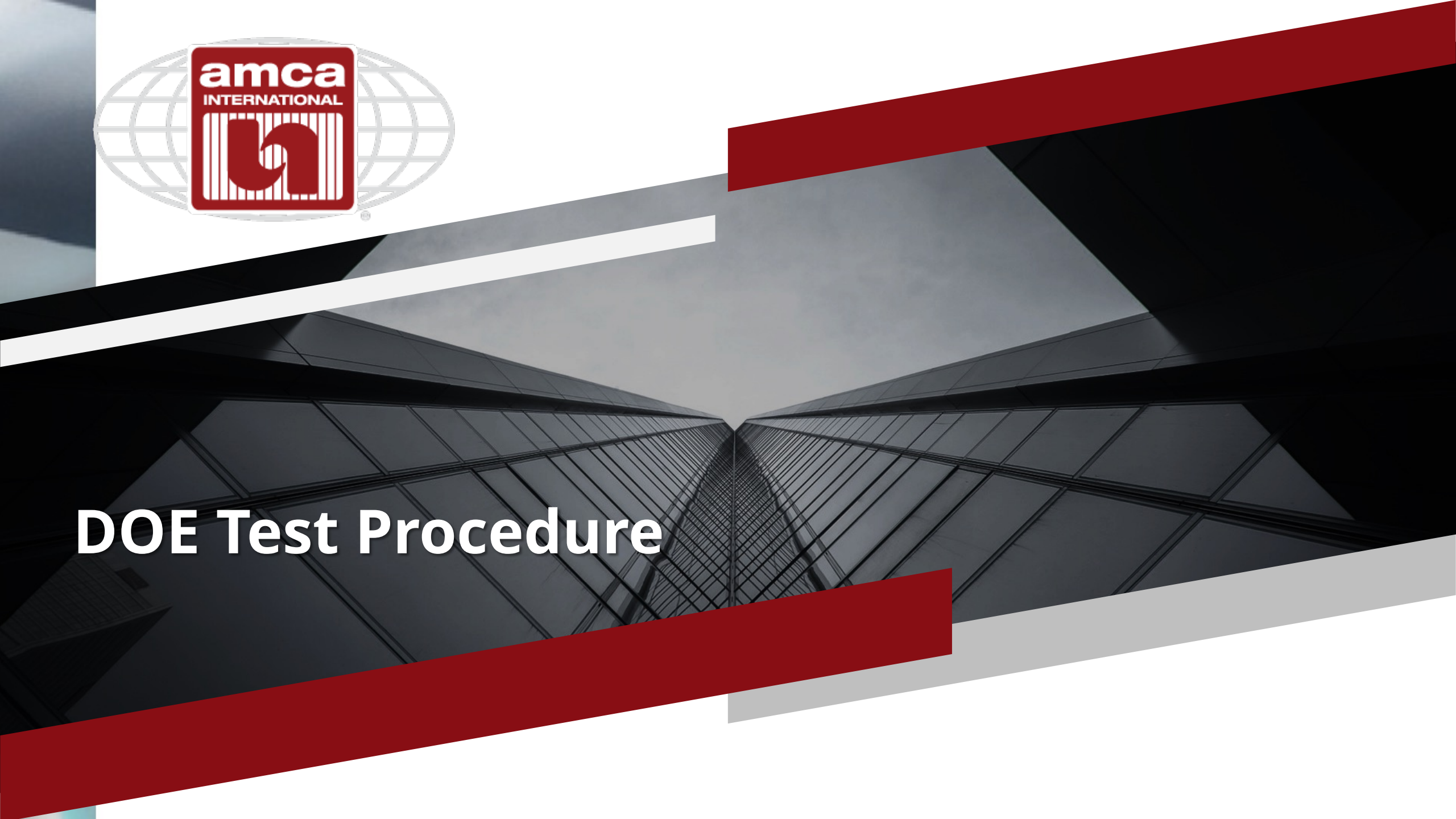
Scope Exclusions - continued

- GFBs are not:
  (ix) A fan and blower embedded in the equipment listed below;
  - GFBs are not an embedded fan subject to the following exclusions:
    (i) The federal test procedure does not apply to fans embedded in:
    - (A) Single phase central air conditioners and heat pumps rated with a certified cooling capacity less than 65,000 Btu/h
    - (B) Three phase, air-cooled, small commercial packaged air-conditioning and heating equipment rated with a certified cooling capacity less than 65,000 Btu/h
    - (C) Transport refrigeration (*i.e.,* Trailer refrigeration, Self-powered truck refrigeration, Vehicle-powered truck refrigeration, Marine/Rail container refrigerant);
    - (D) Vacuum cleaners;
    - (E) Heat Rejection Equipment: Packaged evaporative open-circuit cooling towers; Evaporative field-erected open-circuit cooling towers; Packaged evaporative closed-circuit cooling towers; Evaporative field-erected closed-circuit cooling towers; Packaged evaporative condensers; Field-erected evaporative condensers; Packaged air-cooled (dry) coolers; Field-erected air-cooled (dry) cooler; Air-cooled steam condensers; Hybrid (water saving) versions of all of the previously listed equipment that contain both evaporative and air-cooled heat exchange sections;
    - (F) Air curtains; and
    - (G) Direct expansion-dedicated outdoor air system that are subject to any of DOE's test procedures

Scope Exclusions - continued

(ii) The federal test procedure does not apply to *supply or condenser fans* embedded in:

- (A) Air-cooled commercial package air conditioners and heat pumps (CUAC/CUHP) with a certified cooling capacity between 5.5 ton (65,000 Btu/h) and 63.5 ton (760,000 Btu/h)
- (B) Water-cooled and evaporatively-cooled commercial air conditioners that are subject to DOE's energy conservation standard
- (C) Water-source heat pumps that are subject to DOE's energy conservation standard
- (D) Single package vertical air conditioners and heat pumps
- (E) Packaged terminal air conditioners and heat pumps (PTAC/PTHP)
- (F) Computer room air conditioners that are subject to DOE's energy conservation standards; and
- (G) Variable refrigerant flow multi-split air conditioners and heat pumps (VRF)



DOE Test Procedure

DOE Test Procedure

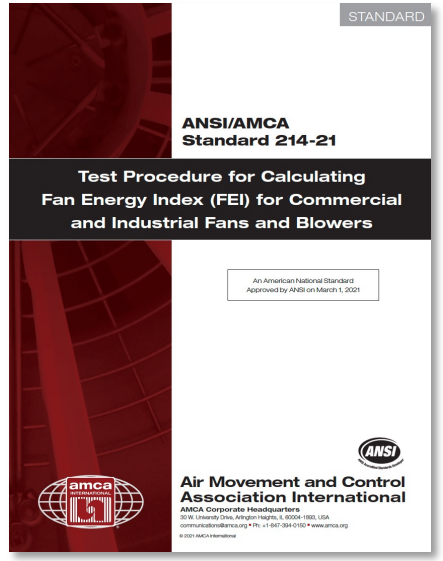
- Applies to manufacturers, which include business entities that package components into a “fan”
- Covers fans imported for sale in the USA and U.S. territories
- Canada usually adopts DOE efficiency regulations in time
- Deadline for compliance was Oct. 30, 2023
  - “Voluntary” representations of “energy usage” and “energy efficiency”
  - 34 companies asked for and received extension to April 29, 2024

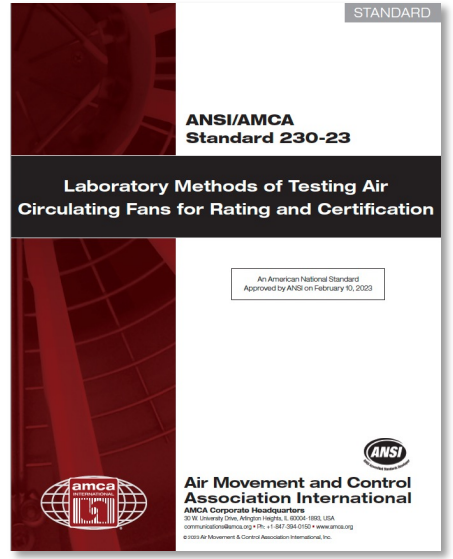
DOE Test Procedure

- Energy Usage and Efficiency Representations Covered
- Explicitly:
  - GFB: FEI and the intermediary parameter, Fan Electrical Power (FEP)
  - ACF: cfm/W
- Implicitly: Parameters measured or calculated using the test procedure:
- Examples:
    - Brake horsepower
    - Total efficiency
    - Static efficiency
    - Airflow
    - Etc.

DOE Test Procedure

- GFB Method of Test
  - ANSI/AMCA Standard 214-21*
  - FEI is regulatory metric
  - AMCA 214 references methods of test and integrates portions of other AMCA standards to make it easier for regulators to use FEI
- ACF Method of Test
  - ANSI/AMCA 230-23
  - Measuring and calculating cfm/W at maximum speed

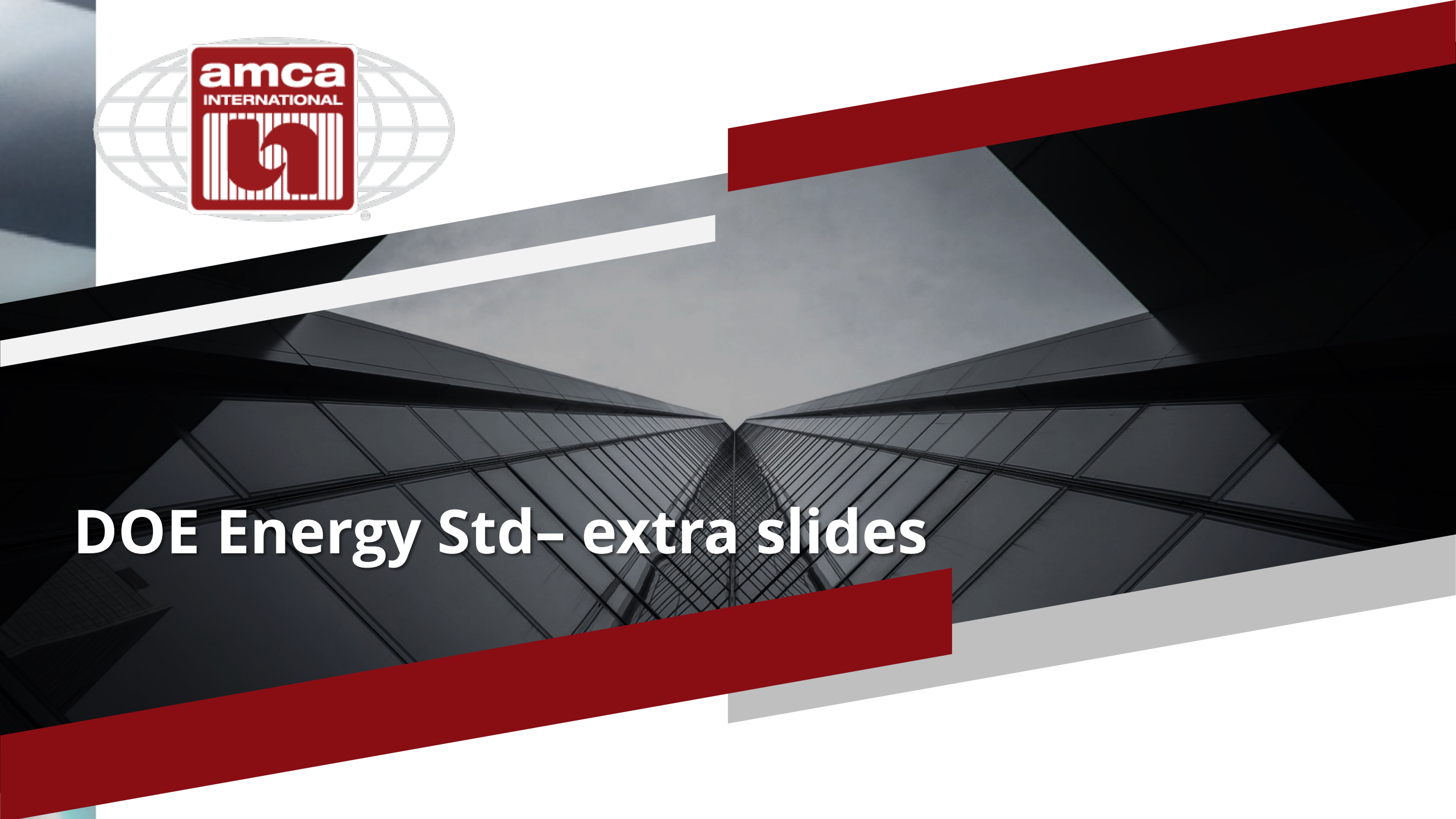




* Bonus slides have complete references to AMCA standards

DOE Test Procedure

- Manufacturer impact: Published fan information (ratings/representations) must conform to test procedure by October 30, 2023:
  - Selection software
  - Websites
  - Labels and Markings
  - Hardcopy literature (catalogs, data sheets) can be phased out
- There are no filing requirements
- Enforceable – DOE can levy fines and civil penalties for non-compliance up to $584 per product per day from date of non-compliance



DOE Energy Std– extra slides

DOE Proposed Standards for GFB

Equipment Class	Fan Energy Index (FEI)
Axial Inline	1.18
Axial Panel	1.48
Axial Power Roof Ventilator	0.85
Centrifugal Housed	1.31
Centrifugal Unhoused	1.35
Centrifugal Inline	1.28
Radial Housed	1.17
Centrifugal Power Roof Ventilator - Exhaust	1.00
Centrifugal Power Roof Ventilator - Supply	1.19

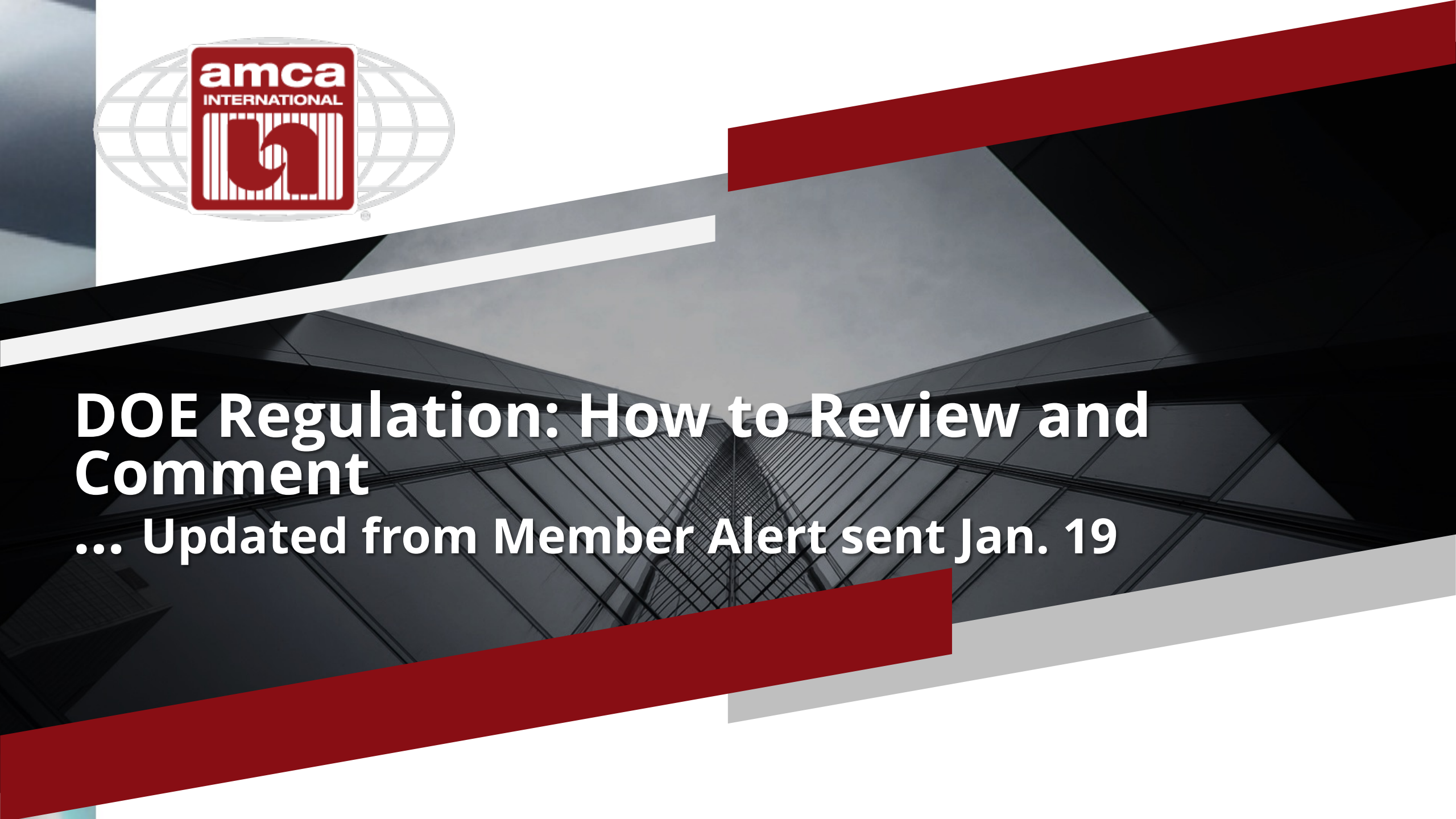
*A if sold without a drive

*A*B if sold with a drive

A & B are adjustment parameters

DOE Levels Vs. Energy Code and Title 20

- FEI is a ratio of a baseline fan vs. fan being considered
- Baseline Fan has an FEI = 1.00
- Fan with FEI 1.10 is 10% more efficient at the design airflow and pressure
  - Axial Panel Fan: 1.48 is almost 50% more efficient than currently required
  - Centrifugal Unhoused: 1.35 is 35% more efficient than currently required



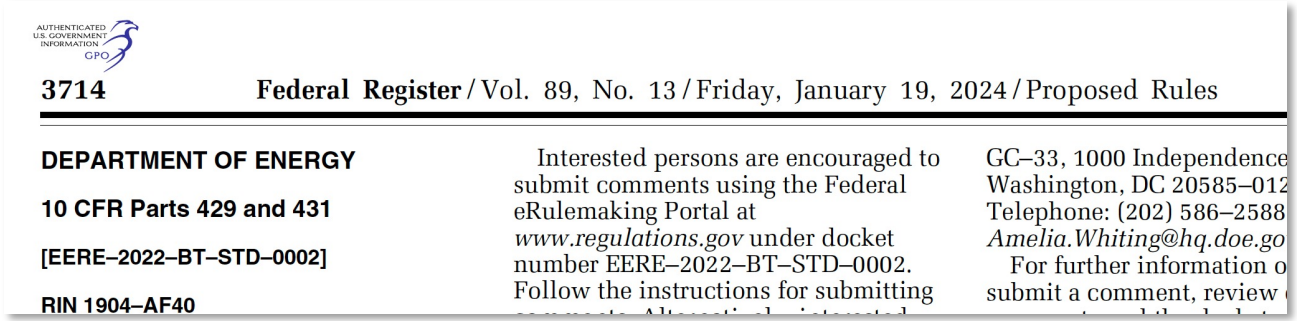
DOE Regulation: How to Review and Comment

… Updated from Member Alert sent Jan. 19

Obtain the Documents

- *Federal Register* NOPR, published Jan. 19, 2023
  - This is the official "file of record."
  - Link will automatically open the file as PDF in browser window
  - Use "File Save As…" command and name the file.
    - This will download the file as a PDF on your computer
  - Three-column format, 167 pages

Federal Register page 3714 is PDF Page 1


AUTHENTICATED U.S. GOVERNMENT INFORMATION GPO

3714 **Federal Register** / Vol. 89, No. 13 / Friday, January 19, 2024 / Proposed Rules

DEPARTMENT OF ENERGY

10 CFR Parts 429 and 431

[EERE–2022–BT–STD–0002]

RIN 1904–AF40

Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov* under docket number EERE–2022–BT–STD–0002. Follow the instructions for submitting

GC–33, 1000 Independence
Washington, DC 20585–012
Telephone: (202) 586–2588
Amelia.Whiting@hq.doe.go
For further information o
submit a comment, review

- Technical Support Document
  - Link will go to page where you can download PDF from the DOE docket
  - Large document

To Attend Public Meeting In-Person or Online

- Wednesday, February 21, 2024, from 10:00 a.m. to 4:00 p.m
  - Location: U.S. Department of Energy, Forrestal Building, Room 6E-069, 1000 Independence Avenue, SW, Washington, DC 20585.
- To attend in-person
  - Send email to appliance_standards_public_meetings@ee.doe.gov
  - U.S. citizenship recommended
  - Send email to mivanovich@amca.org for advice on how to visit DOE HQ
- Click here to register for the webinar IN ADVANCE.
  - DOE treats online comments/questions as if delivered in-person
  - Event is recorded. Transcriptions and slides posted to docket

Guidance for Reviewing NOPR and TSD

Note: Pages are "PDF" pages, not "Document" pages shown on bottom of documents

- **Minimum Time Available and Less Technical Expertise**
  - Read the regulatory language
    - This is what will appear in the *Code of Federal Regulations* when FINAL.
    - PDF Pages 157-162
  - Read the synopsis (Section I)
    - Overview of the DOE's logic and justifications
    - PDF Pages 2-21

Guidance for Reviewing NOPR and TSD

Moderate Time and Expertise

1. Read the technology options
   - How DOE thinks fans can be made more efficient by manufacturers
   - Table IV-7 is important
   - PDF pages 46-49
2. Read the screening analysis
   - How DOE picked the technology options to include in the proposed energy levels
   - Table IV-8 is important
   - PDF page 49

Guidance for Reviewing NOPR and TSD

Moderate Continued

3. Read the engineering analysis
   - Costs are associated with increased efficiencies and what screened-in technology(s) each efficiency level (EL) is based on.
   - PDF pages: 50-69
4. Read the energy-use analysis
   - How DOE determines annual energy use, which is used to calculate operating costs and savings from higher EL
   - PDF pages: 69-72
5. Read the life-cycle-cost and payback-period analyses
   - How DOE justifies the selected EL/trial standard levels.
   - PDF pages 73-78

Guidance for Reviewing NOPR and TSD

To Research DOE Technical and Economic Analyses

- Moderate Guidelines Plus:
  - Read sections of Technical Support Document (TSD) that appeal to you
    - Has all the technical details associated with the rulemaking
    - Global review of fan regulations
    - Other interesting and useful background information.