AMCA International
Air Movement and Control Association International, Inc.
The International Authority on Air System Components Since 1917

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21 November 2019

Theresa L. Newman
Office of the Secretary
Department of Natural Resources and Environmental Control
89 Kings Highway
Dover, DE 19901
Email: DNRECHearingComments@delaware.gov

Dear Ms. Newman:

We are writing to you on behalf of the Air Movement and Control Association (AMCA) International, which is a not-for-profit trade association representing nearly 400 manufacturers worldwide of fans, blowers, control dampers, life-safety dampers, louvers and other air-system products for commercial and industrial applications. AMCA is an international standards developer and administers a Certified Ratings Program that currently covers nearly 4,000 product lines globally.

Recent advocacy efforts through AMCA have been strongly focused on developing a new fan-efficiency metric for use in commercial and industrial air-systems design, and for use in energy-efficiency codes, standards, and regulations.

The new metric, Fan Energy Index (FEI), was developed by AMCA and its member companies in collaboration with the U.S. Department of Energy and a body of efficiency-advocacy organizations. FEI is defined as ANSI/AMCA Standard 208-2018, Calculation of the Fan Energy Index.

FEI has replaced the Fan Efficiency Grade (FEG) metric in:

- ASHRAE 90.1-2019, which is now published;
- ASHRAE 189.1-2020, which has completed public review without negative comments; and
- 2021 edition of the International Energy Conservation Code (IECC), which is undergoing online balloting following the October 2019 public hearings. The IECC proposal (CE139-19) completed public review without comments and was placed on the consent agenda, so AMCA is confident that it will be included in the 2021 edition. Proposal CE139-19 language is attached to this letter so Delaware can see the IECC provisions.

Moving from the FEG metric to the new FEI metric saves energy and reduces carbon emissions based on four improvements:

1. The FEI metric promises to save more energy than the FEG metric and increase the service life of fans as a result of improved “right-sizing.” One reason for doing so is that unlike FEG, FEI includes the impact of motors and drives in the efficiency calculations. Another reason is that FEI is an ‘operating point’ metric, which means that when engineers size and select the fan at the most challenging design point, such as the hottest day of the year when airflow needs to be highest, which fans rarely operate at, the fan will run more efficiently at the less-challenging duty points.

2. FEI also improves enforceability by doing away with the sizing/selection window needed by FEG, which causes confusion among design engineers and code officials. The window, which is not included in the FEG rating, could easily lead to smaller, less-efficient, fan sizes from being selected.
3. With FEI, the exclusion for power-roof ventilators and other low-pressure fans has been removed from the new model-code language. This provides coverage to more types of fans.
4. The language in ASHRAE 90.1-2019 and 2021 IECC also lowers the lower threshold of scope from 5 HP to 1 HP, also adding to the energy-saving power of the fan-efficiency provision.

We are writing to you to advise you of these developments with our hopes that Delaware will choose to adopt the FEI metric in the current code cycle, instead of the FEG metric found in ASHRAE 90.1-2016 and IECC-2018. This will help phase out the FEG metric more quickly to achieve national unity on a fan-efficiency metric and accelerate energy savings and carbon reduction in Delaware.

To assist energy codes and industry with adopting and enforcing FEI, AMCA has made substantial resources available. A web page at www.amca.org/fei has numerous technical papers, videos, and PowerPoint presentations. Access to the rating standard, AMCA 208, Calculation of the Fan Energy Index (FEI) is available at no cost. There also are links to self-paced online training materials at the introductory (for designers and code officials) and advanced (for manufacturers) levels.

Additionally, the AMCA Certified Ratings Program now has 275 fan product lines certified for FEI ratings for major manufacturers such as Greenheck and Loren Cook, with more on the way.

AMCA would be happy to schedule a meeting with Delaware code officials to provide more information on FEI and to provide subsequent technical support as needed to help Delaware reduce unnecessary energy consumption and carbon emissions.

Thank you and best wishes.

Sincerely,

Michael Ivanovich, Senior Director, Global Affairs, AMCA International, mivanovich@amca.org
Aaron Gunzner, Advocacy Manager, AMCA International, agunzner@amca.org

CE139-19

IECC: SECTION C202 (New), C403.8.3, Chapter 6CE (New)

Proponent: Connor Barbaree, representing ASHRAE (cbarbaree@ashrae.org)

2018 International Energy Conservation Code

SECTION C202
GENERAL DEFINITIONS

Add new definition as follows:

FAN, EMBEDDED. A fan that is part of a manufactured assembly where the assembly includes functions other than air movement.

FAN ARRAY. Multiple fans in parallel between two plenum sections in an air distribution system.

FAN NAMEPLATE ELECTRICAL INPUT POWER. The nominal electrical input power rating stamped on a fan assembly nameplate.

FAN ENERGY INDEX (FEI). The ratio of the electric input power of a reference fan to the electric input power of the actual fan as calculated in accordance with AMCA 208.

FAN SYSTEM ELECTRICAL INPUT POWER. The sum of the fan electrical power of all fans that are required to operate at fan system design conditions to supply air from the heating or cooling source to the conditioned spaces and/or return it to the source or exhaust it to the outdoors.

Revise as follows:

C403.8.3 Fan efficiency (Mandatory). ~~Fans~~ Each fan and fan array shall have a fan ~~efficiency grade~~ energy index (~~FEG~~ FEI) of not less than ~~67~~ 1.00 at the design point of operation, as determined in accordance with AMCA ~~205~~ 208 by an *approved*, independent testing laboratory and labeled by the manufacturer. ~~The total efficiency of the fan~~ Each fan and fan array used for a variable-air-volume system shall have an FEI of not less than 0.95 at the design point of operation ~~shall be within 15 percentage points of the maximum total efficiency of the fan.~~ as determined in accordance with AMCA 208 by an approved, independent testing laboratory and labeled by the manufacturer. The FEI for fan arrays shall be calculated in accordance with AMCA 208 Annex C.

Exceptions ~~**Exception**~~**:** The following fans are not required to have a fan ~~efficiency grade:~~ energy index:

1. Fans that are not embedded fans with motor nameplate horsepower of less than 1.0 hp (0.75 kW) or with a nameplate electrical input power of less than 0.89 kW.
2. Embedded fans that have ~~1. Fans of 5 hp (3.7 kW) or less as follows: 1.1. Individual fans with~~ a motor nameplate horsepower of 5 hp (3.7 kW) or less ~~, unless Exception 1.2 applies.~~ or with a fan system electrical input power of 4.1 kW or less.
3. Multiple fans operated ~~1.2. Multiple fans~~ in series or parallel as the functional equivalent of a single fan that have a combined motor nameplate horsepower of 5 hp (3.7 kW) or less ~~and are operated as the functional equivalent of a single fan.~~ or with a fan system electrical input power of 4.1 kW or less.

~~4.2.~~ Fans that are part of equipment covered in Section C403.3.2.

~~5.3.~~ Fans included in an equipment package certified by an *approved agency* for air or energy performance.

~~4. Powered wall/roof ventilators.~~
~~5. Fans outside the scope of AMCA 205.~~
6. Ceiling fans, i.e., nonportable devices suspended from a ceiling or overhead structure for circulating air via the rotation of the blades.
7. Fans used for moving gases at temperatures above 425°F (250 °C).
8. Fans used for operation in explosive atmospheres.
9. Reversible fans used for tunnel ventilation.
10.~~6.~~ Fans that are intended to operate only during emergency conditions.
11. Fans outside the scope of AMC208.

AMCA

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208-18: Calculation of the Fan Energy Index

Reason: This proposal harmonizes the recent revisions in Addendum ao of ASHRAE 90.1, which will be in the 2019 edition of the standard. Replacing the Fan Efficiency Grade (FEG) metric with Fan Energy Index (FEI) will result in a more effective energy savings metric and updates the corresponding definitions and standard. FEI was developed in response to the U.S. Department of Energy (DOE) rulemaking for commercial fans and blowers, whereby a wire-to-air metric was deemed to be more effective at saving energy because it would consider the impacts of motors and drives on fan energy performance. Although DOE has since stalled the fan rulemaking, the State of California has initiated an efficiency regulation for commercial and industrial fans under its Title 20 appliance/equipment efficiency standard. FEI has been added to the DOE EnergyPlus software and to the DOE Fan System Assessment Tool. Unlike FEG, FEI can be used in calculations for energy savings, and it does not require a “sizing/selection window,” which makes enforcement easier.

Bibliography: 1. Title: New Federal Regulations for Ceiling Fans: What You Need to Know
Authors: Christian Taber; Michael Ivanovich

Published: ASHRAE Journal, January 2018

File: 42-46_Taber-Ivanovich_Fans, for Web.pdf

Link: www.amca.org/resources/documents/42-46_Taber-Ivanovich_Fans,%20for%20Web.pdf

Keywords: large diameter, ceiling fans, efficiency, performance, U.S. Department of Energy, DOE, AMCA Standard 230, AMCA Standard 208, fan energy index, FEI

Abstract: In January 2017, the U.S. Department of Energy (DOE) finalized its first efficiency performance standards for ceiling fans, which include minimum efficiency requirements for large-diameter ceiling fans. Ratings using the DOE test procedure allow comparisons of products based on electric input power and airflow. Because the DOE performance metric is not based on a specific airflow point, some additional effort on the part of the designer may be required to evaluate fan performance equitably at a specific airflow point. Here are four things to know about the DOE’s regulation of ceiling fans that will help to ensure a successful and efficient ceiling-fan selection.

2. Title: Revolutionary Method of Saving Energy for Commercial and Industrial Fan Systems,

Authors: Michael Ivanovich, Mark Bublitz, and Tim Mathson. Presented at the 2017 ACEEE Summer Study for

Industrial Energy Efficiency, Denver, Colorado. August 15-18, 2017:

Paper: ACEEE-2017-Paper.pdf

Link: www.amca.org/resources/documents/ACEEE-2017-Paper.pdf

PowerPoint: Bublitz FEI ACEEE Industrial EE 2017 presentation.pdf

Link:
www.amca.org/resources/documents/Bublitz%20FEI%20ACEEE%20Industrial%20EE%202017%20presentation.pd

3. Title: New Efficiency Metric for Fans Enables New Approaches for Efficiency Regulations and Incentives.

Authors: Michael Ivanovich, Mike Wolf, Tom Catania.

Presented at the 9th International Conference on Energy Efficiency In Domestic Appliances And Lighting (EEDAL), Irvine, California, September 13-15, 2017.

Paper: EEDAL-2017-Paper.pdf

Link: www.amca.org/resources/documents/EEDAL-2017-Paper.pdf

Presentation: AMCA FEI EEDAL 2017 presentation.pdf

Link: www.amca.org/resources/documents/AMCA%20FEI%20EEDAL%202017%20presentation.pdf

4. AMCA Introduction to Fan Energy Index (FEI) for Stand-Alone Fans. A self-directed 1.5-hour interactive training course. Includes AMCA Standard 208, Calculating Fan Energy Index.

Course link: https://courses-pes.talentlms.com/catalog/info/id:141

Cost Impact: The code change proposal will increase the cost of construction
This proposal may increase the cost of some construction. However, it is a cost-effective change resulting in more efficient fan selection with proven economic payback and positive return on investment.

Staff Analysis: A review of the standard proposed for inclusion in the code, AMCA 208-18, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2019.

Analysis: A review of the standard proposed for inclusion in the code, AMCA 208, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2019.

Proposal # 4866

CE139-19