



AMCA International

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

30 West University Drive
Arlington Heights, IL 60004, USA
847-394-0150
communications@amca.org
www.amca.org

Template for Replacing the IECC-2015 and -2018 Fan Efficiency Grade (FEG) Metric with the IECC-2021 Fan Energy Index (FEI) Metric

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AMCA International Advocacy Team

Contact: Aaron Gunzner, Advocacy Manager, AMCA International, agunzner@amca.org

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Call to Action

Effective with the 2021 IECC, the Fan Energy Index (FEI) metric replaces the Fan Efficiency Grade (FEG) metric in section C403.8.3 Fan Efficiency, along with applicable definitions and references. If updating energy codes to 2015 or 2018 editions of the IECC, AMCA International urges jurisdictions to replace the FEG-based provision with the FEI-based provision. To help facilitate the phaseout of the FEG metric, AMCA International, with permission from ICC, has developed this template showing the underline-strikeout changes that would need to be made.

Reason Statement

Replacing the FEG metric with the FEI metric in energy codes will save energy by enabling fan selections that include effects of motors, drives, and part-load performance. Enforcement also is made easier because the “sizing and selection window” based on peak total efficiency is removed.

Background Resources

- [AMCA Advocacy Brief – FEI](#) – for detailed rationale for energy code updates from FEG to FEI.
- [AMCA FEI microsite](#) – for more information about the FEI metric.
- [Find AMCA FEI-certified products](#) – for confidence that sufficient third-party-certified products are available to meet demand.
- [ASHRAE proposal to modify IECC-2018 for FEI provision](#) – link is to PDF of all change proposals; search for “CE129-19” or navigate to PDF page 1,343.

Contact Information

Please send any questions about this template or FEI to Aaron Gunzner, advocacy manager, AMCA International, at agunzner@amca.org or +1 847-704-6337.

Itemized Changes to Fan-Efficiency Language

Updates to the fan-efficiency provisions in the 2021 IECC encompass definitions, core language, and references. The relevant changes are detailed below, with new text underlined and deleted text struck through.

Definitions

SECTION C202

GENERAL DEFINITIONS

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 EFFICIENCY GRADE (FEG). A numerical rating identifying the fan's aerodynamic ability to convert shaft power, or impeller power in the case of a direct-driven fan, to air power.

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.

Core Language

For the sake of simplicity, the obsolete 2015 and 2018 IECC sections are shown below in their entirety in strikeout format, preceded by the 2021 IECC section recommended for replacement in underline format.

ADDITIONS AS PER IECC 2021

C403.8.3 Fan efficiency.

Each fan and fan array shall have a fan energy index (FEI) of not less than 1.00 at the design point of operation, as determined in accordance with AMCA 208 by an *approved* independent testing laboratory and labeled by the manufacturer. 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, as determined in accordance with AMCA 208 by an approved independent laboratory and labeled by the manufacturer. The FEI for fan arrays shall be calculated in accordance with AMCA 208 Annex C.

Exceptions: The following fans are not required to have a fan 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 a motor nameplate horsepower of 5 hp (3.7 kW) or less, or with a fan system electrical input power of 4.1 kW or less.
3. Multiple fans operated 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 or with a fan system electrical input power of 4.1 kW or less.
4. Fans that are part of equipment covered in Section C403.3.2.
5. Fans included in an equipment package certified by an *approved agency* for air or energy performance.
6. Ceiling fans, which are defined as 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. Fans that are intended to operate only during emergency conditions.
11. Fans outside the scope of AMCA 208.

DELETIONS FROM IECC 2015

C403.2.12.3 Fan efficiency.

Fans shall have a fan efficiency grade (FEG) of not less than 67 when determined in accordance with AMCA 205 by an *approved*, independent testing laboratory and labeled by the manufacturer. The

total efficiency of the fan at the design point of operation shall be within 15 percentage points of the maximum total efficiency of the fan.

Exception: The following fans are not required to have a fan efficiency grade:

1. Fans of 5 hp (3.7 kW) or less as follows:
 - 1.1. Single fan with a motor nameplate horsepower of 5 hp (3.7 kW) or less, unless Exception 1.2 applies.
 - 1.2. Multiple fans in series or parallel 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.
2. Fans that are part of equipment covered under Section C403.2.3.
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. Fans that are intended to operate only during emergency conditions.

DELETIONS FROM IECC 2018

~~C403.8.3 Fan efficiency (Mandatory).~~

Fans shall have a fan efficiency grade (FEG) of not less than 67, as determined in accordance with AMCA 205 by an *approved*, independent testing laboratory and labeled by the manufacturer. The total efficiency of the fan at the design point of operation shall be within 15 percentage points of the maximum total efficiency of the fan.

Exception: The following fans are not required to have a fan efficiency grade:

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.
 - 1.2. Multiple fans in series or parallel 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.
2. Fans that are part of equipment covered in Section C403.3.2.
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. Fans that are intended to operate only during emergency conditions.

References

CHAPTER 6 [CE] REFERENCED STANDARDS

AMCA	Air Movement and Control Association International 30 West University Drive Arlington Heights, IL 60004-1806
205-12	Energy Efficiency Classification for Fans C403.8.3
208-18	<u>Calculation of the Fan Energy Index</u> C403.8.3