



AMCA International

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The International Authority on Air System Components Since 1917

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Template for Replacing the Fan Efficiency Grade (FEG) Metric in ANSI/ASHRAE/IES Standard 90.1-2013 and -2016 with the Fan Energy Index (FEI) Metric in ANSI/ASHRAE/IES Standard 90.1-2019

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Sections of 2013, 2016 and 2019 editions of ANSI/ASHRAE/IES Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings, which is a copyrighted work owned by ASHRAE, have been reproduced herein with the written permission of the ASHRAE. No portion may be reproduced, distributed or transmitted without advance written permission from ASHRAE. Copyright © 2013, 2016, 2019 ASHRAE. All rights reserved.

Call to Action

Effective with the 2019 edition of ANSI/ASHRAE/IES Standard 90.1, the Fan Energy Index (FEI) metric replaces the Fan Efficiency Grade (FEG) metric in Section 6.5.3.1.3 Fan Efficiency, along with applicable definitions and references. If updating energy codes to 2013 or 2016 editions of ASHRAE 90.1, 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 ASHRAE, 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.

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.
- [Addendum *ao* to ANSI/ASHRAE/IES Standard 90.1-2016](#) – link is to PDF containing the FEI Addendum *ao* and other addenda integrated into a single document. Search for “FEI” to navigate to relevant content.

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 2019 version of ANSI/ASHRAE/IES 90.1 encompass definitions, core language, and references. The relevant changes are detailed on the following pages, with new text underlined and deleted text struck through.

Definitions

3 Definitions, Abbreviations, and Acronyms

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): the fan efficiency without consideration of drives, as defined in AMCA 205.

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 per AMCA 208.

fan system electrical 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 ASHRAE 90.1-2013 and -2016 sections are shown below in their entirety in strikeout format, preceded by the ASHRAE 90.1-2019 section recommended for replacement in underline format.

ADDITIONS PER ASHRAE 90.1-2019

6.5.3.1.3 Fan Efficiency

Each fan and *fan array* shall have a *fan energy index (FEI)* of 1.00 or higher. Each fan and *fan array* used for a *variable-air-volume system* that meets the requirements of Section 6.5.3.2.1 shall have an *FEI* of 0.95 or higher. The *FEI* for *fan arrays* shall be calculated in accordance with AMCA 208 Annex C.

Exceptions to 6.5.3.1.3

1. Fans that are not *embedded fans* with a *motor nameplate horsepower* of less than 1.0 hp or with a *fan nameplate electrical input power* of less than 0.89 kW.
2. *Embedded fans* and *fan arrays* with a combined *motor nameplate horsepower* of 5 hp or less or with a fan system electrical input power of 4.1 kW or less.
3. *Embedded fans* that are part of *equipment* listed under Section 6.4.1.1.
4. *Embedded fans* included in *equipment* bearing a third-party-certified seal for air or *energy performance* of the *equipment package*.
5. Ceiling fans.
6. Fans used for moving gases at temperatures above 482°F.
7. Fans used for operation in explosive atmospheres.
8. Reversible fans used for tunnel ventilation.
9. Fans outside the scope of AMCA 208.
10. Fans that are intended to only operate during emergency conditions.

DELETIONS FROM ASHRAE 90.1-2013**6.5.3.1.3 Fan Efficiency**

Fans shall have a fan efficiency grade (FEG) of 67 or higher based on manufacturers' certified data, as defined by AMCA 205. 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.

Exceptions:

1. Single fans with a motor nameplate kilowatts of 5 hp or less
2. Multiple fans in series or parallel (e.g., fan arrays) that have a combined motor nameplate kilowatts of 5 hp or less and are operated as the functional equivalent of a single fan
3. Fans that are part of equipment listed under Section 6.4.1.1
4. Fans included in equipment bearing a third party certified seal for air or energy performance of the equipment package
5. Powered wall/roof ventilators (PRV)
6. Fans outside the scope of AMCA 205
7. Fans that are intended to only operate during emergency conditions

DELETIONS FROM ASHRAE 90.1-2016**6.5.3.1.3 Fan Efficiency**

Fans shall have a *fan efficiency grade (FEG)* of 67 or higher based on *manufacturers'* certified data, as defined by AMCA 205. 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.

Exceptions to 6.5.3.1.3

1. Individual fans with a motor *nameplate horsepower* of 5 hp or less that are not part of a group operated as the functional equivalent of a single fan.
2. Multiple fans in series or parallel (e.g., fan arrays) that have a combined motor *nameplate horsepower* of 5 hp or less and are operated as the functional equivalent of a single fan.
3. Fans that are part of *equipment* listed under Section 6.4.1.1.
4. Fans included in *equipment* bearing a third party certified seal for air or *energy* performance of the *equipment* package.
5. Powered *wall/roof* ventilators (PRV)
6. Fans outside the scope of AMCA 205.
Fans that are intended to only operate during emergency conditions..

References**12 Normative References**

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AMCA 205-12
AMCA 208-18

Energy Efficiency Classification for Fans
Calculation of the Fan Energy Index