STANDARD

ANSI/AMCA Standard 214-21

Test Procedure for Calculating Fan Energy Index (FEI) for Commercial and Industrial Fans and Blowers

An American National Standard
Approved by ANSI on March 1, 2021

Air Movement and Control Association International

AMCA Corporate Headquarters
30 W. University Drive, Arlington Heights, IL 60004-1893, USA
communications@amca.org ▪ Ph: +1-847-394-0150 ▪ www.amca.org

ANSI/AMCA Standard 214-21

Test Procedure for Calculating Fan Energy Index (FEI) for Commercial and Industrial Fans and Blowers

Air Movement and Control Association International
30 West University Drive
Arlington Heights, Illinois
60004

AMCA Publications

Authority

ANSI/AMCA Standard 214 was adopted by the membership of the Air Movement and Control Association International Inc. on December 31, 2020. It was approved as an American National Standard on March 1, 2021.

Copyright

Objections

The Air Movement and Control Association (AMCA) International Inc. will consider and take action upon all written complaints regarding its standards, certification programs or interpretations thereof. For information on procedures for submitting and handling complaints, write to:

AMCA International Inc.
30 West University Drive
Arlington Heights, IL 60004-1893
U.S.A.

European AMCA
Avenue de Tervueren 188a
Postbox 4
1150 Brussels, Belgium

Asia AMCA Sdn Bhd
No. 7, Jalan SiLC 1/6,
Kawasan Perindustrian SiLC Nusajaya,
Mukim Jelutong, 79200 Nusajaya, Johor
Malaysia

Disclaimer

AMCA uses its best efforts to produce publications for the benefit of the industry and the public in light of available information and accepted industry practices. However, AMCA does not guarantee, certify or assure the safety or performance of any products, components or systems tested, designed, installed or operated in accordance with AMCA publications or that any tests conducted under its publications will be non-hazardous or free from risk.

Foreword

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ANSI.)

The purpose of AMCA Standard 214, Test Procedure for Calculating Fan Energy Index (FEI) for Commercial and Industrial Fans and Blowers, is to aid federal and state rulemaking efforts to establish energy-efficiency standards for commercial and industrial fans and blowers, providing a consistent method of calculating FEI across the many different options or circumstances that exist in the fan market (fans sold without motors and drives, fans sold with unregulated motors or regulated motors, etc.).

An expressed difficulty in establishing an FEI-based fan regulation is having to work with four AMCA standards and publications: ANSI/AMCA Standard 207, Fan System Efficiency and Fan System Input Power Calculation; ANSI/AMCA Standard 208, Calculation of the Fan Energy Index; ANSI/AMCA Standard 210/ASHRAE Standard 51, Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating); and AMCA Publication 211, Certified Ratings Program Product Rating Manual for Fan Air Performance. AMCA Standard 214 consolidates these documents.

AMCA Standard 214 primarily is for fans that are tested alone or with motors and drives; it does not apply to fans tested embedded inside of other equipment. AMCA Standard 214 covers most fan types and sizes.

For fans that already have been tested for rating using test procedures referenced in this document, no new testing is required for applying this standard. Fan manufacturers may be required to update their internal data-collection, calculation, and documentation systems to acquire the data necessary for the calculation of FEI.

AMCA Standard 214 covers only calculation of FEI and fan electrical power (FEP). It does not cover labeling, compliance filing, surveillance, and other regulatory processes.

Presenting FEI values to the market may also require fan manufacturers to modify fan-selection software and printed materials.

Calculations in AMCA Standard 214 may require fan manufacturers to collect additional information from prospective buyers, such as drive (transmission) configuration and expected motor selection.

Compliance with AMCA Standard 214 requires fan manufacturers to assemble product data not historically presented to the market, such as fan outlet area, fan total pressure, and fan category.

Review Committee

Mark Bublitz	Chair	The New York Blower Company
John Bade	Member	2050 Partners
Chaitanya Johar	Member	AAON
Adam Sterne	Member	Acme Engineering and Manufacturing Corp.
Chris Quinones	Member	AcoustiFLO, LLC
Christian Taber	Member	Big Ass Fans
Mark Gerken	Member	Cincinnati Fan
Chad Oldham	Member	Greenheck Fan Corporation
Aaron Saldanha	Member	Howden
Daniel Hernandez	Member	Johnson Controls Inc. / PennBarry
Bob Valbracht	Member	Loren Cook Company
Neal Boyd	Member	Northern Blower
Dan Delaney	Member	Regal Beloit
Ola Wettergren	Member	Systemair
Trinity Persful	Member	Twin City Fan Companies, Ltd.
Dustin Meredith	Member	Trane
William B Howarth	Member	Ventilation & Fan Consulting Service International
Aschenbach, Kai	Member	Ziehl-Abegg SE
Lee Buddrus	Non-Voting Member	Acme Engineering & Manufacturing Corp.
Anthony (Geoff) Sheard	Non-Voting Member	AGS Consulting, LLC
Abhishek Jain	Non-Voting Member	Air Flow Pvt Ltd
Joanna Mauer	Non-Voting Member	Appliance Standards Awareness Project
Fernando A. Ruiz Con., M.A., P.E.	Non-Voting Member	ARMEE
Franco Cincotti	Non-Voting Member	Comefri USA
Marcel Kamutzki	Non-Voting Member	Daltec Process Fans
Armin Hauer	Non-Voting Member	ebm-papst Inc.
Alejandro Galdamez	Non-Voting Member	California Energy Commission
Chad Worth	Non-Voting Member	Energy Solutions
Nathan Fetting	Non-Voting Member	Greenheck Fan Corporation

DongWon Park	Non-Voting Member	Gumsung Poong Ryuk Co,. Ltd
Sameh Ezzat	Non-Voting Member	Hammam Industries & Co.
Mohammad Sulaiman Hassan	Non-Voting Member	Italconsult Spa
Mark Lessans	Non-Voting Member	Johnson Controls
Sanaee Iyama	Non-Voting Member	Lawrence Berkeley National Laboratory
Keith Lins	Non-Voting Member	M. K. Plastics Corp.
Nigil Sudharjanan	Non-Voting Member	Maico Gulf
Tanmoy Kumar Choudhury	Non-Voting Member	Maico Gulf LLC (Dynair / Dynavent / Elicent)
Shekhar Maurya	Non-Voting Member	Nehmeh Corporation
Jim Gatto	Non-Voting Member	Robinson Fans Inc
Joshua Lynch	Non-Voting Member	S&P USA Ventilation Systems, LLC
Rad Ganesh	Non-Voting Member	Twin City Fan Companies, Ltd.
Luis Javier Diaz	Non-Voting Member	ZITRON SA
Joseph Brooks	AMCA Staff Liaison	AMCA International, Inc.

Contents

Test Procedure for Calculating Fan Energy Index (FEI) for Commercial and Industrial Fans and Blowers

1. Scope

This standard applies to fans where air is used as the test gas with the following exceptions:

- Ceiling fans
- Cross-flow fans
- Air Curtain Units

2. References (Normative)

The following referenced documents are required for the application of this document. For dated references only the edition cited applies. For undated references, the latest edition of the referenced document applies.

AHRI Standard 1210 (I-P/2019), Performance Rating of Variable Frequency Drives

ANSI/AMCA Standard 210-16/ASHRAE 51-16, Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating

ANSI/AMCA Standard 230-15, Laboratory Methods of Testing Air Circulating Fans for Rating and Certification

ANSI/AMCA Standard 250-12, Laboratory Methods of Testing Jet Tunnel Fans for Performance

ANSI/AMCA Standard 260-20, Laboratory Methods of Testing Induced Flow Fans for Rating

ANSI/AMCA Standard 99-2016, Standards Handbook

ANSI/ASHRAE Standard 222-2016, Standard Method of Test for Electrical Power Drive Systems

CAN/CSA C747-09, Energy efficiency test methods for small motors

CAN/CSA C838-13, Energy efficiency test methods for three-phase variable frequency drive systems

IEEE 112-2017, Standard Test Procedure for Polyphase Induction Motors and Generators

ISO 5801:2017, Fans – Performance testing using standardized airways

ISO 13350:2015, Fans – Performance testing of jet fans

10 CFR 431.25, Energy conservation standards and effective dates

3. Definitions

3.1 Absolute pressure
The pressure if the datum pressure is absolute zero. It is always positive.

3.2 Axial impeller
An impeller (propeller) with a number of blades extending radially from a central hub in which airflow through the impeller is axial in direction; that is, airflow enters and exits the impeller parallel to the shaft axis with a fan flow angle less than or equal to 20 degrees. Blades can be either single thickness or airfoil shaped**.**