

AMCA Standard 205-10

Energy Efficiency Classification for Fans



**AIR MOVEMENT AND CONTROL
ASSOCIATION INTERNATIONAL, INC.**

The International Authority on Air System Components

AMCA Standard 205-10

Energy Efficiency Classification for Fans



Air Movement and Control Association International, Inc.
30 W. University Drive
Arlington Heights, Illinois
60004

AMCA Publications

Authority AMCA International Standard 205 was approved by the membership of the Air Movement and Control Association International, Inc. on February 19, 2010.

An errata was issued on March 4, 2010, and incorporated into the document on March 9, 2010 to address editorial corrections. The corrections can be found in the errata section at the end of this document.

Copyright © 2010 by Air Movement and Control Association International, Inc.

All rights reserved. Reproduction or translation of any part of this work beyond that permitted by Sections 107 and 108 of the United States Copyright Act without the permission of the copyright owner is unlawful. Requests for permission or further information should be addressed to the Executive Director, Air Movement and Control Association International, Inc. at 30 West University Drive, Arlington Heights, IL 60004-1893 U.S.A.

Objections Air Movement and Control Association International, Inc. will consider and decide all written complaints regarding its standards, certification programs, or interpretations thereof. For information on procedures for submitting and handling complaints, write to:

Air Movement and Control Association International
30 West University Drive
Arlington Heights, IL 60004-1893 U.S.A.

AMCA International, Incorporated
c/o Federation of Environmental Trade Associations
2 Waltham Court, Milley Lane, Hare Hatch
Reading, Berkshire, United Kingdom
RG10 9TH

Disclaimer AMCA uses its best efforts to produce standards 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 standards or that any tests conducted under its standards will be non-hazardous or free from risk.

Review Committee

Franco Cincotti, Chair	Comefri USA Inc.
Thomas Bader	Ziehl-Abegg, Inc.
Guido Banzi	Maico Italia S.p.A
Mike Brendel	Lau Industries, Inc.
Tony Breen	Nuaire Ltd.
Dario Brivio	Nicotra Gebhardt S.p.A
John Cermak	Acme Engineering and Manufacturing Corp.
W.T.W. (Bill) Cory	Cory Consultancy
Pierangelo Dela Mora	Comefri S.p.A
Matt Gaedtke	Greenheck Fan Corp.
Rad Ganesh	Twin City Fan Companies, Ltd.
Maszlan Abdul Ghafer	Mecomb Singapore, Ltd.
Ms. S.L. Goh	AFMA Technologies
Alain Guedel	CETIAT
Tom Gustafason	Hartzell Fan, Inc.
Oh-yong Kwon	MPI
Bong-soo Lee	MPI
Geoff Lockwood	ebm-papst
Mikael Lönnberg	Systemair AB
John Murphy	JOGRAM, Inc.
Ralf Neumeier	Ziehl-Abegg, Inc.
Kim Osborn	Governair Corp.
Brian Reynolds	Trane
Tan Tin Tin	AFMA Technologies
Soon Kok Wee	Mecomb Singapore, Ltd.
Tarek Yacout	Hammam Industries & Co.
Joe Brooks	AMCA International, Inc.
Mark Stevens	AMCA International, Inc.

Contents

- 1. **Scope**1
- 2. **Normative References**1
- 3. **Definitions / Symbols**1
 - 3.1 Definitions1
 - 3.2 Symbols3
- 4. **General**3
 - 4.1 Use of installation categories3
 - 4.2 Fan energy efficiency calculations3
- 5. **Efficiency Classification for Fans**3
 - 5.1 General3
 - 5.2 FEG Classification of fan efficiency5
 - 5.3 FMEG Classficiations of overall fan efficiency5
- 6. **Use of Fan Efficiency Grades in Codes and Specifications**5
- Annex A. Energy Efficiency Grades for a Fan without Drive (Normative)**8
- Annex B. Calculation of Annual Energy Consumption (Normative)**12
- Annex C. Range of Fan Efficiency for Selection of the Fan in the System (Normative)**13
- Errata**14

Energy Efficiency Classification for Fans

1. Scope

This standard defines the classification for all fan types designed to be driven by motors of nominal rating 125 W (1/6 hp) and above. The fans can range from the purpose built single fan to series produced fans manufactured in large quantities. This standard applies to the fan and not to the fan system. This standard excludes classification for circulating fans.

This standard can also be used by legislative or regulatory bodies for defining the energy efficiency requirements of fans used in specific applications.

2. Normative References

The following referenced documents shall be utilized for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ANSI/AMCA Standard 210-07
Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Ratings

AMCA Standard 99
Standards Handbook

IEEE 112-2004
Standard Test Procedure for Polyphase Induction Motors and Generators

IEEE 114-2001
Standard Test Procedure for Single Phase Induction Motors

ISO 5801:2007
Industrial Fans - Performance Testing Using Standardized Airways

ISO/DIS 12759
Fans - Efficiency Classification for Fans

ISO 13348:2007
Industrial Fans - Tolerances, Methods of Conversion and Technical Data Presentation

ISO 13349:2008
Industrial Fans - Vocabulary and Definitions of Categories

3. Definitions / Symbols

For the purpose of this standard, the definitions, units of measure, and symbols in this section apply.

3.1 Definitions

3.1.1 Fan

A rotary machine that imparts energy to an air stream and by means of one or more impellers fitted with blades to maintain quasi continuous flow with a fan pressure rise that does not normally exceed 30 kPa (120 in. wg).

Note: The pressure limit corresponds approximately to a fan specific work of 25 kJ/kg.

3.1.2 Fan size

The design impeller diameter.

3.1.3 Fan drives (transmission, motor/control system)

Any device used to power the fan including motor, mechanical transmission (e.g. belt drive, coupling etc.), motor/control system (e.g. variable frequency controller, electronic commutator etc.).

3.1.4 Fan without drive

A fan with its impeller attached to a fan shaft supported by bearings. See Figure 1.

3.1.5 Fan with drive

A fan with drive. See Figure 2.

3.1.6 Air

Term used as abbreviation for “air or other gas”.

3.1.7 Standard air

The air with a density of 1.200 kg/m³ (0.075 lbm/ft³).

3.1.8 Fan pressures

3.1.8.1 Fan (total) pressure, P_t

Difference between the stagnation pressures at the fan outlet and the fan inlet.

Note: For incompressible flow (see ISO 5801, Section 14.5.1), the fan (total) pressure is equal to the difference of total pressures at the fan outlet and the fan inlet.