

# ANSI/AMCA Standard 204-05

## Balance Quality and Vibration Levels for Fans

An American National Standard  
Approved by ANSI on September 23, 2005



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

The International Authority on Air System Components

## ANSI/AMCA STANDARD 204-05

### Balance Quality and Vibration Levels for Fans



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

This is a preview of "ANSI/AMCA 204-05". [Click here to purchase the full version from the ANSI store.](#)

© 2006 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 Chief Staff Executive, Air Movement and Control Association International, Inc. at 30 West University Drive, Arlington Heights, IL 60004-1893 U.S.A.

## Authority

This edition of ANSI/AMCA Standard 204 was adopted by the membership of the Air Movement and Control Association International, Inc., on 03 August 2003. This standard addresses the need of both the users and manufacturers of fans for technically accurate but uncomplicated information of the subjects of fan balance precision and vibration levels. The data presented herein is referenced to applicable national and international standards and is in harmony with these standards, including ISO 14694:2003, *Industrial fans - Specification for balance quality and vibration levels*. Information from the reference standards is supplemented by years of experience on the part of committee members and from other contributors in the industry.

## AMCA 204 Review Committee

Dr. John Cermak, Chair	Acme Engineering & Manufacturing Corporation
Dick Williamson, Vice Chair	Twin City Fan Companies, Ltd.
Dr. Vasanthi Iyer	Air Movement Solutions, LLC
Ralph Jackson	Cincinnati Fan & Ventilator Company
Enrique Hernandez	Flakt Woods Mexico Fans, S.A. de C.V.
Tim Kuski	Greenheck Fan Corporation
David Marshall	Howden Buffalo, Inc.
Tan Tin Tin	Kruger Ventilation Industries Pte. Ltd.
Bradley F. Skidmore. P.E.	Loren Cook Company
Scott Phillips	The New York Blower Company
Robert W. Lipke	RWL Technical Services, Inc.
Paul R. Saxon (ret.)	AMCA International Staff
Joe Brooks	AMCA International Staff

## 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.

### **Objections to AMCA Standards and Certifications Programs**

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

or

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

## TABLE OF CONTENTS

<b>1. Purpose and Scope</b>	.1
1.1 Purpose	.1
1.2 Scope	.1
<b>2. Normative References</b>	.1
<b>3. Definitions / Units of Measure / Symbols</b>	.1
3.1 Definitions	.1
3.2 Units of measure	.3
3.3 Symbols	.3
<b>4. Application Categories</b>	.4
<b>5. Balancing</b>	.5
5.1 Balance quality grade	.5
5.2 Permissible residual unbalance	.5
<b>6. Vibration</b>	.6
6.1 Measurement requirements	.6
6.2 Fan support system	.7
6.3 Factory tests	.7
6.4 Vibration limits for operation <i>in-situ</i>	.9
<b>7. Other Rotating Components</b>	.11
<b>8. Documentation</b>	.11
8.1 Balance	.11
8.2 Vibration	.11
<b>Annex A. SI / I-P Conversion Table (informative)</b>	.12
<b>Annex B. Relationships (Informative)</b>	.13
<b>Annex C. Maximum Permissible Residual Unbalance (Informative)</b>	.15
<b>Annex D. Instruments and Calibration (Informative)</b>	.17
D.1 Instruments	.17
D.2 Calibration	.17
<b>Annex E. References (Informative)</b>	.18

This is a preview of "ANSI/AMCA 204-05". [Click here to purchase the full version from the ANSI store.](#)

# Balance Quality and Vibration Levels for Fans

## 1. Purpose and Scope

This standard addresses the subjects of fan balance and vibration. It is part of a series of standards and publications listed in Annex E that cover important aspects related to the design, manufacture and use of fans.

Other standards exist that deal with the vibration of machines in general. This standard considers only fans. Vibration is recognized to be an important parameter regarding the mechanical operation of fans. Balance quality is a precondition to satisfactory mechanical operation.

### 1.1 Purpose

The purpose of this standard is to define appropriate fan balance quality and operating vibration levels to individuals who specify, manufacture, use, and maintain fans.

### 1.2 Scope

This standard covers fans with rigid rotors, generally found in commercial heating, ventilating and air conditioning; industrial process applications; mine/tunnel ventilation applications, and power generation applications. Other applications are not specifically excluded, except as follows:

Excluded are installations that involve severe forces, impacts, or extreme temperature acting on the fan.

Fan foundations and installation practices are beyond the scope of this standard. Foundation design and fan installation are not normally the responsibilities of the fan manufacturer. It is fully expected that the foundation upon which the fan is mounted will provide the support and stability necessary to meet the vibration criteria of the fan as it is delivered from the factory.

Other factors such as impeller cleanliness, aerodynamic conditions, background vibration, operation at rotational speeds other than those agreed upon, and maintenance of the fan affect fan vibration level but are beyond the scope of this standard.

This standard is intended to cover only the balance or vibration of the fan and does not take into account the effect of fan vibration on personnel, equipment, or processes.

Any or all portions of this standard, or modifications thereof, are subject to agreement between the concerned parties.

## 2. Normative References

The following standards contain provisions that, through specific reference in this text, constitute provisions of this American National Standard. At the time of publication of this standard the editions indicated were valid.

All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below.

- [1] **ANSI S2.7-1982 (R1997)** *Balancing Terminology*, American National Standards Institute, 11 West 42<sup>nd</sup> Street, New York, NY 10035 U.S.A
- [2] **ISO 1925:2001** *Mechanical vibration – Balancing vocabulary*, International Organization for Standardization, 1 Rue de Varembe, Case Oistake 56, Ch-1211, Geneve 20, SWITZERLAND
- [3] **ANSI S2.19-1989 (R1997)** *Balance Quality of Rigid Rotating Bodies (ISO 1940)*, American National Standards Institute, 11 West 42<sup>nd</sup> Street, New York, NY 10035 U.S.A.

## 3. Definitions / Units of Measure / Symbols

### 3.1 Definitions

**3.1.1 Balancing:** The process of adding or removing mass in a plane or planes on a rotor in order to move the center of gravity towards the axis of rotation.

**3.1.2 Balance quality grade:** The recommended limits for residual unbalance of a rotor based upon the intended application. (Note: Commonly used balance quality grades in ANSI S2.19 refer to the vibration that would result if the rotor operated in free space, i.e., Balance Quality Grade G6.3 corresponds to a shaft vibration of 6.3 mm/s velocity, at the operating rotational speed of the rotor). The value