

ANSI/AMCA Standard 500-D-07

Laboratory Methods of Testing Dampers for Rating

An American National Standard
Approved by ANSI on January 23, 2007



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

The International Authority on Air System Components

This is a preview. [Click here to purchase the full publication.](#)

ANSI/AMCA STANDARD 500-D-07

**Laboratory Methods of Testing
Dampers for Rating**



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

[This is a preview. Click here to purchase the full publication.](#)

© 2007 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.

[This is a preview. Click here to purchase the full publication.](#)

Authority

AMCA Standard 500-D-07 was adopted by the membership of the Air Movement and Control Association International, Inc. on 19 October, 2006. It was approved as an American National Standard by the American National Standards Institute (ANSI) and became effective on 23 January 2007.

AMCA 500-D Review Committee

Mike Watz, Co-Chair	Greenheck Fan Corporation
Dane Carey, Co-Chair	NCA Manufacturing, Inc.
Roger Lichtenwald	Air Balance, Inc.
Vince Kreglewicz	Arrow United Industries
Charles Theis	Honeywell International
John Young	Nailor Industries
Mike Beaver	P.C.I. Industries
Wendell Simmons	Reliable Products
Robert Van Becelaere	Ruskin Company
Dan Kaiser	Underwriters Laboratories, Inc.
Tim Orris	AMCA International

Corresponding Members

Prasad Bhatt	CERT-AIRE Technical Services, Ltd.
Jack Buckley, P.E.	Buckley Consultant
John Clark, P.E.	Bakke Kopt Ballou McFarlin, Inc.
Michael Dillon, P.E.	Dillon Consulting Engineers
Francis McCabe	Prefco Products, Inc.
Bob Wasilewski	SMACNA

Disclaimer

AMCA International 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 International 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 International 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
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

Related AMCA Standards and Publications

AMCA Publication 502	<i>Damper Application Manual for Heating, Ventilation and Air Conditioning</i>
AMCA Publication 503	<i>Fire, Ceiling(Radition), Smoke and Fire/Smoke Dampers Application Manual</i>
ANSI/AMCA Standard 510	<i>Methods of Testing Heavy Duty Dampers for Rating</i>
AMCA Publication 511	<i>Certified Ratings Program for Air Control Devices</i>
ANSI/AMCA Standard 520	<i>Laboratory Methods for Testing Actuators</i>

TABLE OF CONTENTS

1. Purpose	1
2. Scope	1
3. Units of Measurement	1
3.1 System of units	1
3.2 Basic units	1
3.3 Airflow rate and velocity	1
3.4 Pressure	1
3.5 Torque	1
3.6 Gas properties	1
3.7 Dimensionless groups	2
3.8 Physical constants	2
4. Symbols and Subscripts	2
4.1 Symbols and subscripted symbols	2
4.2 Additional subscripts (planes of measurement)	3
5. Definitions	3
5.1 Damper	3
5.2 Air control damper	3
5.3 Free area	4
5.4 Face area	4
5.5 Psychrometrics	4
5.6 Pressure	4
5.7 Performance variables	4
5.8 Miscellaneous	5
6. Instruments and Methods of Measurement	5
6.1 Accuracy [4]	5
6.2 Pressure	6

6.3	Airflow rate	7
6.4	Torque	7
6.5	Air density	8
6.6	Voltage	8
6.7	Meters	8
6.8	Pneumatic actuator supply air pressure	8
6.9	Pressure gauges	8
6.10	Chronometers	8
6.11	Velocity meters	8
7.	Equipment and Setups	8
7.1	Setups	8
7.2	Ducts	9
7.3	Chambers	9
7.4	Variable supply and exhaust systems	10
8.	Objective, Observations and Conduct of Test	10
8.1	Air performance - pressure drop test	10
8.2	Air flow leakage rate using ambient air	12
8.3	Air flow leakage rate using ambient or heated air [15]	16
8.4	Dynamic closure test using ambient air	17
8.5	Operational test using ambient air	19
8.6	Damper dynamic operational torque	22
8.7	Dynamic closure test using heated air	24
8.8	Operational test using heated air	26
9.	Calculations	28
9.1	Calibration collection	28
9.2	Density and viscosity of air	28
9.3	Damper airflow rate	29
9.4	Density correction	31
9.5	Continuity of mass flow	31
9.6	Airflow leakage - system leakage correction	31

9.7 Pressure drop - duct system correction	31
9.8 Airflow leakage - system leakage correction for elevated temperature leakage tests	32
10. References	33
Annex A. SI and I-P Conversions	60
A.1 I-P Equivalents of SI units	60
A.2 SI Equivalents of I-P units	61
Annex B. Presentation of Air Performance Results for Rating Purposes	62
B.1 Rating air performance - pressure drop	62
B.2 Rating air leakage	62
Annex C. Bibliography	63

