

AMCA Publication 302-73 (R2008)

Application of Sone Loudness Ratings for Non-Ducted Air Moving Devices



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

The International Authority on Air System Components

AMCA PUBLICATION 302-73 (R2008)

**Application of Sone Loudness Ratings
for Non-Ducted Air Moving Devices**



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

This is a preview of "AMCA 302-73 (R2008)". [Click here to purchase the full version from the ANSI store.](#)

© 2008 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 publication was approved by the AMCA International membership in February, 1973. It was reaffirmed by the Board of Directors on February 16, 2008.

The following individuals contributed to the development of the original Publication 302:

R. A. Gerlitz	Robbins & Meyers, Inc. - Propellair Division
D. D. Herrman	Hartzell Propellar Fan Company
R. Jorgensen	Buffalo Forge Co.
R. E. Parker	Ilg Electric Ventilating Co.
H. R. Bohanon	Acme Engineering & Manufacturing
E. A. Cruse	AMCA International

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
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

This is a preview of "AMCA 302-73 (R2008)". [Click here to purchase the full version from the ANSI store.](#)

TABLE OF CONTENTS

1. Purpose	1
2. Suggested Limits for Room Loudness	1
3. Examples	2
4. Coefficients of General Building Materials	10

This is a preview of "AMCA 302-73 (R2008)". [Click here to purchase the full version from the ANSI store.](#)

Application of Sone Loudness Ratings for Non-Ducted Air Moving Devices

1. Purpose

The loudness of a sound as heard by the human ear depends not only upon the overall intensity of the sound, but on its frequency distribution as well. The ear acts as an analyzer, determining the loudness in a rather complicated way from the sound intensities at the various frequencies. This loudness can be measured by making a proper summation of the sound intensity in each of eight octave bands, and the resulting units are called "sones." By definition, one "sone" is the loudness of a sound with a frequency of 1000 cycles per second and a sound pressure of 0.02 microbar. Practically, one sone is approximately equal to the loudness of a quiet refrigerator in a quiet kitchen.

The sone scale is linear to the human ear. A sound of 20 sones is twice as loud as one of 10 sones. Because of its linearity, and because it is related to loudness as perceived by the ear, the sone is used as a single number method of rating the sound output of non-ducted fans and power ventilators. Within the present state of the art, when comparing sone loudness ratings, differences of $\pm 6\%$ or less are not considered significant.

The AMCA method of rating in sones gives the loudness at a distance of 5 feet from the unit in free space with no nearby reflecting surfaces. Most practical applications, however, will involve the determination of total loudness within a room.

The charts and formulae given in this bulletin are for the purpose of estimating the loudness of fans as installed, and take into consideration room size and acoustical qualities as well as the number and loudness ratings of the fans. It will be necessary to know the acoustical characteristics of other noise sources within the room to be able to estimate the total loudness of all sources. For the addition of sounds, it is assumed that the noise spectrums are similar. The room effect chart is for the reverberant field in the room, and applies everywhere except in the space near the fan. Within this space, the direct sound field can be estimated and added to the reverberant field to obtain total loudness.

The sound pressure level in a room as measure by a Sound Level Meter on the "A" network, (dBA) can be estimated by use of the Loudness -dBA correlation chart. This chart gives the relationship between loudness in sones and dBA levels for normal fan spectrums within ± 2 dBA, which is about the same order as experimental errors in sound measurements. It must be emphasized that this correlation applies only after the calculation for room effect and direct sound field have been completed and does not apply to the fan alone.

2. Suggested Limits for Room Loudness

2.1 Auditoriums and music halls

1	to	3	Concert and opera halls
1.5		5	Legitimate theaters
2		6	Movie theaters
2		6	Semi-outdoor amphitheatres
2		6	Lecture halls
1.5		5	Multi-purpose
3		9	Courtrooms
4		12	Auditorium lobbies
2		6	T.V. audience studios

2.2 Churches and schools

1.7	to	5	Sanctuaries
2.5		8	Schools and classrooms
4		12	Recreation halls
6		18	Kitchens
2		6	Libraries
4		12	Laboratories
5		15	Corridors and halls

2.3 Hospitals and clinics

1.7	to	5	Private rooms
2.5		8	Wards
4		12	Laboratories
2.5		8	Operating Rooms
4		12	Lobbies and waiting rooms
4		12	Halls and corridors

2.4 Hotels

4	to	12	Lobbies
8		24	Banquet rooms
3		9	Ball rooms
2		6	Individual rooms or suites
7		21	Kitchen and laundries
4		12	Halls and corridors
6		18	Garages