



ASA/ANSI S12.2-2019

Reaffirmed by ANSI December 4, 2023

AMERICAN NATIONAL STANDARD

Criteria for Evaluating Room Noise

Secretariat:

Acoustical Society of America

Approved on May 21, 2019:

American National Standards Institute, Inc.

Abstract

This Standard provides three primary methods for evaluating room noise: a survey method that employs the A-weighted sound level; an engineering method that employs expanded noise criteria (NC) curves; and a method for evaluating low-frequency fluctuating noise using room noise criterion (RNC) curves.

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Criteria for Evaluating Room Noise

ANSI/ASA S12.2-2019

Accredited Standards Committee S12, Noise

Standards Secretariat
Acoustical Society of America
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Foreword

[This Foreword is for information only, and is not a part of the American National Standard ANSI/ASA S12.2-2019 American National Standard Criteria for Evaluating Room Noise. As such, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the standard.]

This standard comprises a part of a group of definitions, standards, and specifications for use in noise. It was developed and approved by Accredited Standards Committee S12 Noise, under its approved operating procedures. Those procedures have been accredited by the American National Standards Institute (ANSI). The Scope of Accredited Standards Committee S12 is as follows:

Standards, specifications, and terminology in the field of acoustical noise pertaining to methods of measurement, evaluation, and control, including biological safety, tolerance, and comfort, and physical acoustics as related to environmental and occupational noise.

This standard revises and replaces ANSI/ASA S12.2-2008, which has been withdrawn and technically revised. Changes have been made to the NC and dBA values for some spaces. The RC Mark II procedures of the 2008 edition remain briefly discussed in an informative Annex. This Standard provides three primary methods for evaluating room noise: a survey method that employs the A-weighted sound level; an engineering method that employs expanded noise criteria (NC) curves; and a method for evaluating low-frequency fluctuating noise using room noise criterion (RNC) curves.

This standard is not comparable to any existing ISO Standard.

At the time this Standard was submitted to Accredited Standards Committee S12, Noise, for approval, the membership was as follows:

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American National Standard

Criteria for Evaluating Room Noise

1 Scope

The three primary methods for evaluating room noise are:

1. The survey method that employs the A-weighted sound level;
2. The engineering method that employs noise criteria (NC) curves; and
3. The method for evaluating low-frequency fluctuating noise using room noise criteria (RNC) curves.

This Standard also contains one ancillary set of criteria curves for evaluating acoustically induced vibrations or rattles.

Requirements are given in the body of the Standard for determining whether a:

1. Measured or estimated A-weighted sound level satisfies a specified noise criterion.
2. Set of octave-band sound pressure levels satisfies a specified NC curve.
3. Time-series of octave-band sound pressure levels satisfies a specified RNC curve.
4. Table of octave-band sound pressure levels that, when modulated by fluctuations at low frequencies, may cause perceptible vibrations or rattles in lightweight constructions.

Annex A presents examples of the use of RNC for evaluating measured or estimated sound level spectra in rooms.

Annex B presents a discussion of room criteria (RC), NC, balanced noise criteria (NCB), and RNC curves.

Annex C contains recommended noise level specifications for various occupied activity areas.

Annex D contains the procedures for use of the RC Mark II curves.

Annex E contains criteria for recording studios and other low-noise situations.

No guidance is given for the selection of equipment or the methods for measuring noise levels to be evaluated by the curves.

2 Normative references

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

ANSI/ASA S1.1-2013 *American National Standard Acoustical Terminology*.

ANSI/ASA S1.4-2014/Part 3/IEC 61672-3:2013 American National Standard Electroacoustics - Sound Level Meters - Part 3: Periodic Tests (a nationally adopted international standard)

ANSI/ASA S1.6-2016 American National Standard Preferred Frequencies and Filter Band Center Frequencies for Acoustical Measurements.

ANSI/ASA S1.13-2005 *American National Standard Measurement of Sound Pressure Levels in Air*.

ANSI/ASA S12.65-2006 (R2011) *American National Standard Rating Noise with Respect to Speech Interference*.

3 Terms, definitions, abbreviations, and symbols

For the purposes of this standard, the terms and definitions given in ANSI/ASA S1.1 and the following apply:

3.1

mid-frequency average (LMF)

the average of the octave-band sound pressure levels in 500 Hz, 1000 Hz, and 2000 Hz:

$$LMF = (\frac{1}{3})(L_{500} + L_{1000} + L_{2000}),$$

where L_{500} , L_{1000} , and L_{2000} are the octave-band sound pressure levels at 500, 1000, and 2000 Hz, respectively. Unit: decibel (dB); abbreviation: LMF; symbol: L_{MF} .

3.2

speech-interference level (SIL)

the average of the octave-band sound pressure levels in 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz:

$$SIL = (\frac{1}{4})(L_{500} + L_{1000} + L_{2000} + L_{4000}),$$

where L_{500} , L_{1000} , L_{2000} , and L_{4000} are the octave-band sound pressure levels at 500, 1000, 2000, and 4000 Hz, respectively.

NOTE This definition is consistent with the American National Standard definition in ANSI/ASA S12.65-2006.

3.3

rumble

noise with excessive levels in the octave bands at and below 500 Hz

3.4

rattle

audible noise due to excessive motion of wall or ceiling systems and furnishings attached to them

3.5

hiss

noise with excessive levels in the octave bands at and above 1000 Hz

3.6**equivalent (continuous) sound level (LEQ)**

ten times the logarithm to the base ten of the ratio of time-mean-square instantaneous A-weighted sound pressure, during a stated time interval, T , to the square of the standard reference sound pressure. Unit: decibel (dB); abbreviation: LEQ; symbol: L_{eqT} .

NOTE 1 A frequency weighting other than the standard A-weighting may be employed if specified explicitly. The frequency weighting that is essentially constant between limits specified by a manufacturer is called flat.

NOTE 2 In symbols, equivalent (continuous) sound level in decibels is:

$$L_{eqT} = 10 \log \left\{ \left(\frac{1}{T} \right) \int_0^T \frac{p_A^2(t) dt}{p_0^2} \right\}$$

where p_A^2 is the squared instantaneous A-weighted sound pressure signal, a function of elapsed time t , in air at standard temperature and pressure, reference sound pressure $p_0 = 20 \mu\text{Pa}$; T is a stated time interval.

NOTE 3 In principle, the sound pressure signal is not exponentially time-weighted, neither before nor after squaring.

3.7**surge**

a sizeable or clearly perceptible fluctuation in low-frequency sound and mostly produced by airflow in building ventilation systems

3.8**abbreviations and symbols**

For the purposes of this standard, the following abbreviations and symbols apply:

NC	Noise criteria
RNC	Room noise criteria
NCB	Balanced noise criteria
N	Neutral noise spectrum designator
H	Hiss, a hissy noise spectrum designator
R	Rumble, a “rumbly” noise spectrum designator
RV	Perceptible vibration
QAI	Quality assessment indicator
SIL	Speech interference level
OASPL	Overall sound pressure level
LEQ	Equivalent (sound pressure) level
RC	Room criteria