

**ANSI/AHRI Standard 280**

**2011 Standard for**

**Requirements for the  
Qualification of Reverberation  
Rooms in the 63 Hz Octave  
Band**



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Note:

This standard supersedes ANSI/AHRI Standard 280-2008.

## TABLE OF CONTENTS

SECTION	PAGE
Section 1. Purpose.....	1
Section 2. Scope.....	1
Section 3. Definitions.....	1
Section 4. Reverberation Room Qualification and Testing Procedures .....	2
Section 5. Conformance Conditions .....	3

## TABLES

Table 1. Broadband Standard Deviation Limits.....	2
Table 2. Pure Tone Standard Deviation .....	3

## APPENDICES

Appendix A. References – Normative .....	4
Appendix B. References – Informative .....	4

# REQUIREMENTS FOR THE QUALIFICATION OF REVERBERATION ROOMS IN THE 63 HZ OCTAVE BAND

## Section 1. Purpose

**1.1 Purpose.** The purpose of this standard is to establish a method of qualifying reverberation rooms in the 63 Hz Octave Band (50, 63 and 80 Hz One-Third Octave Bands).

**1.1.1 Intent.** This standard is intended for the guidance of the industry, including manufacturers, engineers, installers, contractors and users.

**1.1.2 Review and Amendment.** This standard is subject to review and amendment as technology advances.

## Section 2. Scope

**2.1 Scope.** This standard applies to products rated in the 63 Hz Octave Band (50, 63 and 80 Hz One-Third Octave Bands) where the sound power is determined from measurements made in a reverberation room by using the comparison method as specified per ANSI/ASA Standard S12.51/ISO: 3741.

## Section 3. Definitions

*Definitions.* All terms in this document will follow the standard industry definitions in the current edition of *ASHRAE Terminology of Heating, Ventilation, Air Conditioning and Refrigeration* unless otherwise defined in this section.

**3.1 Broadband Sound.** Sound that is random in nature with frequency components distributed over a broad frequency band. Typically pure tones or periodic disturbances will not be distinguishable in this type of sound spectrum.

**3.2 Comparison Method.** A method used to determine Sound Power Level by comparing the Sound Pressure Level of the source under test to the average Sound Pressure Level produced in the room by a Reference Sound Source of known sound power level output. The difference in Sound Power Level is equal to the difference in Sound Pressure Level when conditions in the room are the same for both sets of measurements.

**3.3 Discrete Frequency Component.** A component of the sound field having an instantaneous sound pressure that varies essentially as a simple sinusoidal function of time.

**3.4 Hertz (Hz).** A unit of frequency equal to one cycle per second

**3.5 Low Frequency Data.** Low frequency data for purposes of this standard is the 63 Hz Octave Band (50, 63 and 80 HZ One-Third Octave Bands).

**3.6 Octave Band.** A band of sound covering a range of frequencies such that the highest is twice the lowest. The Octave Bands used in this standard are those defined in ANSI/ASA Standard S1.11.

**3.7 One-Third Octave Band.** A band of sound covering a range of frequencies such that the highest frequency is the cube root of two times the lowest frequency. The One-Third Octave Bands used in this standard are those defined in ANSI/ASA Standard S1.11.

**3.8 Reference Sound Source (RSS).** A portable, aerodynamic sound source that produces a known stable Broadband Sound.

**3.9 "Shall" or "Should."** "Shall" or "should" shall be interpreted as follows:

**3.9.1 Shall.** Where "shall" or "shall not" is used for a provision specified, that provision is mandatory if compliance with the standard is claimed.

**3.9.2 Should.** "Should" is used to indicate provisions which are not mandatory but which are desirable as good practice.

**3.10 Sound Power Level,  $L_w$ .** Ten times the logarithm to the base ten of the ratio of the sound power radiated by the source to a reference sound power, expressed in decibels (dB). The reference sound power used in this standard is 1 picowatt (pW).

**3.11 Sound Pressure Level,  $L_p$ .** Twenty times the logarithm to the base ten of the ratio of a given sound pressure to a reference sound pressure of 20  $\mu$  Pa, expressed in decibels (dB).

## Section 4. Reverberation Room Qualification and Testing Procedures

**4.1 Low Frequency Reverberation Room Qualification Procedures and Requirements.**

**4.1.1 Procedure for Broadband Qualification.** The procedures specified in ANSI/ASA Standard S12.51/ISO: 3741 shall be followed for broadband room qualification. One-third octave band Sound Pressure Levels shall be measured to the nearest 0.1 dB. The test room qualifies for the measurement of Broadband Sound if each of the One-Third Octave Bands computed standard deviation does not exceed the limits given in Table 1. The RSS used for broadband room qualifications shall meet the requirements of AHRI Standard 250.

One-Third Octave Band Center Frequency (Hz)	Octave Band Center Frequency (Hz)	Standard Deviation, $\sigma$ (dB)
50, 63, 80	63	2

**4.1.2 Procedure for Discrete Frequency Qualification.** The procedures specified in ANSI/ASA Standard S12.51/ISO: 3741 shall be followed for one-third octave band discrete frequency room qualification. The discrete frequencies used in the qualification of the 50, 63, and 80 Hz One-Third Octave Bands are equal to those found in ANSI/ASA Standard S12.51/ISO: 3741 for the 500, 630, and 800 Hz bands divided by 10. The speaker used shall be no greater than 400 mm in diameter. One-third octave band Sound Pressure Levels shall be measured to the nearest 0.1 dB. The test room qualifies for the measurement of Discrete Frequency Components if the computed standard deviation does not exceed the limits given by Table 2.

One-Third Octave Band Center Frequency (Hz)	Octave Band Center Frequency (Hz)	Standard Deviation, $\sigma$ (dB)
50, 63, 80	63	4

#### **4.2 Reverberation Room Physical Requirements.**

**4.2.1 Room Requirements.** The reverberation room shall meet the requirements of ANSI/ASA Standard S12.51/ISO: 3741. Additionally, the room volume shall not be less than 280 cubic meters.

#### **4.3 Reverberation Room Sound Power Testing Procedure.**

**4.3.1 Testing Procedure Using the Comparison Method.** To determine the Sound Power Levels in frequency bands below 100 Hz, the comparison method as described in ANSI/ASA Standard S12.51/ISO: 3741 shall be used. All Sound Pressure Levels shall be measured in One-Third Octave Bands to the nearest 0.1 dB. Sound Power Levels shall be computed for each of the One-Third Octave Bands, and the octave band Sound Power Level shall be computed from the one-third octave band Sound Power Levels. The RSS used shall meet the requirements of and be calibrated per AHRI Standard 250.

### **Section 5. Conformance Conditions**

**5.1 Conformance.** While conformance with this standard is voluntary, conformance shall not be claimed or implied for products or equipment within the standard's *Purpose* (Section 1) and *Scope* (Section 2) unless such product claims meet all of the requirements of the standard and all of the testing and rating requirements are measured and reported in complete compliance with the standard. Any product that has not met all the requirements of the standard cannot reference, state, or acknowledge the standard in any written, oral, or electronic communication.

## APPENDIX A. REFERENCES – NORMATIVE

**A1** Listed here are all the standards, handbooks, and other publications essential to the formation and implementation of the standard. All references in this appendix are considered part of this standard.

**A1.1** ANSI/ASA Standard S1.11-2004 (R2009), *Specification for Octave-Band and Fractional Octave-Band Analog and Digital Filters*, American National Standards Institute, 25 West 43rd Street, 4th Fl., New York, NY 10036, U.S.A.

**A1.2** ANSI/ASA S12.51-2002/ISO:3741:1999 (R2007), *Acoustics – Determination of sound power levels of noise sources using sound pressure – Precision method for reverberation rooms*, Nationally Adopted International Standard (NAIS Standard) American National Standards Institute, 25 West 43rd Street, 4th Fl., New York, NY 10036, U.S.A.

**A1.3** ANSI/AHRI Standard 250-2008, *Performance and Calibration of Reference Sound Sources*, 2008, Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Blvd, Suite 500, Arlington, VA 22201, U.S.A.

**A1.4** *ASHRAE Terminology of Heating, Ventilating, Air-Conditioning and Refrigeration*, Second Edition, 1991, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 1791 Tullie Circle, N.E., Atlanta, GA 30329, U.S.A.

## APPENDIX B. REFERENCES – INFORMATIVE

None.