

AHRI Standard 300

**2015 (R2021) Standard for
Sound Rating and Sound
Transmission Loss of Packaged
Terminal Equipment**



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IMPORTANT

SAFETY DISCLAIMER

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AHRI uses its best efforts to develop standards/guidelines employing state-of-the-art and accepted industry practices. AHRI does not certify or guarantee that any tests conducted under its standards/guidelines will be non-hazardous or free from risk.

Note:

This standard supersedes AHRI Standard 300-2008.

Note:

This version of the standard differs from the 2008 version of the standard in the following:

- This standard references the sound intensity test method defined in ANSI/AHRI Standard 230, as an alternate method of test to the reverberation room test method defined in ANSI/AHRI Standard 220 for determination of sound power ratings.

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SOUND RATING AND SOUND TRANSMISSION LOSS OF PACKAGED TERMINAL EQUIPMENT

Section 1. Purpose

1.1 Purpose. The purpose of this standard is to establish, for packaged terminal equipment: definitions; test requirements; rating requirements; minimum data requirements for Published Ratings; and conformance conditions. Additionally, this standard establishes a method to determine sound transmission loss for Packaged Terminal Equipment.

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 the indoor and outdoor sections of factory-made Packaged Terminal Equipment as defined in AHRI Standard 310/380 (CSA-C744).

Section 3. Definitions

All terms in this document will follow the standard industry definitions in the *ASHRAE Terminology* website (<https://www.ashrae.org/resources--publications/free-resources/ashrae-terminology>) unless otherwise defined in this section.

3.1 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 Standard S1.11.

3.2 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. The One-third Octave Bands used in this standard are those defined in ANSI Standard S1.11.

3.3 Outdoor-indoor Transmission Class (OITC). The A-weighted sound reduction calculated using the equipment sound transmission loss in the range of 80 to 4,000 Hz, as measured in accordance with ASTM 1332 Test Method E90.

3.4 Packaged Terminal Air-conditioner. A wall sleeve and a separate unencased combination of heating and cooling assemblies specified by the builder and intended for mounting through the wall. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation and heating availability by purchaser's choice of at least hot water, steam or electric resistance heat.

3.5 Packaged Terminal Heat Pump. A separate unencased refrigeration system installed in a cabinet of similar function and configuration to that of a Packaged Terminal Air-conditioner. It utilizes reverse cycle refrigeration as its prime heat source and has other supplementary heat source availability by purchaser's choice of at least hot water, steam or electric resistance heat.

3.6 Published Rating. A statement of the assigned values of those performance characteristics, under stated Rating Conditions, by which a unit may be chosen to fit its application. These values apply to all units of like nominal size and type (identification) produced by the same manufacturer. The term Published Rating includes the rating of

all performance characteristics shown on the unit or published in specifications, advertising or other literature controlled by the manufacturer, at stated Rating Conditions.

3.6.1 *Application Rating.* A rating based on tests performed at application Rating Conditions (other than Standard Rating Conditions).

3.6.2 *Standard Rating.* A rating based on tests performed at Standard Rating Conditions.

3.7 *Rating Conditions.* Any set of operating conditions under which a single level of performance results and which causes only that level of performance to occur.

3.7.1 *Standard Rating Conditions.* Rating conditions used as the basis of comparison for performance characteristics.

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.

3.10.1 *A-weighted Sound Power Level, L_{wA} .* The logarithmic summation of A-weighted, one-third octave band Sound Power Levels.

3.11 *Sound Quality Indicator (SQI).* The calculated metric determined when following the procedure contained in ANSI/AHRI Standard 1140 for quantifying sound quality whereby measured sound levels are weighted to adjust for psychoacoustic sensitivity to frequency distribution and any discrete tones which may be present and then converted to a single number Sound Quality Indicator.

3.12 *Sound Transmission Class (STC).* A single-number rating derived from sound transmission loss data in accordance with the method described in ASTM Standard E413.

Section 4. Test Requirements

4.1 *Test Requirements.* Unit sound power ratings shall be determined by tests conducted in a reverberation room or using sound intensity.

4.1.1 If the reverberation room method is used, Sound Power Levels for the unit under test shall be determined according to ANSI/AHRI Standard 220. The reverberation room shall meet the requirements of and be qualified in accordance with ANSI/AHRI Standard 220. A Reference Sound Source (RSS) shall be used that meets the performance requirements and is calibrated per ANSI/AHRI Standard 250.

4.1.2 If the sound intensity method is used, Sound Power Levels for the unit under test shall be conducted in accordance with ANSI/AHRI Standard 230.

4.1.3 Sound tests for the determination of sound transmission loss shall be conducted in accordance with ASTM Standard E90.

4.1.4 Indoor/outdoor sound power ratings shall be determined in accordance with ANSI/AHRI Standards 350 and 270, respectively.

4.2 *Mounting of Equipment for Testing.* Equipment shall be mounted in a way that is representative of a design application of the product.

4.2.1 *Indoor Sound Rating.* The unit shall be mounted in accordance with the provisions of AHRI Standard 350.

4.2.2 *Outdoor Sound Rating.* The unit shall be mounted to have the minimum protrusion outdoors as recommended by the manufacturer. In no case shall the unit be recessed.

4.2.3 *Sound Transmission Loss.* The unit shall be mounted in accordance with the provisions of ASTM Standard E90 with the unit not running and with the damper closed. The specimen shall be isolated from the filler wall structure using gaskets and sealant, unless otherwise specified by the manufacturer. The filler wall shall meet all the requirements of ASTM Standard E90 Annex A3. This rating shall be calculated using the area of the outside dimensions of that portion of the wall sleeve that penetrates the outer face of the wall.

4.3 *Electrical Characteristics.* Tests shall be performed at the rated voltage(s), phase and frequency specified on the unit nameplate, and measured at the unit service connection.

4.4 *Operation.* All components required to produce the standard rating cooling capacity under the appropriate AHRI standard shall be operated while data is being taken. Standard Rating Conditions (cooling) for the appropriate standard shall be maintained.

4.5 *Test Method Measurement Reproducibility.* Sound Power Levels obtained from either reverberant room or sound intensity methods made in conformance with this standard are expected to result in measurement standard deviations which are equal to or less than those in Table 1. For the reverberation room method this table represents the uncertainty that would result from using ANSI/AHRI Standard 220 and a Reference Sound Source calibrated per ANSI/AHRI Standard 250. For the sound intensity method, the uncertainties in this table include uncertainty in the sound intensity measurement due to the test environment, background noise levels, and selection of measurement points as defined in ANSI/AHRI Standard 230. The standard deviations in Table 1 do not account for variations of sound power caused by changes in operating conditions.

Table 1. Reproducibility in the Determination of Non-ducted Equipment Sound Power Levels		
Octave Band Center Frequency, Hz	One-third Octave Band Center Frequency, Hz	Maximum Standard Deviation of Reproducibility, dB
63	50 to 80	4.0
125	100 to 160	3.0
250	200 to 315	2.0
500 to 4,000	400 to 5,000	1.5
8,000	6,300 to 10,000	3.0

Section 5. Rating Requirements

5.1 *Introduction.* The sound ratings shall be applicable for the complete unit operating. The ratings shall comprise:

- 5.1.1** Un-weighted octave band Sound Power Levels, (L_w), dB (125 Hz to 8,000 Hz are required, 63 Hz is optional)
- 5.1.2** Overall A-weighted Sound Power Level, (L_{wA}), dB (100 Hz to 10,000 Hz are required, 50 Hz to 10,000 Hz are optional)
- 5.1.3** STC rating
- 5.1.4** Sound Quality Indicator (SQI) per ANSI/AHRI Standard 1140 (optional)
- 5.1.5** Un-weighted one-third octave band Sound Power Levels, dB (optional)
- 5.1.6** OITC rating (optional)

5.2 *Sound Transmission Loss.* This standard employs three distinct characterizations for sound transmission loss:

- 5.2.1** One-third octave band sound transmission loss
- 5.2.2** Sound Transmission Class (STC)
- 5.2.3** Outdoor-indoor Transmission Class (OITC)

5.3 *Rating Requirements.* Indoor sound ratings shall be determined in accordance with the provisions of ANSI/AHRI Standard 350. Outdoor sound ratings shall be determined in accordance with the provisions of ANSI/AHRI Standard 270. STC shall be determined in accordance with ASTM Standard E413. OITC shall be determined in accordance with ASTM Standard E1332 using test method ASTM Standard E90.

5.4 *Application Ratings.* Application sound ratings for conditions other than standard shall be based upon tests conducted at those conditions.

5.5 *Rating Tolerances.* Any equipment selected at random and tested in any suitably qualified laboratory in accordance with this standard, shall not have a sound rating higher than its published sound rating. It also, shall not have STC and OITC values less than its published Standard STC and OITC values.

Section 6. Minimum Data Requirements for Published Ratings

6.1 *Published Ratings.* Published sound power ratings shall be for the unit with all components running that are necessary to produce the AHRI standard thermal rating. The sound power ratings shall include Sections 6.1.1 and 6.1.2. Section 6.1.3 and 6.1.4 are optional.

6.1.1 The un-weighted octave band Sound Power Levels to the nearest decibel from 125 Hz to 8,000 Hz (63 Hz is optional).

6.1.2 The overall A-weighted Sound Power Level to the nearest decibel covering the range of 100 Hz to 10,000 Hz (or optionally from 50 Hz to 10,000 Hz).

6.1.3 Optionally, the Sound Quality Indicator (SQI) may be published. The SQI shall be rounded to the nearest 0.1.

6.1.4 Optionally, the un-weighted One-third octave band Sound Power Levels to the nearest 0.1 decibel may be published.

6.2 *Published Transmission Loss Ratings.* Published transmission loss ratings shall include One-third Octave Band transmission loss data and STC.

6.3 *Standard Sound Rating.* When AHRI standard thermal rating conditions have been established for the equipment, a standard sound rating shall be published for the unit operating at those conditions.

6.4 *Reporting Requirements.* All claims to sound ratings in product literature within the scope of this standard shall include the statement “Rated in accordance with AHRI Standard 300”. Manufacturer’s published literature shall include:

6.4.1 Method of sound test (ANSI/AHRI Standard 220 or ANSI/AHRI Standard 230)

6.4.2 Thermal rating conditions (AHRI Standard 310/380 (CSA-C744) and application rating points)

Section 7. Marking and Nameplate Data

7.1 *Marking and Nameplate Data.* As a minimum, the nameplate shall display the manufacturer's name, model designation, and electrical characteristics.

Nameplate voltages for 60 Hertz systems shall include one or more of the equipment nameplate voltage ratings shown in Table 1 of ANSI/AHRI Standard 110. Nameplate voltages for 50 Hertz systems shall include one or more of the utilization voltages shown in Table 1 of IEC Standard 60038.

Section 8. Conformance Conditions

8.1 *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 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 standards, handbooks and other publications essential to the formation and implementation of the standards. All references in this appendix are considered as part of the standard.

A1.1 ANSI Standard S1.11-2004, *Specifications for Octave-band and Fractional Octave-band Analog and Digital Filters*, 2004, American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A.

A1.2 ANSI/AHRI Standard 110-2012, *Air-conditioning and Refrigerating Equipment Nameplate Voltage*, 2012, Air-conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, U.S.A.

A1.3 ANSI/AHRI Standard 220-2014, *Reverberation Room Qualification and Testing Procedures for Determining Sound Power of HVAC Equipment*, 2012, Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, U.S.A.

A1.4 ANSI/AHRI Standard 230-2013, *Sound Intensity Testing Procedures for Determining Sound Power of HVAC Equipment*, 2013, Air-conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, U.S.A.

A1.5 ANSI/AHRI Standard 250-2013 with Addendum 1, *Performance and Calibration of Reference Sound Sources Equipment*, 2013, Air-conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, U.S.A.

A1.6 ANSI/AHRI Standard 270-2015, *Sound Rating of Outdoor Unitary Equipment*, 2015, Air-conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, U.S.A.

A1.7 ANSI/AHRI Standard 350-2015, *Sound Rating of Non-ducted Indoor Air-conditioning Equipment*, 2015, Air-conditioning, Heating, and Refrigeration Institute, 2008, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, U.S.A.

A1.8 ANSI/AHRI Standard 1140-2012, *Sound Quality Evaluation Procedures for Air-conditioning and Refrigeration Equipment*, 2012, Air-conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, U.S.A.

A1.9 ANSI/AHRI/CSA Standard 310/380-2014 (CSA-C744-14), *Packaged Terminal Air-conditioners and Heat Pumps*, 2004, Air-conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, U.S.A.

A1.10 ASHRAE *Terminology*, <https://www.ashrae.org/resources--publications/free-resources/ashrae-terminology>, 2015, ASHRAE, Inc., 180 Technology Parkway, Peachtree Corners, GA 30092, U.S.A.

A1.11 ASTM Standard E90-2009, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions*, 2009, American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, U.S.A.

A1.12 ASTM Standard E413-2010, *Classification for Rating Sound Insulation*, 2010, American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, U.S.A.

A1.13 ASTM Standard E1332-2010 *Standard Classification for Determination of Outdoor-Indoor Transmission Class*, 2010, American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, U.S.A.

A1.14 IEC Standard 60038, *IEC Standard Voltages*, 2002, International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, 1211 Geneva 20, Switzerland.

APPENDIX B. REFERENCES – INFORMATIVE

B1 Listed here are standards, handbooks, and other publications which may provide useful information and background but are not considered essential. References in this appendix are not considered part of the standard.

None.