

AHRI Standard 270-2025 (SI/I-P)

Sound Performance Rating of Outdoor Unitary Equipment



**AIR-CONDITIONING, HEATING,
& REFRIGERATION INSTITUTE**

we make life better®

2311 Wilson Blvd, Suite 400
Arlington, VA 22201 USA
www.ahrinet.org
Phone: (703) 524-8800



©Copyright 2025, by Air-Conditioning, Heating, and Refrigeration Institute
Registered United States Patent and Trademark Office
Printed in U.S.A.

**IMPORTANT
SAFETY DISCLAIMER**

AHRI does not set safety standards and does not certify or guarantee the safety of any products, components or systems designed, tested, rated, installed or operated in accordance with this standard/guideline. It is strongly recommended that products be designed, constructed, assembled, installed and operated in accordance with nationally recognized safety standards and code requirements appropriate for products covered by this standard/guideline.

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.

ICS Code: 17.140.01

Note:

This standard supersedes AHRI Standard 270-2015 with Addendum 1.

AHRI CERTIFICATION PROGRAM DISCLAIMER

AHRI Standards are developed independently of AHRI Certification activities and can have scopes that include products that are not part of the AHRI Certification Program. The scope of the applicable AHRI Certification Program can be found on AHRI's website at <http://www.ahrinet.org>.

Intent

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

Review and Amendment

This standard is subject to review and amendment as technology advances.

2025 Edition

This edition of AHRI Standard 270 (SI/I-P), *Sound Performance Rating of Outdoor Unitary Equipment*, was prepared by Airside Standards Technical Committee. The standard was approved for publication by the Standards Committee on January 2, 2025.

Origin and Development of AHRI Standard 270

- ARI 270-67, *Standard for Sound Rating of Outdoor Unitary Equipment* was published as a new standard in 1967 to provide the industry and the public a procedure for rating and evaluating the sound levels of outdoor unitary equipment.
- ARI 270-75 was published in 1975
- ARI 270-94 was published in 1994
- ARI 270-95 was published in 1995
- AHRI 270-2009, *Sound Performance Rating of Outdoor Unitary Equipment* superseded ARI 270-95 and was approved as an American National Standard (ANS) on 11 December 2009. Revisions included:
 - Replaced with ratings comprised of *sound power levels* expressed in decibels and a numeric sound quality indicator
 - The frequency range of interest was expanded to include the 63 Hz octave band
 - All *sound power levels* determined from *one-third octave band sound pressure level* measurements
 - The scope of the ratings was expanded to optionally include sound levels for “fan(s) only”
 - References AHRI 220 for reverberation room qualification and testing replacing ANSI S12.31 and ANSI S12.32
- Revised in 2015 to reference the sound intensity test method defined in AHRI 230, as an alternate method of test to the reverberation room test method defined in AHRI 220 for determination of sound power ratings.
- Addendum 1 was published in March 2016 to remove the last sentence in Section 4.3.2, edit the second paragraph in Section 4.3.3, edit Section 5.1.2, and remove Section 5.5.
- AHRI administratively withdrew ANS for AHRI 270-2009 on 7 August 2020

Summary of Changes

AHRI Standard 270-2025 (SI/I-P) contains the following update(s) to the previous edition:

- Remove references to AHRI 1140
- Incorporate Addendum 1 from AHRI 270-2015 (SI/I-P)

Committee Personnel
Waterside Work Group

Company/Organization	Participant	Voting Role
Voting Organizations		
Trane Technologies	Derrick Knight, Chair	Primary
	Anthony Dix	Alternate
Aaon, Inc.	Karina Saenz-Acosta	Primary
Carrier Corporation	Lee Tetu	Primary
	Wei Zhou	Alternate
Daikin Applied Americas Inc.	Jeffrey Watt	Primary
GE Appliances, a Haier Company	Richard Phillips	Primary
Johnson Controls, Inc.	Paul Bauch	Primary
	Roger Howard	Alternate
Lind Acoustics LLC	Steve Lind	Primary
Mitsubishi Electric US Inc.	Alvaro Araque	Primary
	Erik Sprague	Alternate
Nortek Air Solutions, LLC	Kim Osborne	Primary
Price Industries Inc.	Edgar Duroni	Primary
Jacob (Cobi) Waxman		AHRI Staff Liaison

Waterside Work Group Scope:

This standard work group is responsible for the revision of AHRI 270.

Waterside Technical Committee

Company/Organization	Participant	Voting Role
Voting Organizations		
Trane US Inc.	Derrick Knight, Chair	Primary
	Anthony Dix	Alternate
Carrier Corporation	Lee Tetu, Vice-chair	Primary
	Wei Zhou	Alternate
Daikin Applied Americas Inc.	Jeffrey Watt	Primary
Emerson Commercial and Residential Solutions	Miles Strand	Primary
GE Appliances, a Haier Company	Richard Phillips	Primary
Intertek	Jim Kline	Primary
Johnson Controls, Inc.	Roger Howard	Primary
	Paul Bauch	Alternate
	Sonya Thorpe	Alternate
Mitsubishi Electric Cooling & Heating	Erik Sprague	Primary
	Alvaro Araque	Alternate
Multistack, LLC	David Winnes	Primary
Price Industries Inc.	Edgar Duroni	Primary
Swegon North America Inc.	Karl Peterman	Primary
Nonvoting Organizations		
Aaon, Inc	Karina Saenz-Acosta	Nonvoter
Lind Acoustics LLC	Steve Lind	Nonvoter
Nortek Air Solutions, LLC	Kim Osborn	Nonvoter
Jacob Waxman		AHRI Staff Liaison

Waterside Standards Technical Committee Scope:

The Waterside and Refrigeration STC is responsible for development and maintenance of standards and guidelines related to sound and vibration of equipment whose primary function is to move, heat, or cool a liquid.

Out of scope for this STC are standards whose primary purpose is not sound and vibration performance, or that are common to both airside and water/refrigeration.

Standards Committee

Company/Organization	Participant	Voting Role
Voting Organizations		
Trane US Inc.	Darcy Lee, Chair	Primary
Daikin Applied Americas Inc.	Henry Ernst, Vice-chair	Primary
A.O. Smith Corporation	Hammam Amaireh	Primary
Bradford White Corp.	Bryan Ahee	Primary
Carrier Corporation	Dominique Taudin	Primary
Copeland	Aditya Sakhalkar	Primary
Danfoss	Justin Prosser	Primary
ebm-papst Inc.	Armin Hauer	Primary
Johnson Controls, Inc.	Patrick Marks	Primary
Lennox International Inc.	Bruce Perkins	Primary
Nailor Industries	Gus Faris	Primary
Rheem Manufacturing Company	Gene Havard	Primary
Swegon North America Inc.	Karl Peterman	Primary
Jerry Yeh		AHRI Staff Liaison

These lists represent the membership at the time the Standards Technical Committee, Standards Committee, and Standards Work Group were balloted on the final text of this edition. Since that time, changes in the membership may have occurred. Membership on these committees shall not in and of itself constitute an endorsement by the committee members or their employers of any document developed by the committee on which the member serves.

TABLE OF CONTENTS

Section

SECTIONS

Section 1. Purpose	1
Section 2. Scope	1
Section 3. Definitions	1
3.1 Expression of Provisions	1
3.2 Standard Specific Definitions	1
Section 4. Test Requirements	3
4.1 Test Requirements	3
4.2 Unit Installation	3
4.3 Unit Operation	3
4.4 Air Velocity at Measurement Positions	4
4.5 Test Method Measurement Reproducibility	5
Section 5. Rating Requirements	5
5.1 Introduction	5
5.2 Determination of Outdoor Sound Power Level Ratings	5
5.3 Rating Tolerances	6
5.4 Application Sound Ratings	6
Section 6. Minimum Data Requirements for Published Ratings	6
6.1 Published Ratings	6
6.2 Standard Sound Rating	6
Section 7. Marking and Nameplate Data	6
7.1 Marking and Nameplate Data	6
Section 8. Conformance Conditions	7

TABLE

Table 1 Reproducibility in the Determination of Non-ducted Equipment Sound Power Levels	5
---	---

APPENDICES

Appendix A. References – Normative	8
Appendix B. References – Informative	9

SOUND PERFORMANCE RATING OF OUTDOOR UNITARY EQUIPMENT

Section 1. Purpose

This standard establishes definitions, test requirements, rating requirements, minimum data requirements for *published ratings*, marking and nameplate data, and conformance conditions for outdoor unitary equipment.

Section 2. Scope

This standard applies to the outdoor sections of factory-made air-conditioning and heat pump equipment as defined in AHRI 210/240, AHRI 340/360 (cooling capacity ratings of equal to or less than 40 kW (135,000 BTU /hr), AHRI 1230, AHRI 1160 (I-P), and AHRI 1161 (SI). Products covered include *air-source unitary heat pumps*, *heat pump pool heaters*, *unitary air-conditioners*, and *variable refrigerant flow (VRF) Systems*.

Section 3. Definitions

All terms in this document shall follow the standard industry definitions in the ASHRAE Terminology website unless otherwise defined in this section.

3.1 Expression of Provisions

Terms that provide clear distinctions between requirements, recommendations, permissions, options, and capabilities.

3.1.1 “Can” or “cannot”

Express an option or capability.

3.1.2 “May”

Signifies a permission expressed by the document.

3.1.3 “Must”

Indication of unavoidable situations and does not mean that an external constraint referred to is a requirement of the document.

3.1.4 “Shall” or “shall not”

Indication of mandatory requirements to strictly conform to the standard and where deviation is not permitted.

3.1.5 “Should” or “should not”

An expression of alternatives rather than requirements. In the negative form, an alternative is the expression of potential choices or courses of action that is not preferred but not prohibited.

3.2 Standard Specific Definitions

3.2.1 A-weighted Sound Power Level, L_{WA}.

The logarithmic summation of A-weighted, *one-third octave band sound power levels*.

3.2.2 Air-source Unitary Heat Pump

One or more factory-made assemblies that can include an indoor conditioning coil(s), compressor(s), and outdoor coil(s), including means to provide a heating function. Products conformant with this standard shall provide the function of air heating with controlled temperature and can include the functions of air-cooling, air-circulating, air-cleaning, dehumidifying or humidifying. When such equipment is provided in more than one assembly, the separated assemblies shall be designed to be used together, and the requirements of rating outlined in the standard are based upon the use of matched assemblies.

3.2.3 Heat Pump Pool Heater

A factory-made assembly, that contains the air moving device, compressor, refrigerant-to-water heat exchanger and air-to-refrigerant heat exchanger using ambient air as the heat source. Products conformant with this standard shall provide the function of heating pool water to achieve a controlled temperature, but can include the functions of pool water cooling, air-heating, air cooling, air-circulating, air-cleaning, or dehumidifying. Models can consist of more than one assembly to be used together for the purpose of cooling and heating air. Models with separated assemblies shall be designed to be used together, and the requirements of rating outlined in this standard are based upon the use of matched assemblies.

3.2.4 Hertz (Hz)

A unit of frequency equal to one cycle per second.

3.2.5 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 ASA Standard S1.11.

3.2.6 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 ASA Standard S1.11.

3.2.7 Published Rating

A statement of the assigned values of those performance characteristics, under stated *rating conditions*, where a unit can be chosen to fit the application. These values apply to all units of the same nominal size and type (identification) produced by the same manufacturer. This 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*.

3.2.7.1 Application Rating

A rating based on tests performed at *rating conditions* other than *standard rating conditions*.

3.2.7.2 Standard Rating

A rating based on tests performed at *standard rating conditions*.

3.2.8 Rating Conditions

Any set of operating conditions where a single level of performance results and causes only that level of performance to occur.

3.2.8.1 Standard Rating Conditions

Rating conditions used as the basis of comparison for performance characteristics.

3.2.9 Reference Sound Source (RSS)

A portable, aerodynamic sound source that produces a known stable broadband sound.

3.2.10 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 of 1 pW, expressed in decibels, dB. Reference Section [3.2.1](#) (*A-weighted sound power level*).

3.2.11 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 μ Pa, expressed in decibels, dB.

3.2.12 Unitary Air-conditioner

One or more factory-made assemblies that can include an evaporator or cooling coil(s), compressor(s) and condenser(s). Either alone or in combination with a heating plant, the functions are to provide air-circulation, air cleaning, cooling with controlled temperature and dehumidification, and can optionally include the function(s) of heating or humidifying, or both. Where such equipment is provided in more than one assembly, the separated assemblies are to be designed to be used together, and the requirements of rating outlined in this standard are based upon the use of these assemblies in operation together.

3.2.13 Variable Refrigerant Flow System (VRF System)

An engineered direct exchange (DX) multi-split system incorporating at least one variable capacity compressor distributing refrigerant through a piping network to multiple indoor fan coil units each capable of individual zone temperature control, through proprietary zone temperature control devices and common communications network. Variable refrigerant flow includes three or more steps of control on common, inter-connecting piping.

Section 4. Test Requirements**4.1 Test Requirements**

All standard *sound power level* ratings shall be determined by tests conducted in a reverberation room or using sound intensity.

- 1) If the reverberation room method is used, the room shall meet the requirements of and be qualified in accordance with AHRI 220 except as indicated within the body of this standard. *Sound power levels* for the unit under test shall be determined in accordance with AHRI 220. An RSS that meets the performance requirements of and is calibrated in accordance with AHRI 250 shall be used.
- 2) If the sound intensity method is used, the test shall be conducted in accordance with AHRI Standard 230.
- 3) Measured sound data shall be in *one-third octave bands* (100 Hz to 10,000 Hz are required, 50 Hz to 80 Hz are optional) in accordance with the procedures specified above for the method of test being used.
- 4) For packaged rooftop equipment with indoor fans, the volumetric flow rate, m³/s (CFM), and total static pressure, kPa (in. of water) gage, for the indoor fan(s) shall be recorded.

4.2 Unit Installation

The unit under test shall be located within the reverberation room as specified in AHRI 220.

4.2.1 Unitary air-conditioners and Air-source Unitary Heat Pumps

Where applicable, unit supply and return ducting shall be acoustically treated to prevent sound radiation (refer to AHRI 260 (I-P/SI) for guidance in duct construction). In the case of wall-mounted equipment, the mounting wall shall be of heavy masonry or same construction, or an auxiliary mounting platform shall be provided to minimize wall vibration effects. The noise radiating from the connecting refrigerant piping on split systems shall be minimized.

4.2.2 Heat Pump Pool Heaters and Water-source VRF Systems

The installation includes water flow through the unit. The water pipe diameter shall match the nominal diameter of the unit connection. The water pipe shall be acoustically treated so that water flow noise through the pipe does not contribute to the unit sound rating.

4.3 Unit Operation

The unit under test shall operate as specified below in Section [4.3.1](#) through Section [4.3.5](#).

4.3.1 Electrical Characteristics

Tests shall be performed at the nameplate rated voltage, phase, and frequency at the unit service connection. For units with dual nameplate voltage ratings, standard sound tests shall be performed at both voltages. The higher of the two ratings obtained shall be the AHRI standard sound rating or both ratings shall be published.

4.3.2 Outdoor-side Air Quantity

All tests shall be made at the outdoor-side air quantity specified by the manufacturer where the fan drive is adjustable, or, where the fan drive is direct-connected, shall be determined at the outdoor air quantity inherent to the unit when operated with all of the air resistance elements associated with inlet louvers and any duct work and attachments that can be supplied as part of the unit.

4.3.3 Unit Operation Requirements

Standard sound ratings shall be based on sound tests conducted with the unit operating at rated voltage (V), phase, and frequency (Hz) as specified on the unit nameplate and measured at the service connection. The sound measurements shall be made with the equipment operating at the AHRI standard thermal *rating conditions*. All components required to produce the *standard rating* capacity under AHRI 210/240, AHRI 340/360, AHRI 1160 (I-P), AHRI 1161 (SI) or AHRI 1230 shall be operated while data is being taken and the test conditions shall be identical to the standard (cooling) condition temperatures specified in AHRI 210/240, AHRI 340/360, AHRI 1160 (I-P), AHRI 1161 (SI) or AHRI 1230.

4.3.3.1 For Heat Pump Pool Heaters

In an optional second step, the compression equipment or pump, or both shall be turned off and sound readings taken with only the fan(s) operating. During this step, the temperature of the ambient air entering the unit shall be within 1.0°C (1.8°F) of the temperature measured during compressor operation.

4.3.3.2 For water-source VRFs

To accurately capture the contribution of extraneous sources, compression equipment shall be turned off and sound ratings shall be measured with the pump operating.

4.3.4 Indoor-side Loading

The indoor side loading shall be maintained as follows:

4.3.4.1 Single-package Units

Tests shall be conducted at the air quantity used for *standard rating* tests as specified in AHRI 210/240 or AHRI 340/360.

4.3.4.2 Split-system Units

The indoor refrigeration load shall be maintained at the values required to duplicate those found under *standard rating* tests as specified in AHRI 210/240, AHRI 340/360 or AHRI 1230.

4.3.5 Test Condition Tolerances

During sound rating tests, the equipment operating conditions shall not deviate from the specified operating conditions by more than the following tolerances:

- 1) Air Temperature: $\pm 1.0^{\circ}\text{C}$ (1.8°F)
- 2) Water Temperature: $\pm 1.0^{\circ}\text{C}$ (1.8°F)

Note: Water temperature tolerances apply to *heat pump pool heaters*.

When the indoor-side loading is simulated by a method not requiring air, the following tolerances apply:

- 1) Suction gas temperature at compressor: $\pm 3.0^{\circ}\text{C}$ (5.4°F)
- 2) Evaporator pressure: ± 15 kPa (60 in. of water)

Note: Suction gas temperature at the compressor is applicable only when the suction gas superheat is at least 5.5°C (9.9°F) in the equivalent *standard rating* test specified in the AHRI standard for the equipment being tested.

4.4 Air Velocity at Measurement Positions

Sound measurements shall not be made when the air velocity over the microphone exceeds 5.6 m/s (1100 ft/min). A foam windscreen shall be installed on the microphone that shall not affect the microphone *sound pressure* response by more than ± 1 dB for frequencies of 20 to 4000 Hz or ± 1.5 dB for frequencies above 4000 Hz.

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 that are equal to or less than those in [Table 1](#). For the reverberation room method this table represents the uncertainty that results from using AHRI 220 and an *RSS* calibrated in accordance with AHRI 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 AHRI 230. The standard deviations due to changes in operating conditions are not reflected in the values in [Table 1](#).

Table 1 Reproducibility in the Determination of Non-ducted Equipment Sound Power Levels

<i>Octave Band Center Frequency, Hz</i>	<i>One-third Octave Band Center Frequency, Hz</i>	<i>Maximum Standard Deviation of Reproducibility, dB</i>
63	50 to 80	4.0
125	100 to 160	3.0
250	200 to 315	2.0
500 to 4000	400 to 5000	1.5
8000	6300 to 10,000	3.0
A-weighted 50-10,000, Hz		0.5 ¹
Note:		
1. Applicable to a source that emits noise with a relatively “flat” spectrum in the frequency range 50 Hz to 10,000 Hz.		

Section 5. Rating Requirements

5.1 Introduction

The outdoor sound rating shall be for the complete unit operating and optionally for the unit operating with “fan(s) only.” The ratings shall comprise the following:

- 1) Un-weighted *octave band sound power levels*, L_w , dB (125 Hz to 8000 Hz are required, 63 Hz is optional)
- 2) Overall *A-weighted sound power levels*, L_{wA} , dB covering the range of 100 Hz to 10,000 Hz (or optionally from 50 Hz to 10,000 Hz)
- 3) Un-weighted *one-third octave band sound power levels*, dB are optional

5.2 Determination of Outdoor Sound Power Level Ratings

The unit under test shall be installed as specified by Section [4.2](#) of this standard.

5.2.1 One-third Octave Band Sound Power Level Calculations

For the reverberation room method, these unit levels shall be determined in accordance with Section 6.5 of AHRI 220. For the sound intensity method, the unit levels shall be determined in accordance with Section 7.2 for discrete points and Section 7.3 for scanning of AHRI 230.

5.2.2 Octave Band Sound Power Level Calculations

For the reverberation room method, the *octave band sound power level* shall be determined in accordance with Section 6.6 of AHRI 220. For the sound intensity method, the *octave band sound power level* shall be determined in accordance with Section 7.4 of AHRI 230.

5.2.3 A-weighted Sound Power Level Calculations

For the reverberation room method, the *A-weighted sound power level* shall be determined in accordance with Section 6.7 of AHRI 220. For the sound intensity method, the *A-weighted sound power level* shall be determined in accordance with Section 7.5 of AHRI 230.

The *A-weighted sound power level* and *octave band sound power levels* shall be rounded to the nearest decibel.

5.3 Rating Tolerances

Outdoor unitary equipment tested in accordance with this standard shall have *octave band sound power levels* (L_w) and an overall *A-weighted sound power level* (L_{wA}), not higher than their *published ratings*. This tolerance applies to optional *one-third octave band sound power levels*.

5.4 Application Sound Ratings

Application sound ratings for the *application rating* conditions other than the AHRI standard thermal rating condition shall be based on sound tests conducted with the equipment operating at those conditions.

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. Variable speed equipment shall be operated at constant speed for the duration of the test. For equipment with variable capacity compressors, the compressors shall be operated at rated and constant capacity for the duration of the test.

The sound power ratings shall include Section 6.1.1 and Section 6.1.2 as listed below. Section 6.1.3 is optional. Additionally, sound power data can be published for the unit operating with only the fan(s) running.

6.1.1 Un-weighted Octave Band Sound Power Levels

The un-weighted *octave band sound power levels* to the nearest decibel from 125 Hz to 8000 Hz (63 Hz is optional).

6.1.2 Overall A-weighted Sound Power Levels

The overall *A-weighted sound power levels* 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 Un-weighted One-third Octave Band Sound Power Levels

Optionally, the un-weighted *one-third octave band sound power levels* to the nearest 0.1 dB can be published.

6.2 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, optionally accompanied by the same data for the unit operating with “fan(s) only.”

All claims to sound ratings within the scope of this standard shall include the statement “Rated in accordance with AHRI Standard 270 (SI/I-P)”. All claims to ratings outside the scope of this standard shall include the statement “Outside the scope of AHRI Standard 270 (SI/I-P)”. Application sound ratings within the scope of this standard shall include a statement of the thermal *rating conditions*, compressor speed, fan speed, and compressor loading conditions at which the ratings apply and be accompanied by the standard sound rating.

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

Section 8. Conformance Conditions

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

This appendix lists all standards, handbooks, and other publications essential to the development and implementation of the standard. All references in this appendix are part of the standard.

- A.1. ANSI/AHRI Standard. 110-2024 (SI/I-P), *Air-conditioning, Heating and Refrigerating Equipment Nameplate Voltages*, 2024, Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, USA.
- A.2. AHRI Standard 210/240-2023 (2020), *Performance Rating of Unitary Air-Conditioning and Air Source Heat Pump Equipment*, 2020, Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, USA.
- A.3. ANSI/AHRI Standard 220-2022, *Reverberation Room Qualification and Testing Procedures for Determining Sound Power of HVAC Equipment*, 2022, Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, USA.
- A.4. AHRI Standard 230-2022, *Sound Intensity Testing Procedures for Determining Sound Power of HVAC Equipment*, 2022, Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, USA.
- A.5. ANSI/AHRI Standard 250-2022, *Performance and Calibration of Reference Sound Sources Equipment*, 2022, Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, USA.
- A.6. AHRI Standard 260 (I-P)-2017, *Sound Rating of Ducted Air Moving and Conditioning Equipment*, 2017, Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, USA.
- A.7. AHRI Standard 261 (SI)-2017, *Sound Rating of Ducted Air Moving and Conditioning Equipment*, 2017, Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, USA.
- A.8. AHRI Standard 340/360-2022 (I-P), *Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment*, 2022, Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, USA.
- A.9. ANSI/AHRI Standard 1160-2022 (I-P), *Performance Rating of Heat Pump Pool Heaters*, 2022, Air-Conditioning, Heating and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, USA.
- A.10. ANSI/AHRI Standard 1161-2023 (SI), *Performance Rating of Heat Pump Pool Heaters*, 2023, Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, USA.
- A.11. AHRI Standard 1230-2023 (I-P), *Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-conditioning and Heat Pump Equipment*, 2023, Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd, Suite 400, Arlington, VA 22201, U.S.A.
- A.12. ANSI/ASA Standard S1.11-2004 (R2009), *Specification for Octave-Band and Fractional Octave-Band Analog and Digital Filters*, 2009, American National Standards Institute, 25 West 43rd Street, 4th Fl., New York, NY 10036, USA.
- A.13. ASHRAE Terminology. ASHRAE. Accessed November 17, 2022. <https://www.ashrae.org/technical-resources/authoring-tools/terminology>.
- A.14. IEC 60038:2009+AMD1:2021 CSV, *IEC Standard Voltages*, 2021, International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, 1211 Geneva 20, Switzerland.

APPENDIX B. REFERENCES – INFORMATIVE

This appendix lists all standards, handbooks, and other publications that are not essential but that can provide useful information and background. All references in this appendix are not part of the standard.

None.