

**AHRI Standard 530-2011**

**2011 Standard for  
Rating of  
Sound and Vibration for  
Refrigerant Compressors**



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## **IMPORTANT**

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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 530-2005.

Note:

This version of the standard differs from that of 2005 in the following ways:

1. Reverberation Room requirements including instrumentation and qualification shall be in accordance with AHRI Standard 220.
2. Reverberation Room testing shall be done per AHRI Standard 220.
3. Sound Power Levels shall be computed per AHRI Standard 220 for testing done in a reverberation room.
4. Anechoic/Hemi-Anechoic Test Room requirements including instrumentation and qualification shall be in accordance with ANSI S12.55/ISO 3745.
5. Anechoic/Hemi-Anechoic Test Room testing shall be done per ANSI S12.55/ISO 3745.
6. Sound Power Levels are to be computed per ANSI S12.55/ISO 3745 for testing done in an Anechoic/Hemi-Anechoic Test Room.

Note: The AHRI Technical Committee on Sound will investigate alternative measurement methods for possible inclusion in future revisions of this standard.

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# RATING OF SOUND AND VIBRATION FOR REFRIGERANT COMPRESSORS

## Section 1. Purpose

**1.1 Purpose.** The purpose of this standard is to establish for the rating of sound and vibration for Refrigerant Compressors: definitions; test requirements; rating requirements; minimum data requirements for published ratings; and conformance conditions.

**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 External-drive, Hermetic, and Semi-Hermetic Positive Displacement Refrigerant Compressors. In the case of External-drive Refrigerant Compressors, the driving mechanism shall be excluded from the sound and vibration measurements. However, for Semi-Hermetic Refrigerant Compressors where the driving mechanism is an integral part of the compressor assembly as defined in Section 3, it shall be included in the measurements.

**2.1.1 Exclusion.** An External-drive Refrigerant Compressor, coupling and motor assembly mounted on a common base is excluded from this standard, since the vibration measurement method specified in the standard does not apply to this type of product.

## Section 3. Definitions

All terms in this document shall 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 Amplitude Root Mean Square (rms).** Refer to definition 3.16.

**3.2 Anechoic Test Room.** A test room whose surfaces absorb essentially all of the incident sound energy over the frequency range of interest, thereby affording free-field conditions over the measurement surface.

**3.3 Bandwidth.** The difference between the upper and lower frequencies in a contiguous set of frequencies. It is typically measured in Hz.

**3.4 Flat Top Window.** A weighting function applied during fast fourier transform analysis to obtain the true amplitudes of periodic components of a time signal. It is designed specifically to minimize the amplitude error. It facilitates calibration by using a calibration tone which may lie anywhere between two lines of the analyzer. Maximum amplitude error is less than 0.01 dB.

**3.5 Fundamental Frequency.** The speed of the compressor drive/shaft expressed in Hz.

**3.5.1 Fundamental Pulsation Frequency.** The dominant frequency observed in the pressure pulse. For reciprocating compressors, where all events are equally spaced in time, this is usually the number of cylinders times the Fundamental Frequency.

**3.6 Harmonics.** Sinusoidal quantity that has a frequency which is an integral multiple of the frequency of the periodic quantity to which it is related.

**3.7 Hemi-Anechoic Test Room.** A test room with a hard, reflecting floor whose other surfaces absorb essentially all of the incident sound energy over the frequency range of interest, thereby affording free-field conditions above a reflecting plane.

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

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

**3.10 One-Third Octave Band.** A band of sound covering a range of frequencies such that the highest is the cube root of two times the lowest. Note: The One-Third Octave Bands used in this standard are those shown in Table 1 and as defined in ANSI Standard S1.11.

**3.11 Pulsation.** The fluctuation of the pressure in a discharge or suction line about some mean pressure.

**3.12 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.

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

**3.13 Reference Sound Source (RSS).** A portable, aerodynamic sound source that produces a known stable broad band sound power output.

**3.14 Refrigerant Compressor.**

**3.14.1 External-drive (Open Type) Refrigerant Compressor.** A compressor with a shaft or other moving parts extending through a casing to be driven by an external power source, thus requiring a shaft seal or equivalent rubbing contact between fixed and moving part.

**3.14.2 Hermetic Refrigerant Compressor.** A compressor and motor enclosed in the same housing without an external shaft or shaft seals. The motor operates in the refrigerant.

**3.14.3 Semi-Hermetic Refrigerant Compressor.** A compressor directly coupled to an electric motor and contained within a gas-tight bolted casing. The motor operates in the refrigerant.

**3.15 Reverberation Test Room.** A reverberation room or reverberation chamber is an acoustically designed room for uniform distribution of acoustic energy. It is used to determine the Sound Power Level of a source and also to find the absorption coefficient of a material (sound absorption).

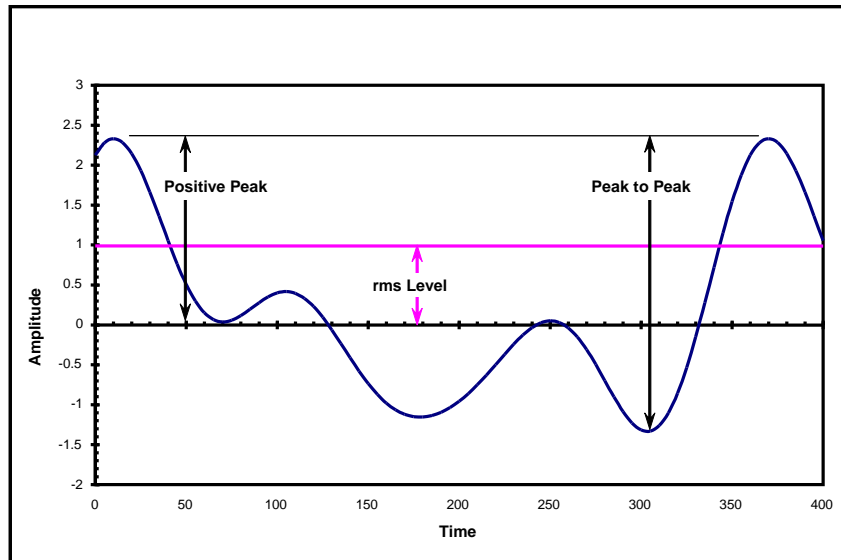
**3.16 Root Mean Square (rms).** The square root of the average of the sum of the squared instantaneous values of a function measured over the sample period.

$$S_{rms} = \left[ \frac{\sum_{i=1}^n S_i^2}{n} \right]^{1/2}$$

1

Where:

- i = individual sample
- n = Number of sample measurements
- S = Dynamic signal from sound, vibration, or pressure measuring instruments
- S<sub>rms</sub> = Root Mean Square value of S (Figure 1 depicts the peak to peak and the rms wave amplitude levels of a non-sinusoidal vibration or pressure signal.)



**Figure 1. Time Domain Wave Amplitude Descriptors**

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

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

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

**3.18** *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 power, expressed in decibels (dB). The reference sound power used in this standard is one picowatt (pW).

**3.18.1** *A-Weighted Sound Power Level ( $L_{WA}$ )*. The logarithmic summation of A-Weighted, One-Third Octave Band levels.

**3.19** *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  $\mu\text{Pa}$ , expressed in decibels (dB).

**3.20** *Working Load*. The portion of the compressor weight supported by the individual isolator.

## Section 4. Test Requirements

**4.1** *General Test Requirements*.

**4.1.1** *Compressor Mounting*. The compressor to be tested shall be mounted on a mass at least four times the mass of the compressor. The isolators used shall be those recommended for that particular compressor by the manufacturer. Isolator stiffness in N/m at the Working Load shall be reported as specified in Appendix D.

**4.1.2** *Compressor Line Connections*. To minimize the external load on the compressor, discharge and suction line connections shall be made at the compressor with flexible tubing, such as an extruded Teflon tube with a stainless steel wire braid cover and a length to diameter ratio of at least 50. The lines need to be supported to minimize the static load on the compressor.

To provide uniform flow, the lines shall have the same nominal inside diameter as the tubing size recommended by the compressor manufacturer. If mechanical connectors are used, the inner diameter of the connector shall be the same as the inner diameter of the refrigerant line, unless the connector is part of the compressor assembly.

In the event that flexible lines are not commercially available, rigid tubing may be used in a setup that provides flexibility for either the suction and/or discharge lines. A complete detailed sketch of the tubing geometry used shall be provided which includes mounting points, suction fittings and discharge fittings similar to the generic sketch in Figure 2.

All refrigerant lines not part of the compressor assembly shall be installed and treated to minimize their acoustic contribution.

**4.1.3 Electrical Power Supply.** Test voltage and frequency shall be as specified on the compressor nameplate. Where dual voltages (i.e., 230/460 V) are shown, either voltage may be used. Where extended voltage is specified (i.e., 208/230 V), the higher voltage shall be used. When dual frequency is indicated, tests shall be conducted at both frequencies.

Test voltage shall be  $\pm 1\%$  of that specified and the frequency shall be held to  $\pm 0.5$  Hz tolerance.

**4.1.4 Test Conditions.** The compressor shall be tested after thermal and operating stabilization has been reached. The type of oil and refrigerant used for each test shall be identified. Standard Rating Conditions are defined in 5.4.

**4.1.5 Narrow Band Measurements.** When using digital Fourier analyzers to measure discrete spectrum component amplitudes, a Flat Top Window shall be used. Record the amplitude at each peak. The Bandwidth shall be no more than 1/5 of the Fundamental Frequency, but wide enough so that side bands cannot be individually discerned.

## 4.2 Sound Level Measurements.

**4.2.1 Sound Testing Requirements.** Sound tests shall be conducted in an Anechoic or Hemi-Anechoic Test Room meeting all the requirements of, and that has been qualified per ANSI Standard S12.55/ISO 3745 or in a Reverberation Room meeting all the requirements of, and that has been qualified per AHRI Standard 220. The tests shall be conducted at operating conditions specified in 4.1.3, 4.1.4, and 5.4.

Note: the RSS shall meet the requirements of AHRI Standard 250.

**4.2.1.1 Determination of Sound Power Levels.** The Sound Power Levels shall be determined in decibels with respect to 1 pW for the One-third Octave Bands from 100 to 10,000 Hertz (50 to 80 Hertz is optional). The overall A-weighted level shall be calculated from the one-third octave band Sound Power Levels. For testing done in an Anechoic or Hemi-Anechoic Test Room, the testing and calculation procedures as specified in ANSI Standard S12.55/ISO 3745 shall be followed to determine the required one-third octave band Sound Power Levels and the overall A-Weighted Sound Power Level. For testing done in a Reverberant Test Room, the testing and calculation procedures as specified in AHRI Standard 220 shall be followed to determine the required one-third octave band Sound Power Levels and the overall A-Weighted Sound Power Level.

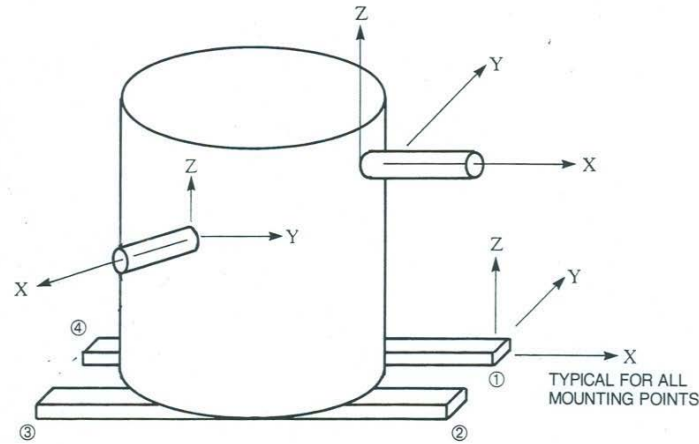
## 4.3 Vibration Measurements.

**4.3.1 Operating Conditions.** The tests shall be conducted at the operating conditions described in 4.1.3, 4.1.4 and 5.4.

**4.3.2 Measurement Points.** See Figure 2. Vibration measurements shall be taken at all mounting locations (1, 2, 3, 4), as close to the mounting point as possible. In addition, measurements shall also be taken on the compressor shell or body close to the location of the suction and the discharge fittings.

**4.3.3 Measurement Directions.** See Figure 2. Vibration measurements shall be taken in three orthogonal directions at the suction and discharge fitting locations and in three orthogonal directions at the mounting locations.

At the suction and discharge fitting location, one direction shall be parallel to the centerline of the tubing at the fitting. One of the remaining two directions should describe the tangential motion of the compressor body at the fitting, if applicable, and shall be described in a sketch. The third direction is then defined by the orthogonality requirement (Figure 2).



**Figure 2. Vibration Test Locations at Suction, Discharge, and Mounting Locations**

**4.3.4 Vibration Transducer.** The vibration transducer shall consist of a single axis accelerometer, or a commercially available triaxial accelerometer that meets the following requirements:

**4.3.4.1** Any added mass to the compressor assembly must be insignificant (1/1000) when compared with the mass of the compressor.

**4.3.4.2** Any accelerometer or measurement system used shall have a flat  $\pm 0.2$  dB frequency response from 5 to 1000 Hz.

**4.3.4.3** Each accelerometer as mounted to the compressor shall have its first natural frequency in excess of 8000 Hz and shall be mechanically attached or cemented, with or without an intermediate block or stud, to the compressor shell or structure.

**4.3.4.4** Handheld, beeswax, or other soft adhesive mounting methods are excluded.

**4.3.5 Measurement System Calibration.** The system used shall be calibrated in accordance with ANSI/ASA Standard S2.11.

#### 4.4 Gas Pulsation Measurements.

**4.4.1** The tests shall be conducted at the operating conditions described in 4.1.3, 4.1.4 and 5.4.

**4.4.2** To avoid the build-up of a standing wave, which could influence the results, the length of the refrigerant line shall be a minimum of 12.2 m in which there are no variations in inside diameter or sharp bends. It is recommended that a coil of tubing with a minimum radius of 30 tube diameters be used. To avoid heat transfer with the surrounding environment, it is recommended that the coil either be insulated or buried in sand. At least two pressure transducer

test locations shall be used in that line. They shall be spaced  $\frac{1}{4}$  wavelength apart based on the Fundamental Pulsation Frequency for the design. The wavelength can be calculated as follows:

$$\lambda = c/f$$

2

Where:

$c$  = speed of sound in the refrigerant at the measurement point, m/s

$f$  = frequency, Hz

$\lambda$  = wavelength, m



**4.4.2.1 Exclusion.** Compressors of capacity less than 440 W, where test conditions may be difficult to control with long line lengths, may be tested with as little as 1.25 m between the compressor and the condition control element (valve or heater). Two transducers spaced ¼ wavelength apart shall be used, but no more than a distance of 1.00 m.

**4.4.3** The pressure transducer shall have a minimum of 10 diameters of straight tube upstream of the measurement location. The closest transducer may not be more than 20 tube diameters from the compressor connection.

**4.4.4** The transducer shall be mounted in an adaptor such that the face is on a plane, parallel to the gas flow and as close as possible to the inner surface of the refrigerant tube. The face of the transducer shall be no larger than the inside diameter of the tube. The opening between the face and the tube shall not be less than the diameter of the transducer face. Any pressure transducer and measurement system used shall have a flat ± 0.2 dB frequency response from 5 to 5000 Hz.

**4.4.5** The usefulness of this measurement is only as an estimate of the comparative pulses measured. The final installed configuration will have line turns and cross-sectional changes causing reflected pressures (standing waves) wholly unrelated to the stand measured ones and these not only result in wave interference but can upset the source impedance itself giving different pulsations. Since the actual use pulsations can be different from the stand measured pulse, the actual installed configuration should be thoroughly examined for the true pressures.

**Section 5. Rating Requirements**

**5.1 Sound Power Level Ratings.** One-third octave band Sound Power Levels from 100 to 10,000 Hertz (50 to 10,000 Hertz is optional) and the resulting Overall A-weighted level are required.

**5.1.1** Compressor Sound Power Levels for each One-Third Octave Band shown in Table 1 shall be determined in accordance with 4.2.1.1. The sound power level test data shall be expressed in dB re. 1 pW for each One-Third Octave Band and shall be rounded to the nearest 0.1 dB.

**5.1.2 A-Weighted Sound Power Level.** The A-Weighted Sound Power Level shall be calculated per Equation 2 and rounded to the nearest decibel.

$$L_{wA} = 10 \cdot \log \sum_{j=j_{min}}^{j_{max}} 10^{0.1(L_{wj} + C_j)} \tag{3}$$

where:

- $C_j$  and  $j$  = Values given in Table 1
- $j_{min}$  and  $j_{max}$  = Values given in Table 1 of  $j$  corresponding, respectively, to the lowest ( $j_{min}$ ) and highest ( $j_{max}$ ) One-Third Octave Bands of measurement
- $L_{wA}$  = A-Weighted Sound Power Level
- $L_{wj}$  = Sound Power Level in the  $j^{th}$  One-Third Octave Band

**Table 1. One-Third Octave Bands and A-Weighting Factors, dB**

Band Number (j)	Octave Band Center Frequency, Hz	A-Weighting Factor (Cj), dB	Band Number (j)	Octave Band Center Frequency, Hz	A-Weighting Factor (Cj), dB	Band Number (j)	Octave Band Center Frequency, Hz	A-Weighting Factor (Cj), dB	Band Number (j)	Octave Band Center Frequency, Hz	A-Weighting Factor (Cj), dB
1	50	-30.2	7	200	-10.9	13	800	-0.8	19	3150	1.2
2	63	-26.2	8	250	-8.6	14	1000	0.0	20	4000	1.0
3	80	-22.5	9	315	-6.6	15	1250	0.6	21	5000	0.5
4	100	-19.1	10	400	-4.8	16	1600	1.0	22	6300	-0.1
5	125	-16.1	11	500	-3.2	17	2000	1.2	23	8000	-1.1
6	160	-13.4	12	630	-1.9	18	2500	1.3	24	10000	-2.5

**5.2 Vibration Data.** Narrow band vibration data using the Flat Top Window per ISO 18431 Parts 1 and 2 shall be obtained from a spectrum analysis of the vibration signal. These data shall be presented as rms displacement in mm [mils] for comparison purposes. Data shall be obtained in the frequency range of 5 to 500 Hz.

**5.3 Gas Pulsation Data.** Narrow band pressure pulsation using the Flat Top Window per ANSI/ASA S2.1/ISO 2041 data shall be obtained from a spectrum analysis of the pulsation signal. If two transducers,  $\frac{1}{4}$  wavelength apart are used, the highest value from either transducer at each frequency peak shall be used. These data shall be presented as kPa rms, for comparison purposes. Data shall be obtained in the frequency range of 5 to 1,000 Hz.

Additionally, the time domain highest single cycle peak-to-peak pressure over each of the pressure transducers used shall be measured and their average value reported, with a plot of the trace closest to that average.

**5.4 Standard Rating Conditions.** All tests on a positive displacement compressor shall be conducted with the compressor operating at conditions specified in AHRI Standard 540 for the specific application. For compressors not covered by AHRI Standard 540, the equipment (system) shall be operated at the conditions for which the compressor was specifically designed.

**5.5 Rating Tolerances.** Any Refrigerant Compressor selected at random and tested in accordance with this standard shall have an AHRI standard sound and vibration rating, when tested, not higher than its standard rating.

## Section 6. Minimum Data Requirements for Published Ratings

### 6.1 Required Data To Be Published.

**6.1.1 Operational Data.** The operational data shall be recorded as specified in Appendix D.

**6.1.2 Sound Power Level Rating's Data.** One-Third Octave Band Sound Power Levels from 100 to 10,000 Hertz (50 to 10,000 Hertz is optional) and the resulting overall A-Weighted Sound Power Level shall be recorded as specified in Appendix E.

Note: The overall A-Weighted Sound Power Level shall be for the full range of one-third octave band Sound Power Levels reported.

**6.1.3 Data Recording.** Data to be recorded per Appendix E shall be one-third octave band Sound Power Level and A-Weighted Sound Power Level.

**6.1.4 Vibration Data To Be Reported.** The three highest rms displacement levels, in mm, shall be recorded as specified in Appendix F. These displacements shall be obtained from narrow band analysis. Conversion methods are defined in Appendix C. Since displacement amplitudes decrease with an increase in frequency at constant acceleration, maximum acceleration and maximum displacement may not occur at the same frequency. Care shall be used to ensure that maximum rms displacements are obtained for frequencies only at the fundamental mechanical rotating frequency and harmonics of the fundamental frequency.

**6.1.5 Optional Information.** As an option, narrow band Acceleration data may be supplied in chart form. These data shall be clearly labeled in units and amplitude, i.e., peak, peak-to-peak or rms. If the data is presented in dB levels, then the reference value and applicable sensitivity factors shall be stated.

**6.1.6 Gas Pulsation Data To Be Reported.** The ten highest pressure levels as identified in the narrow band analysis of the gas Pulsations shall be tabulated and reported in Appendix G. The value is expressed in kPa rms.

**Section 7. Conformance Conditions**

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

**A1.1** AHRI Standard 220-2007, *Reverberation Room Qualification and Testing Procedures for Determining Sound Power of HVAC Equipment*, 2007, Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201, U.S.A.

**A1.2** AHRI Standard 250-2008, *Performance and Calibration of Reference Sound Sources*, 2008, Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201, U.S.A.

**A1.3** AHRI Standard 540-2004, *Positive Displacement Refrigerant Compressors and Compressor Units*, 2004, Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201, U.S.A.

**A1.4** ANSI Standard S1.11-2004 (RA 2009), *Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters*, 2009, American National Standards Institute, 25 West 43<sup>rd</sup> Street, New York, NY 10036, U.S.A.

**A1.5** ANSI Standard S12.55-2006/ISO 3745:2003, *Acoustics-Determination of Sound Power Levels of Noise Sources Using Sound Pressure – Precision Methods for Anechoic and Hemi-anechoic Rooms*, 2006, American National Standards Institute, 25 West 43<sup>rd</sup> Street, New York, NY 10036, U.S.A.

**A1.6** ANSI/ASA S2.1/ISO 2041-2009, *Mechanical vibration, shock and condition monitoring – Vocabulary*, 2009, American National Standards Institute, 25 West 43<sup>rd</sup> Street, New York, NY 10036, U.S.A.

**A1.7** 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.

**A1.8** ISO 18431-1-2005, *Mechanical vibration and shock -- Signal processing -- Part 1: General introduction*, 2005, International Organization for Standardization, Case Postale 56, CH-1211, Geneva 21 Switzerland.

**A1.9** ISO 18431-2-2004, *Mechanical vibration and shock -- Signal processing -- Part 2: Time domain windows for Fourier Transform analysis*, 2004, International Organization for Standardization, Case Postale 56, CH-1211, Geneva 21 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 this standard.

**B1.1** ANSI Standard S12.50-2002 (R 2007) [ISO 3740: 2000], *Acoustics – Determination of sound power levels of noise sources – Guidelines for the use of basic standards*, 2007, American National Standards Institute, 25 West 43<sup>rd</sup> Street, New York, NY 10036, U.S.A.

## APPENDIX C. CONVERSION METHODS (INFORMATIVE)

### C1 To convert from Acceleration or velocity to displacement:

For sinusoidal signals:

$$\text{Displacement: } x(t) = X e^{j\omega t} \quad \text{C1}$$

$$\text{Velocity: } v = \dot{x}(t) = j\omega \cdot x(t) \quad \text{C2}$$

$$\text{Acceleration: } a = \ddot{x}(t) = -\omega^2 \cdot x(t) \quad \text{C3}$$

Therefore the following relation shall be used in vibration measurements:

$$V = \omega \cdot X, \text{ and } a = \omega \cdot V \text{ or } a = \omega^2 X$$

$$X = V/\omega \text{ and } X = a/\omega^2$$

Where:

$f$  = frequency, Hz

$j$  = square root of negative one

$V$  = amplitude of the velocity, m/s

$\omega = 2\pi f$ , radians/s

$\dot{x}(t) = v$  = velocity, m/s

$\ddot{x}(t) = a$  = acceleration, m<sup>2</sup>/s

$X$  = amplitude of the displacement, m

## APPENDIX D. OPERATIONAL DATA - NORMATIVE

The reported information in the fields is required but the format is optional.

COMPRESSOR SPECIFICATIONS: TEST NUMBER \_\_\_\_\_  
DATE OF TEST \_\_\_\_\_

Model: \_\_\_\_\_ Manufacturer: \_\_\_\_\_ Serial: \_\_\_\_\_

Rated Compressor Speed (Hz): \_\_\_\_\_ Capacity (kW): \_\_\_\_\_

Rated Load Current (amps): \_\_\_\_\_ Voltage (V): \_\_\_\_\_ Frequency (Hz): \_\_\_\_\_

Type of Drive: \_\_\_\_\_ Type of Compressor: \_\_\_\_\_

Oil Type Designation, Viscosity and Quantity: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Compressor Unloading Conditions (If Applicable): \_\_\_\_\_

Accessories\*, such as Gears: \_\_\_\_\_

Comments: \_\_\_\_\_

COMPRESSOR TEST CONDITIONS: \_\_\_\_\_

Refrigerant \_\_\_\_\_

\*\* Saturated Suction Temperature/Pressure \_\_\_\_\_ °C/ \_\_\_\_\_ kPa

\*\* Saturated Discharge Temperature/Pressure \_\_\_\_\_ °C/ \_\_\_\_\_ kPa

\*\* Return Gas Temperature \_\_\_\_\_ °C

Nominal Compressor Test Speed \_\_\_\_\_ Hz

Driver Speed \_\_\_\_\_ Hz

Electric Motor Current/Voltage \_\_\_\_\_ amps \_\_\_\_\_ volts

Capacitor(s) (if used) \_\_\_\_\_ mfd \_\_\_\_\_ volts

Isolator Stiffness at Working Load \_\_\_\_\_ N/m

\* Normally furnished as part of the Compressor Assembly (must be in place during test).

\*\* Measured values

Report By \_\_\_\_\_

## APPENDIX E. SOUND TEST DATA - NORMATIVE

The reported information in the fields is required but the format is optional.

MODEL : \_\_\_\_\_

TEST NO: \_\_\_\_\_

DATE: \_\_\_\_\_

One-Third Octave Band Center Frequency, Hz	Sound Power Level, dB re 1 pW
50 (Optional)	
63 (Optional)	
80 (Optional)	
100	
125	
160	
200	
250	
315	
400	
500	
630	
800	
1000	
1250	
1600	
2000	
2500	
3150	
4000	
5000	
6300	
8000	
10,000	

Calculated A-Weighted Sound Power Level \_\_\_\_\_ dBA

Report Test Method Used \_\_\_\_\_

Remarks: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Tested by \_\_\_\_\_

## APPENDIX F. VIBRATION DATA - NORMATIVE

The reported information in the fields is required but the format is optional.

AMPLITUDE (Amp.)

Displacement in mm, rms (To the Nearest 0.002 mm)

MODEL \_\_\_\_\_

TEST NO. \_\_\_\_\_ DATE \_\_\_\_\_

Location			Peak 1 (Highest)		Peak 2 (2nd Highest)		Peak 3 (3rd Highest)	
			Frequency		Frequency		Frequency	
			Hz	mm	Hz	mm	Hz	mm
Mounting Points	1	X						
		Y						
		Z						
	2	X						
		Y						
		Z						
	3	X						
		Y						
		Z						
	4	X						
		Y						
		Z						
Suction Fitting	X							
	Y							
	Z							
Discharge Fitting	X							
	Y							
	Z							
Attach sketch of actual geometry and measurement points.								
Remarks:								

Tested by \_\_\_\_\_



## APPENDIX G. GAS PULSATION DATA - NORMATIVE

The reported information in the fields is required but the format is optional.

(To the Nearest 0.5 kPa )

MODEL \_\_\_\_\_  
TEST NO. \_\_\_\_\_  
DATE: \_\_\_\_\_

Suction		Discharge	
Frequency	Gas Pulsation	Frequency	Gas Pulsation
Hz	kPa rms	Hz	kPa rms

Time domain highest single cycle peak-to-peak pressure for suction, kPa\_\_\_\_\_

Time domain highest single cycle peak-to-peak pressure for discharge, kPa\_\_\_\_\_

Remarks:

\_\_\_\_\_

Tested by \_\_\_\_\_