ANSI/AHRI Standard 575
(Formerly ARI Standard 575)

2008 Standard for

Method of Measuring Machinery Sound Within an Equipment Space

Air-Conditioning, Heating, and Refrigeration Institute
2111 Wilson Boulevard, Suite 500
Arlington, VA 22201, USA
www.ahrinet.org
PH 703.524.8800
FX 703.562.1942

Documents
Document Sharing Hub
Full document details: AHRI Standard 575-2008 - Method of Measuring Machinery Sound Within an Equipment Space

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.

FOREWORD

This document establishes a uniform method of measuring the sound levels produced by air-conditioning and refrigerating machinery installed in mechanical equipment spaces. However, it should be emphasized that this standard was developed for use where the test conditions usually cannot be controlled, e.g., ambient temperature; equipment loading; physical attributes of the space; background sound sources, etc. Since the results obtained may vary substantially, a tolerance on these results cannot be specified.

Uniform practices in making sound level measurements are necessary for effective communication between the owner, the architect, the acoustician, the consulting engineer, the contractor and the equipment manufacturer.

Specifications for sound levels produced by machinery may be written, both for the purpose of supplying information in order to evaluate compliance with noise exposure limits and for the purpose of providing information for adequate building design to meet the acoustical design goals of adjacent occupied spaces. In view of the geometrical and acoustical properties of large equipment, both purposes can best be served by sound data expressed in terms of Sound Pressure Level measured close to the equipment. Sound pressure measurements close to the equipment are least affected by the environment in which the machines are installed.

This standard is based upon the procedures established in ANSI Standard S1.13.

Note:

This standard supersedes ARI Standard 575-94 and has no technical changes.

©Copyright 2008, by Air-Conditioning, Heating, and Refrigeration Institute
Registered United States Patent and Trademark Office

Full document details: AHRI Standard 575-2008 - Method of Measuring Machinery Sound Within an Equipment Space

TABLE OF CONTENTS

PAGE

Section 1. Purpose 1

Section 2. Scope 1

Section 3. Definitions 1

Section 4. Instruments 2

Section 5. Sound Measurements and Calculation Procedures 2

Section 6. Machinery Sound Specifications and Data Presentation 4

Section 7. System Operating Conditions 5

Section 8. Conformance Conditions 5

FIGURES

Figure 1. Test Unit Measurement Points 3

Figure E1. Example Sketch Showing Microphone Locations, Orientation of Test Unit, Key Measurement Points and Surroundings 14

APPENDICES

Appendix A. Reference – Normative 6

Appendix B. Reference – Informative 6

Appendix C. Operating Conditions – Informative 7

Appendix D. Sound Level Recording Format Per ARI Standard 575 – Informative 11

Appendix E. Example of Sound Level Recording Format Per ARI Standard 575 – Informative 12

Documents
Document Sharing Hub

Full document details: AHRI Standard 575-2008 - Method of Measuring Machinery Sound Within an Equipment Space

FORMS

Form C1. Centrifugal Chiller Operational Data Recording Form Per ARI Standard 575 7

Form C2. Reciprocating, Screw or Scroll Chiller Operational Data Recording Form Per ARI Standard 575 8

Form C3. Absorption Chiller Operational Data Recording Form Per ARI Standard 575 9

Form C4. Pump Operational Data Recording Form Per ARI Standard 575 10

Form D1. Sound Test Data Format 11

Documents
Document Sharing Hub

Full document details: AHRI Standard 575-2008 - Method of Measuring Machinery Sound Within an Equipment Space

METHOD OF MEASURING MACHINERY SOUND WITHIN AN EQUIPMENT SPACE

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish a uniform method of measuring and recording the Sound Pressure Level of machinery installed in a mechanical equipment space. It is not the intent of this standard to be used for the sound rating of 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 water chilling systems, pumps and similar operating machines and parts thereof, which for reasons of size or operating characteristics are more practically evaluated in situ.

Section 3. Definitions

All terms in this document 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 *"A"-Weighted Sound Pressure Level.* The measured value obtained with a sound level meter using its "A"-weighting network.

3.2 *Key Measurement Points*. Points located on the measurement parallelepiped at the center of each vertical plane.

3.3 *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.

3.4 O*ne-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 Standard S1.11.

3.5 *Operating Conditions.* Those conditions specified for a particular installation. In general, they are those parameters listed in the job specification sheets for the particular equipment. Examples of parameters to be recorded are found on data forms in Appendix C.

3.6 *Representative "A"-Weighted Sound Pressure Level.* An average "A"-Weighted Sound Pressure Level from a measurement made with a majority of measurement locations not affected by nearby reflective surfaces.

3.7 *Representative High Limit "A"-Weighted Sound Pressure Levels.* An average "A"-Weighted Sound Pressure Level from a measurement made with a majority of measurement locations affected by reflections from nearby surfaces. The value represents an upper bound to the representative "A"-weighted value.

3.8 *Representative High Limit Octave Band Sound Pressure Level.* An average Octave Band Sound Pressure Level calculated from a measurement made with more than two key measurement locations affected by reflections from nearby surfaces.

3.9 *Representative Octave Band Sound Pressure Levels.* An average Octave Band Sound Pressure Level calculated from a measurement made with two or less key measurement locations affected by reflections from nearby surfaces.

Documents
Document Sharing Hub
Full document details: AHRI Standard 575-2008 - Method of Measuring Machinery Sound Within an Equipment Space

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

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

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

3.11 *Sound Pressure Level.* The Sound Pressure Level (L_p), in decibels (dB), of a sound is 20 times the logarithm to the base 10 of the ratio of a given pressure to a reference pressure. The reference pressure (P_o) used in this standard is 20 micropascals.

$$L_p = 20 \cdot \log_{10} (p/P_o)$$

where p is the measured RMS (root mean square) sound pressure, Pa.

3.11.1 *One-Third Octave Band Sound Pressure Level.* A Sound Pressure Level measured when using a one-third octave band filter as defined in Section 3.4.

3.11.2 *Octave Band Sound Pressure Level.* A Sound Pressure Level measured when using an octave band filter as defined in Section 3.3.

3.12 *Uncertain Measurement.* A point where sound energy of other sources causes the observed value to be above its true value.

3.13 *Valid Measurement.* A point where other equipment or adjacent surfaces do not significantly affect the value observed.

Section 4. Instruments

4.1 *Sound Level Meter.* A meter meeting the requirements of the Type 1 meter described in ANSI S1.4 is to be used.

4.2 *Frequency Analyzer.* An octave or one-third octave band filter set meeting the requirements for Class II or III filters respectively, of ANSI S1.11 is to be used.

4.3 *Calibration.* During each series of measurements, an acoustical calibrator with an accuracy of ±0.5 dB shall be applied to the microphone for checking the calibration of the entire measuring system at one or more frequencies over the frequency range of interest. The calibrator shall be checked at the manufacturer's recommended intervals or at least once every year to verify that its output has not changed. In addition, an electrical calibration of the instrumentation system over the entire frequency range of interest shall be performed periodically as recommended by the manufacturer, but at intervals of not more than two years.

Section 5. Sound Measurements and Calculation Procedures

5.1 *Measurements.*

5.1.1 *Measurement Points.* The measurement points shall be determined relative to a reference parallelepiped, which is the smallest imaginary rectangular parallelepiped that will enclose the machine (Figure 1). Minor projections from the machine are disregarded in determining the size of the reference parallelepiped.

The measurement points shall be positioned on the surface of a measurement parallelepiped whose planes are one meter out from the vertical sides of the reference parallelepiped. Key Measurement Points are located at the center of each vertical plane of the measurement parallelepiped. The remaining measurement points are at one meter intervals on the measurement planes starting from the key points. All measurement points are at a height of 1.5 meters from the floor. If the shortest distance between two measurement points at a corner of the measurement parallelepiped is less than one meter, the point nearest to the corner shall be eliminated. The total number of points on the measurement parallelepiped is N.

AVA Documents
Document Sharing Hub
Full document details: AHRI Standard 575-2008 - Method of Measuring Machinery Sound Within an Equipment Space