

# 1994 STANDARD for

# METHOD OF MEASURING MACHINERY SOUND WITHIN AN EQUIPMENT SPACE



AIR-CONDITIONING &  
REFRIGERATION  
INSTITUTE

**Standard 575**

## IMPORTANT

### ***SAFETY RECOMMENDATIONS***

It is strongly recommended that the product be designed, constructed, assembled and installed in accordance with nationally recognized safety requirements appropriate for products covered by this standard.

ARI, as a manufacturers' trade association, uses its best efforts to develop standards employing state-of-the-art and accepted industry practices. However, ARI does not certify or guarantee safety of any products, components or systems designed, tested, rated, installed or operated in accordance with these standards or that any tests conducted under its standards 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.

Specification 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 American National Standard S1.13-1971 (R1986).

Note:

This standard supersedes ARI Standard 575-87.

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# 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.

## 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

**3.1 "A" -Weighted Sound Pressure Level.** The measured value obtained with a sound level meter using its "A" weighting network.

**3.2 Octave Band.** An octave band is 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 American National Standard Institute Standard S1.11-1986.

**3.3 Operating Conditions.** Operating conditions are those conditions specified for the 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 sheets in Appendix A.

**3.4 "Shall," "Should," "Recommended" or "It Is Recommended."** "Shall," "should," "recommended" or "it is recommended" shall be interpreted as follows:

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

**3.4.2 Should, Recommended or It Is Recommended.** "Should," "recommended" or "it is recommended" is used to indicate provisions which are not mandatory but which are desirable as good practice.

**3.5 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.

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

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

**3.6 Uncertain and Valid Measurements.**

**3.6.1** An uncertain measurement is at a point where sound energy of other sources causes the observed value to be above its true value.

**3.6.2** A valid measurement is at 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 American National Standards Institute Standard S1.4-1983 is to be used.

**4.2 Frequency Analyzer.** An octave or third-octave band filter set meeting the requirements for Class II or III filters respectively, of American National Standards Institute Standard S1.11-1986 is to be used.

**4.3 Calibration.** During each series of measurements, an acoustical calibrator with an accuracy of  $\pm 0.5$  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