# 1995 STANDARD for

# METHOD OF RATING SOUND AND VIBRATION OF REFRIGERANT COMPRESSORS


AIR-CONDITIONING & REFRIGERATION INSTITUTE

**Standard 530**

4301 NORTH FAIRFAX DRIVE • ARLINGTON, VIRGINIA 22203

**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.

Note:

This standard supersedes ARI Standard 530-89.

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# METHOD OF RATING SOUND AND VIBRATION OF REFRIGERANT COMPRESSORS

## Section 1. Purpose

**1.1** *Purpose.* The purpose of this standard is to establish for refrigerant compressors: definitions, test requirements, rating requirements, minimum publication requirements, and voluntary conformance.

**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, semi-hermetic (integral drive), and hermetic type refrigerant compressors. In the case of external drive compressors the driving mechanism shall be excluded from the sound and vibration measurements. However, for semi-hermetic compressors, where the driving mechanism is an integral part of the compressor assembly as defined in 3.5.3, it shall be included in the measurements.

**2.1.1** *Exclusion.*

**2.1.1.1** An external drive 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

**3.1** *Definitions.* All terms in this document will 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.

**3.2** *Acceleration "g's."* The ratio of acceleration measured at some point on a structure to the acceleration caused by the earth's gravitational field of 386.4 inches/second$^s$ (in/s$^2$) [9.807 m/s$^2$].

**3.3** *Amplitude Peak (pk)*—See Figure 1.

**3.4** *Amplitude Peak-to-Peak (pk-pk)*—See Figure 1.

**3.5** *Compressor, Refrigerant.*

**3.5.1** *External-drive (open type) Refrigerant Compressor.* A compressor with a shaft or other moving part 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.

**3.5.2** *Hermetic Refrigerant Motor-Compressor.* A combination consisting of a compressor and motor, both of which are enclosed in the same housing, the motor operating in the refrigerant.

**3.5.3** *Semi-Hermetic or Integral Drive Refrigerant Compressor.* Any compressor driving mechanism which can be considered an integral part of the compressor body as a result of being bolted to, pressed on, or fastened by any other mechanical means to the compressor body. The compressor could not be considered a complete unit without the drive mechanism in place. Such a mechanism might consist of a motor drive and gear box assembly bolted to the compressor body.

**3.6** *"Flat top" Window.* A weighting function applied during fast fourier transform analysis to obtain the true amplitudes of periodic components of a time signal.

**3.7** *"Hanning" Window.* A cosine squared weighting function applied to remove the window discontinuity effects that occur during the fast fourier transform analysis of time signals.

**3.8** *Harmonics.* Vibrational frequencies that are integral multiples of fundamental frequency. Such a frequency could be the compressor rotational speed.

**3.9** *Hertz.* Hertz (Hz) is the unit for frequency in cycles per second.

**3.10** *Mils.* 1 mil = 0.001 inches [0.0000254 m]