

SUPERSEDED

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STANDARD SPECIFICATION
SECTION 15200
VIBRATION LIMITS AND CONTROL

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SECTION 15200

VIBRATION LIMITS AND CONTROL

PART 1 - GENERAL

1.01 SCOPE

- A. This section describes the types of vibration isolators needed for different systems as well as the acceptable vibration limits for mechanical equipment.

1.02 SUBMITTALS

- A. All required submittals shall be per Section 01300.

1.03 PIPING SYSTEMS

- A. Connect refrigerant piping to compressors with refrigerant rated flexible metallic sections, oriented parallel to the crank shaft.
- B. Use flexible connections parallel to the crankshaft to connect building air piping to air compressors.
- C. When piping vibration hangars are specified, use type A described in 2.01 A1.

1.04 DUCTWORK

- A. Final attachment of ductwork to fans shall be made with weather-proof, flame retardant flexible connections.
- B. When duct vibration hangars are specified, they shall be type A described in 2.01 A1.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturers and their products shall be as listed below or approved equals.

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2.02 VIBRATION ISOLATORS

- A. Type A: Spring and Resilient Pad Hangars shall consist of a stable steel spring and a neoprene isolator placed in series and encased in a welded steel bracket. They shall be designed to allow up to 15° rod misalignment without short circuiting. Mason Industries, Inc., Model PC30N; Peabody Noise Control Co., Model SFH-HD; Amber Booth Co., Model BSWR.

PART 3 - EXECUTION

3.01 VIBRATION LIMITS

- A. The maximum allowable unfiltered overall velocity measurements for various pieces of equipment are shown below:

Centrifugal fans and pumps	0.20 in./sec.
Vanaxial fans	0.10 in./sec.
Cooling towers	0.30 in./sec.

- B. Displacement measurements at the operating speeds shall not exceed the values in 3.01 A or reduced values if the equipment is mounted on an inertia block. The values in 3.01 A multiplied by the displacement ratio will give the maximum allowable peak-to-peak displacements for equipment on inertia blocks.

$$\text{Displacement Ratio} = \frac{1}{((MB/M) + 1)}$$

where

M - Supported equipment and fluid weight
MB - Inertia base weight

- C. No axial vibration measurement shall exceed the maximum radial (vertical or horizontal) vibration at the same location.
- D. The presence of any vibration at frequencies other than the driving or driven speeds is reason to rate operation not acceptable.

3.02 VERIFICATION TESTING

- A. Vibration testing shall be performed after the equipment has been aligned and balanced in the following manner:
1. Determine and record the operating speeds of the equipment with a tachometer or strobe. Indicate both driving and driven speeds.
 2. When present, check the isolation system for proper operation by:
 - Visually inspecting the equipment installation. All isolators supporting a piece of equipment shall have approximately the same deflection.

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- Applying an unbalanced load and verifying that the system moves freely.
 - Determine the actual isolator deflection and compare it to the specified value.
3. Operate the equipment and perform audible and visual checks for any obvious rough operation. Also check all bearings with a stethoscope. Any problems uncovered at this point shall be corrected before proceeding further.
 4. Measure and record the equipment vibration. The measurements shall be made in all three axes (horizontally, vertically, and axially) at the bearings of each of the components.

3.03 DATA EVALUATION

- A. Equipment not complying with the specified vibration tolerances shall be corrected at the manufacturer's expense. Equipment shall then be retested and measurement results reported.

END OF SECTION