

SECTION 23 05 48.13 - VIBRATION CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Elastomeric isolation mounts.
 - 2. Open-spring isolators.
 - 3. Restrained-spring isolators.
 - 4. Elastomeric hangers.
 - 5. Spring hangers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
 - 2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device type required.
 - 3. Acoustical Treatment Materials: Submittal shall include construction details, materials, dimensions and attachment methods of individual components.
- B. Shop Drawings:
 - 1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
 - 2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
- C. Delegated-Design Submittal: For each vibration isolation device.
 - 1. Include design calculations for selecting vibration isolators and for designing vibration isolation bases.

PART 2 - PRODUCTS

2.1 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads: ASHRAE Type 1.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amber Booth
 - b. Kinetics Noise Control. Model NG or KIP (Basis of Design)
 - c. Mason Industries, Inc.
 - d. Vibration Mountings & Controls, Inc.
2. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
3. Size: Factory or field cut to match requirements of supported equipment.
4. Pad Material: Oil and water resistant with elastomeric properties.
5. Surface Pattern: Waffle pattern.
6. Infused nonwoven cotton or synthetic fibers.
7. Load-bearing metal plates adhered to pads, where applicable.
8. Sandwich-Core Material: Resilient and/or elastomeric, per manufacturer's recommendation.
 - a. Surface Pattern: Waffle pattern.
 - b. Infused nonwoven cotton or synthetic fibers.

2.2 ELASTOMERIC ISOLATION MOUNTS

A. Double-Deflection, Elastomeric Isolation Mounts: ASHRAE Type 2.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amber Booth
 - b. Kinetics Noise Control. Model RD (Basis of Design)
 - c. Mason Industries, Inc.
 - d. Vibration Mountings & Controls, Inc.
2. Mounting Plates:
 - a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded.
 - b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.
3. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.3 OPEN-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators: ASHRAE Type 3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amber Booth.
 - b. Kinetics Noise Control. Model FDS (Basis of Design)
 - c. Mason Industries, Inc.
 - d. Vibration Mountings & Controls, Inc.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig.
7. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

2.4 RESTRAINED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint: ASHRAE Type 4.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amber Booth.
 - b. Kinetics Noise Control. Model FLS (Basis of Design)
 - c. Mason Industries, Inc.
 - d. Vibration Mountings & Controls, Inc.
2. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.
 - a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Top plate with threaded mounting holes or elastomeric pad.
 - c. Internal leveling bolt that acts as blocking during installation.
3. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
4. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
5. Minimum Additional Travel: 50 percent of the required deflection at rated load.
6. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
7. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.5 ELASTOMERIC HANGERS

- A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods: ASHRAE Type 2.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amber Booth.
 - b. Mason Industries, Inc.
 - c. Vibration Mountings & Controls, Inc.
 2. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
 3. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

2.6 SPRING HANGERS

- A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression: ASHRAE Type 3.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amber Booth
 - b. Kinetics Noise Control. Model SFH (Basis of Design)
 - c. Mason Industries, Inc.
 - d. Vibration Mountings & Controls, Inc.
 2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 7. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
 8. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
 9. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SYSTEM DESIGN

- A. Vibration isolation equipment manufacturer shall be responsible for proper selection of spring rates to accomplish the specified minimum static deflections for all spring and pad type isolators, based on weight distribution of equipment to be isolated.
- B. Vibration isolation equipment manufacturer shall be responsible for structural design of steel beam and concrete inertia bases to support mechanical equipment specified herein.

3.3 VIBRATION CONTROL DEVICE INSTALLATION

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 03 30 00 "Cast-in-Place Concrete."
- B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.
- C. Rigid connections shall not exist between equipment and building structure that will degrade the sound and vibration control system(s) specified herein.
- D. Sound and vibration control equipment and materials manufacturer, or his qualified representative, shall be responsible for providing such supervision as may be necessary to assure correct installation and adjustment of the sound and vibration control system. Upon completion of equipment installation and after the system is placed into operation, the manufacturer, or his representative, shall make a final inspection and submit a report to Architect in writing, certifying the correctness of the installation and compliance with Drawings and Specifications.
- E. Piping and ductwork to be vibration isolated shall freely pass through walls and floors without rigid connections. Penetration points shall be sleeved or otherwise formed to allow passage of piping and ductwork, and maintain a minimum of 3/4 inch and a maximum of 1-1/4 inch clearance around the outside surfaces. Refer to Section 23 05 05 for procedures in sealing this annular space.

3.4 VIBRATION ISOLATION SCHEDULE

- A. Equipment base type, isolator type, and minimum deflection rates shall be per 2019 ASHRAE Handbook - HVAC Applications, Table 47 "Selection Guide for Vibration Isolation", with notes. Spring rates shall be per equipment manufacturer and/or vibration isolation manufacturer recommendations.
- B. Bases listed are in addition to any housekeeping pad requirements.
- C. Do not add additional isolation to internally-isolated equipment unless directed by the manufacturer.
- D. Axial Fans, Plenum Fans, Cabinet Fans, Fan Sections, Centrifugal Inline Fans
 - 1. Up to 22" diameter:
 - a. Slab on grade:
 - 1) No base, Isolator attached directly to equipment.
 - 2) Elastomeric Isolation Mount or Elastomeric Hanger.
 - b. All floor spans:
 - 1) No base, Isolator attached directly to equipment.
 - 2) Spring Isolator or Spring Hanger.
 - 2. 24" diameter and larger:
 - a. 2" Total Static Pressure and less, slab on grade and floor span:
 - 1) Structural steel or base rails.
 - 2) Spring Isolator or Spring Hanger.
 - 3) Exceptions:
 - a) 300 RPM and less, all floor spans, concrete inertia base required.
 - b) 301 to 500 RPM, spans over 20 feet, concrete inertia base required.
 - b. 2.1" Total Static Pressure and greater:
 - 1) Concrete Inertia Base.
 - 2) Spring Isolator or Spring Hanger.
- E. Condensing Units
 - 1. Slab on grade:
 - a. No base, Isolator attached directly to equipment.
 - b. Elastomeric Isolation Pad.
 - 2. Spans up to 30 feet:
 - a. No base, Isolator attached directly to equipment.

- b. Restrained Spring Isolator.
 - 3. Spans over 30 feet.
 - a. No base, Isolator attached directly to equipment or curb mounted-base.
 - b. Spring Isolator or Spring Hanger.
- F. Packaged Air Handling, Air Cooling, Heating and Ventilating Units
 - 1. 10 hp and less:
 - a. No base, Isolator attached directly to equipment.
 - b. Spring Isolator or Spring Hanger.
- G. Ductwork and Piping, where noted.
 - 1. Spring Hangers

END OF SECTION