

SECTION 23 0548

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete housekeeping pads.
- B. Equipment support bases.
- C. Vibration isolators.
- D. Roof curb isolation bases

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; 2015.

1.04 SUBMITTALS

- A. Refer to Section - General HVAC Requirements, for submittal procedures.
- B. Product Data:
 - 1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.
- C. Shop Drawings:
 - 1. Provide schedule of vibration isolator type with location and load on each.
- D. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

1.05 QUALITY ASSURANCE

- A. Comply with applicable building code.
- B. Perform design and installation in accordance with applicable codes.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Amber Booth: www.amberbooth.com.
- B. Isolation Technology, Inc.: www.isolationtech.com
- C. Kinetics Noise Control, Inc: www.kineticsnoise.com.
- D. Korfund Dynamics: www.thevmcgroup.com.
- E. Mason Industries: www.mason-ind.com.
- F. Vibration Eliminator Company, Inc; _____: www.veco-nyc.com/#sle.
- G. Vibration Mounting and Control: www.vmc-kdc.com.
- H. Vibro-Acoustics: <http://www.vibro-acoustics.com>.

2.02 PERFORMANCE REQUIREMENTS

- A. General:
 - 1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
 - 2. Steel springs to function without undue stress or overloading.

2.03 EQUIPMENT SUPPORT BASES

- A. Concrete Housekeeping Pads and Bases

1. Provide housekeeping bases as scheduled. Rough up slab under bases before pouring concrete.
 2. Pads shall be rectangular with vertical sides 4-inches from centerline of anchor bolts or 2 inches from edges of equipment supports, whichever provides the larger dimension, side of equipment or base edge, unless otherwise noted.
 3. Chamfer: 3/4-inch on edges and corners.
 4. Reinforcing: 6"x 6" 10/10 WWF at mid-depth of slab. (4 inch thick pads.)
- B. Concrete Inertia Bases:
1. Construction: Engineered, steel forms, with integrated isolator brackets and anchor bolts, welded or tied reinforcing bars running both ways in a single layer.
 2. Size: 6 inches minimum depth and sized to accommodate elbow supports.
 3. Mass: Minimum of 1.5 times weight of isolated equipment.
 4. Connecting Point: Reinforced to connect isolators and snubbers to base including template and fastening devices for equipment.
 5. Concrete: Filled on site with minimum 3000 psi concrete. See Section 03 3000 for additional requirements.

2.04 VIBRATION ISOLATORS

- A. Non-Seismic Type:
1. Neoprene Pad Isolators:
 - a. Rubber or neoprene waffle pads.
 - 1) Hardness: 30 durometer.
 - 2) Thickness: Minimum 1/2 inch.
 - 3) Maximum Loading: 50 psi.
 - 4) Rib Height: Maximum 0.7 times width.
 - b. Configuration: Single layer.
 - c. Configuration: 1/2 inch thick waffle pads bonded each side of 1/4 inch thick steel plate.
 2. Elastomeric Mounts:
 - a. Material: Oil, ozone, and oxidant resistant compounds.
 - b. Assembly: Encapsulated load transfer plate bolted to equipment and base plate with anchor hole bolted to supporting structure.
 3. Open Spring Isolators:
 - a. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection. Color code springs for load carrying capacity.
 - b. Spring Mounts: Provide with leveling devices, minimum 0.25 inch thick neoprene sound pads, and zinc chromate plated hardware.
 - c. Sound Pads: Size for minimum deflection of 0.05 inch; meet requirements for neoprene pad isolators.
 - d. For Exterior and Humid Areas: Hot dipped galvanized housings and neoprene coated springs.
 4. Restrained Steel Springs:
 - a. Housing: Rigid blocking during rigging prevents equipment installed and operating height from changing during temporary weight reduction.
 - b. Equipment Wind Loading: Adequate means for fastening isolator top to equipment and isolator base plate to supporting structure.
 5. Elastomeric Hangers:
 - a. Housing: Steel construction containing elastomeric isolation element to prevent rod contact with housing and short-circuiting of isolating function.
 - b. Incorporate steel load distribution plate sandwiching elastomeric element to housing.

2.05 ROOF CURB ISOLATION BASES

- A. Vibration Isolation Curbs:

1. Manufacturers.
 - a. Amber Booth; Model RTIR.
 - b. Mason Industries; Model CMAB.
 - c. Kinetics; Model KSR.
 - d. Vibration Eliminator Co.; Model AR.
 - e. Vibration Mounting & Control; Model AXR.
2. Construction: Weather-proof assembly with spring isolators, EPDM flexible connection and weather seals at bottom and top rails, to support rooftop equipment.
3. Design: Curb sized to fit rooftop units supplied and with isolators selected to comply with deflection requirements scheduled. Curb shall be sufficiently rigid to prevent misalignment or undue stress on machine, and to transmit design loads to isolators.
4. Non-Seismic Curb Rail:
 - a. Location: Between existing roof curb and rooftop equipment.
 - b. Construction: Aluminum.
 - c. Integral vibration isolation to conform to requirements of this section.
 - d. Weather exposed components consist of corrosion resistant materials.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. Bases:
 1. All bases shall be placed in position and supported temporarily by blocks or shims prior to the installation of the equipment, isolators and restraints.
 2. Isolators shall be installed after all equipment is installed without changing equipment elevations.
 3. Adjust equipment level.
 4. Remove all debris from beneath the equipment and verify that there are no short circuits of the isolators or the isolation system.
- C. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.
- D. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.
- E. Support piping connections to equipment mounted on isolators using isolators or resilient hangers as follows:
 1. Pipes within mechanical rooms shall be vibration isolated from the building's floor above. Minimum first three points of support from base mounted pumps.
 2. Up to 4 Inches Pipe Size: First three points of support.
 3. 5 to 8 Inches Pipe Size: First four points of support.
 4. Select three hangers closest to vibration source for minimum 1.0 inch static deflection or static deflection of isolated equipment. Select remaining isolators for minimum 1.0 inch static deflection or 1/2 static deflection of isolated equipment.
- F. Vibration isolation hangers shall be positioned as close as possible to the structure without coming in contact with any object (including the structure).
 1. Hanger rods shall not contact any object which would short circuit the isolator.
- G. Parallel running pipes may be hung together on a trapeze which is isolated from the building. Do not mix vibration isolated and non-isolated pipes on the same trapeze.

3.02 SCHEDULE

- A. Equipment Isolation Schedule.
 1. Condensing Boiler(s).
 - a. Base: Concrete pad.

- b. Base Thickness: 4 inches.
- c. Isolator Type: Neoprene Pad
- d. Isolator Deflection: 1/2 inches.
- 2. Base Mounted HVAC Pumps above Grade.
 - a. Housekeeping Pad: 4 inches thick.
 - b. Base: Concrete inertia base.
 - c. Base Thickness: 6 inches.
 - d. Isolator Type: Open spring isolators.
 - e. Isolator Deflection: 2.0 inches.
- 3. Roof Mounted utility and fume Fans.
 - a. Base: Structural steel base.
 - b. Isolator Type: Restrained Closed Spring Isolators
 - c. Isolator Deflection: 0.75 inches.
- 4. Suspended fans:
 - a. Isolator Type: Spring Isolator.
 - b. Isolator Deflection: .75 inches.
- 5. Packaged Roof Top Air Conditioning Units.
 - a. Base: Roof curb isolation base.
 - b. Isolator Type: Open spring isolators.
 - c. Isolator Deflection: 1.0 inches.

END OF SECTION