

SECTION 22 05 48
VIBRATION ISOLATION
FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American National Standards Institute (ANSI).
 2. American Welding Society (AWS): D1.1/D1.1M, Structural Welding Code—Steel.
 3. ASTM International (ASTM).
 - a. A36/A36M, Specification for Carbon Structural Steel.
 - b. E488, Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
 4. Vibration Isolation and Seismic Control Manufacturers Association (VISCMA).

1.02 DEFINITIONS

- A. AHJ: Authority Having Jurisdiction.
- B. EPDM: Ethylene-Propylene-Diene Monomer.

1.03 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings, Vibration Isolators:
 - a. Basic equipment layout, length and width, installed operating weights of equipment to be isolated and distribution of weight at isolation points.
 - b. Product Data:
 - 1) Manufacturer's product data including details of materials, construction, dimensions of individual components, installation details, and finishes.
 - 2) Schedule of vibration isolator type with location and static and dynamic load on each.
 - 3) Vibration Isolation Base Details:
 - a) Detail fabrication, including anchorages and attachments to structure and to supported equipment.
 - b) Include auxiliary motor slides and rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.

B. Informational Submittals:

1. Manufacturer's Installation Instructions: Indicate special procedures and setting dimensions.
2. Certifications:
 - a. Manufacturer's Certificate of Compliance, in accordance with Section 01 67 00, Product Requirements.
 - b. Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.
 - c. Welding Certificates: Welding procedures and personnel.

1.04 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M.
- B. Isolation materials, flexible connectors, and seismic restraints shall be same manufacturer. Select and certify using published or factory certified data.

PART 2 PRODUCTS

2.01 EQUIPMENT SCHEDULES

- A. Refer to the Drawings and for product type and capacities. Reference ASHRAE Applications Handbook (2019) Chapter 49 / Table 47 Guide for Vibration Isolation.

2.02 VIBRATION ISOLATION

A. General:

1. Provide for plumbing piping and equipment as identified by this specification.
2. Select in accordance with equipment or pipe weight distribution to produce reasonably uniform deflections.
3. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 30 percent and 60 percent of maximum deflection.

B. Manufacturers:

1. Kinetics Noise Control, Inc.
2. Or equal.

C. Elastomeric Pad:

1. Physical Characteristics:
 - a. Oil-resistant and water-resistant elastomer or natural rubber waffle pads, arranged in single or multiple layers, molded with a nonslip pattern.
 - b. Waffle pads bonded each side of minimum 1/4-inch thick galvanized steel separator plate.
 - c. Factory cut to size that matches requirements of supported equipment.
 - d. Waffle Pad Material: Standard polychloroprene or natural rubber.
 - e. Number of Layers: As required to support equipment load; refer to manufacturer's data for load capacities.
2. Functional Characteristics: Height of waffle ribs shall not exceed 0.7 times width.
3. Performance Characteristics:
 - a. Maximum Loading: 60 psi.
 - b. Minimum Single Layer Thickness: 1/4 inch.
 - c. Separator plate of sufficient stiffness for uniform loading over pad area.

D. Elastomeric Mount:

1. Physical Characteristics:
 - a. Double-deflection type, with molded, oil-resistant rubber or polychloroprene isolator elements.
 - b. Factory-drilled, encapsulated top plate for bolting to equipment.
 - c. Baseplate for bolting to structure.
2. Functional Characteristics: None.
3. Performance Characteristics: None.

E. Open Spring Isolator:

1. Physical Characteristics: Freestanding, laterally stable, open-spring isolators.
2. Functional Characteristics:
 - a. Baseplate:
 - 1) Factory drilled for bolting to structure and bonded to 1/4-inch thick rubber isolator pad attached to baseplate underside.
 - 2) Limit floor load to 100 psig.
 - b. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

3. Performance Characteristics:
 - a. Outside Spring Diameter: Not less than 80 percent of compressed height of spring at rated load.
 - b. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - c. Minimum Additional Travel: 50 percent of required deflection at rated load.
 - d. Lateral Stiffness: 80 percent minimum of rated vertical stiffness.

F. Elastomeric Hanger:

1. Physical Characteristics:
 - a. Double-deflection type.
 - b. Molded, oil-resistant rubber or polychloroprene isolator elements bonded to steel housing.
 - c. Threaded connections for hanger rods.
2. Functional Characteristics: None.
3. Performance Characteristics: None.

G. Spring Hanger:

1. Physical Characteristics:
 - a. Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
 - b. 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.
 - c. Elastomeric Element:
 - 1) Molded, oil-resistant rubber or polychloroprene.
 - 2) Steel washer-reinforced cup to support spring and bushing projecting through bottom of frame.
2. Functional Characteristics: None.
3. Performance Characteristics:
 - a. Outside Spring Diameter: 80 percent minimum of compressed height of spring at rated load.
 - b. Minimum Additional Travel: 50 percent of required deflection at rated load.
 - c. Lateral Stiffness: 80 percent minimum of rated vertical stiffness.
 - d. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.03 EQUIPMENT BASES

A. Manufacturers:

1. Thybar Inc.
2. Or equal.

B. Structural Steel Base:

1. Physical Characteristics:
 - a. Factory-fabricated, welded, structural steel base and rail.
 - b. Design Requirements:
 - 1) Lowest possible mounting height with not less than 1-inch clearance above floor.
 - 2) Provide equipment anchor bolts and auxiliary motor slide bases or rails.
 - 3) Provide supports for suction and discharge elbows for pumps.
 - c. Structural Steel: Bases shall have shape to accommodate supported equipment.
 - d. Support Brackets: Factory-welded steel angles on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
2. Functional Characteristics: None.
3. Performance Characteristics:
 - a. Structural Steel: Steel shapes, plates, and bars complying with ASTM A36/A36M.

2.04 FLEXIBLE CONNECTORS

A. Flexible Pipe Connectors:

1. Manufacturers:
 - a. Kinetics Noise Control, Inc.
 - b. Or equal.
2. Physical Characteristics:
 - a. Braided Nonferrous: For nonferrous piping systems, provide bronze hose covered with bronze wire braid with copper tube ends or bronze flanged ends, braze-welded to hose.
 - b. Braided Stainless Steel: For ferrous piping, provide stainless steel hose covered with Type 304 stainless steel wire braid with NPT steel nipples or 150-psi ANSI flanges, welded to hose.
3. Rubber: Polychloroprene or EDPM construction consisting of multiple piles of polyamide tire cord fabric and elastomer, molded and cured in hydraulic rubber presses.
4. Functional Characteristics: None.
5. Performance Characteristics:
 - a. Rubber: Straight or elbow connector as indicated on the Drawings, rated at 125 psi at 220 degrees F.

2.05 SHOP/FACTORY FINISHING

- A. Manufacturer's standard paint applied to factory-assembled and factory-tested equipment, before shipping.
 - 1. Powder coating on springs and housings.
 - 2. Electro-galvanized hardware.
 - 3. Hot-dip galvanized metal components for exterior use.
 - 4. Baked enamel coat metal components for interior use.
- B. Color-code or otherwise mark vibration isolation devices to indicate capacity range.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation devices for compliance with requirements, installation tolerances, and other conditions affecting performance.
- 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.

3.02 INSTALLATION

- A. General:
 - 1. Install products in accordance with manufacturers' written instructions.
 - 2. Connect wiring to isolated equipment with flexible hanging loop.
 - 3. Install roof curbs, equipment supports, and roof penetrations as specified in Section 07 70 01, Roof Specialties and Accessories.
 - 4. Locate isolation hangers as near overhead support structure as possible.
- B. Vibration Isolators:
 - 1. Install spring hangers without binding.
 - 2. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.
- C. Equipment Bases:
 - 1. Adjust equipment level.
 - 2. Structural Steel Bases: Set steel bases for 1-inch clearance between housekeeping pad and base.

- D. Flexible Connectors: 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.

3.03 FIELD QUALITY CONTROL

A. Testing:

- 1. Conduct the following field quality-control testing:
 - a. Isolator deflection.

3.04 ADJUSTING

A. Vibration Isolation Devices:

- 1. Adjust isolators after piping systems have been filled and equipment is at operating weight.
- 2. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- 3. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop.
- 4. Adjust isolators to ensure units do not exceed rated operating deflections or bottom out under loading, and are not short circuited by other contacts or bearing points.
- 5. Adjust leveling devices as required to distribute loading uniformly on isolators. Shim units as required where leveling devices cannot be used to distribute loading properly.

3.05 CLEANING

- A. After completing equipment installation, inspect vibration isolation devices. Remove paint splatters and other spots, dirt, and debris.

END OF SECTION

