

## PART 1 - GENERAL

## 1.01 SUMMARY

## A. Section Includes:

1. Vibration isolation for piping and equipment.
2. Purchased and/or fabricated equipment must be designed to safely accept external forces in accordance with IBC-NJ in any direction for all rigidly and resiliently supported equipment and piping without failure and permanent displacement of the equipment. Substitution of "Internally Isolated" mechanical equipment in lieu of the specified isolation must be approved for individual equipment units and is acceptable only if above accelerations are certified in writing by equipment manufacturer and stamped by a licensed civil or structural engineer.
3. Vibration isolation calculations must be submitted for all piping and equipment. Calculations for factory fabricated internally isolated equipment must be submitted. These calculations must be signed and sealed by a licensed professional engineer in the State of New Jersey and submitted to the Professional for approval

## B. Related Sections:

1. Vibration isolation in this Section replaces standard isolation systems noted in 22 05 29. All piping and equipment, etc. shall be isolated in accordance with the requirements of the IBC-NJ.

## 1.02 SUBMITTALS

## A. The submittal material shall include descriptive data for all products and materials including but not limited to, the following:

## 1. Descriptive Data:

- a. Catalog cuts and data sheets on specific vibration isolators and restraints to be utilized showing compliance with the specifications.
- b. Testing reports.

## B. Shop Drawings:

1. Drawings showing methods of suspension, support guides for piping, ductwork and equipment.
2. Concrete and steel details for bases including anchor bolt sizes and locations.
3. Number and location of vibration isolation and anchors for each piece of equipment.

4. Specific details of isolators including anchor bolts for mounting and maximum loading at each location, for each piece of equipment and piping.
5. Vibration isolation calculations stamped by a Professional Engineer verifying design and calculations for vibration control system used.

#### 1.03 REFERENCE STANDARDS

- A. International Building Code - 2009 New Jersey Edition (IBC-NJ)
- B. ANSI/SMACNA Vibration Isolation Manual.

Where conflicts exist between the two reference standards, the requirements of the more stringent standard shall apply.

#### 1.04 MANUFACTURER RESPONSIBILITIES

- A. Manufacturer of vibration isolation control equipment shall have the following responsibilities.
  1. Determine vibration isolation sizes and locations.
  2. Guarantee specified isolation system deflection.
  3. Provide installation instructions, drawings and field supervision to assure proper installation and performance.

#### 1.05 QUALITY ASSURANCE

- A. All plumbing systems within the building shall be protected by vibration isolation controls.
- B. Design isolators for equipment and all supports, curbs, etc. installed outdoors to provide adequate restraint to withstand the force of a 120 mph wind applied to any exposed surface of the isolated equipment. Isolators for outdoor equipment shall have bolt holes for attachment to equipment and to supports. The vibration isolation Vendor shall submit verifying shear and over turning calculations for all equipment, supports, curbs, etc. and equipment installation arrangement, stamped by a licensed Professional in the State of New Jersey. The design and supply of miscellaneous support steel above and below isolators will be the responsibility of the vibration isolation manufacturer.
- C. The Contractor shall be responsible for obtaining the services of the New Jersey State Registered Professional Engineer with a minimum of 5 years of vibration design experience in related building component restraints. This engineer shall design and certify vibration isolation for proper installation and performance of plumbing systems.
- D. The Contractor's engineer shall provide field supervision as required to ensure proper installation and performance of systems.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Vibration isolation shall maintain equipment and piping in a captive position. Vibration isolation shall not short circuit vibration isolation systems or transmit objectionable vibration or noise and shall be provided on all equipment as noted in Division 23 Specifications.
- B. Details of support methods for typical conditions are described herein. Actual method(s) of restraint for all equipment shall be submitted by the manufacturer of each piece of equipment accompanied by a letter indicating compliance with the criteria established. The Contractor shall provide restraints as indicated on approved Shop Drawings.

### 2.02 INERTIA BASES

- A. Furnish materials in accordance with IBC-NJ.
- B. Concrete Inertia Bases:
  - 1. Mass: Minimum of 1.5 times weight of isolated equipment, minimum 8" thick.
  - 2. Construction: Structured steel channel perimeter frame, with gusset brackets and anchor bolts, adequately reinforced, concrete filled.
  - 3. Connecting Point: Reinforced to connect isolators and snubbers to base.
  - 4. Concrete: Reinforced 3,000 psi (20 MPa) concrete.

### 2.03 VIBRATION ISOLATORS

- A. Closed Spring Isolators:
  - 1. Type: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
  - 2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with 2" static deflection.
  - 3. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators, and neoprene side stabilizers with minimum 0.25 inch (7 mm) clearance.

### 2.04 REQUIRED APPLICATIONS

- A. All equipment which is bolted directly to concrete housekeeping pads.
- B. All floor mounted equipment mounted on vibration isolators.

- C. All piping and equipment supported from overhead.
- D. Wall hung equipment.
- E. All floor-mounted pipes and ducts are not secured to vibration control floor stands.
- F. Provide inertia base for air compressors and vacuum pumps.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install isolation for motor driven equipment (air compressors and vacuum pumps).
- B. Bases:
  - 1. Set concrete inertia bases for 2 inch (50 mm) clearance between housekeeping pad and base.
- C. Adjust equipment level.
- D. Install spring hangers without binding.
- E. 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.
- F. Provide resiliently mounted equipment with vibration control snubbers. Provide each inertia base with minimum of four (4) vibration control snubbers located close to isolators. Provide snubbers with clearance between 0.15 inch (4 mm) and 0.25 inch (7 mm).

#### 3.02 UTILIZATION

- A. Equipment and piping supported from overhead:
  - 1. For overhead supported equipment, overstress of the building structure must not occur.
- B. Equipment mounted on vibration isolators:
  - 1. Equipment mounted on springs shall utilize vibration spring mounts and do not require additional vibration control providing that the spring mountings:
    - a. Comply with general characteristics of spring isolators.
    - b. Have vertical limit stops and are capable of supporting equipment at fixed elevation during equipment erection.

2. Where equipment weight or characteristics exceed capacity of vibration spring mounts, equipment shall be mounted on standard spring isolators, Mason Industries Type SLR or approved equal and provided with Seismic Restraint Type I restraints.

END OF SECTION