SECTION 15242
VIBRATION ISOLATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Inertia bases.
B. Vibration isolation.
C. Seismic control for equipment.

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Section 03300 - CONCRETE: SUPPLY OF CONCRETE FOR PLACEMENT BY THIS SECTION.

1.03 PERFORMANCE REQUIREMENTS

A. Provide vibration isolation on motor driven equipment over 0.5 HP, plus connected piping and ductwork.

B. Provide minimum static deflection of isolators for equipment as indicated.

1. First Floor, Under 20 hp.
   a. 400 - 600 rpm: 1 in.
   b. 600 - 800 rpm: 0.5 in.
   c. 800 - 900 rpm: 0.2 in.
   d. 1100 - 1500 rpm: 0.14 in.
   e. Over 1500 rpm: 0.1 in.

2. First Floor, Over 20 hp.
   a. 400 - 600 rpm: 2 in.
   b. 600 - 800 rpm: 1 in.
   c. 800 - 900 rpm: 0.5 in.
   d. 1100 - 1500 rpm: 0.2 in.
   e. Over 1500 rpm: 0.15 in.

3. Upper Floors
   a. 400 - 600 rpm: 3.5 in.
   b. 600 - 800 rpm: 2 in.
   c. 800 - 900 rpm: 1 in.
   d. 1100 - 1500 rpm: 0.5 in.
   e. Over 1500 rpm: 0.2 in.

4. Roof
a. 600 - 800 rpm: 3.5 in.  
b. 800 - 900 rpm: 2 in.  
c. 1100 - 1500 rpm: 1 in.  
d. Over 1500 rpm: 0.5 in.  

C. Use concrete inertia bases for fans having static pressure in excess of 3.5 in. WC or motors in excess of 40 HP, and on base mounted pumps over 10 HP.

1.04 SUBMITTALS

A. Shop Drawings: Indicate inertia bases and locate vibration isolators, with static and dynamic load on each.

B. Product Data: Catalog cuts and schedule of vibration isolator type with location and load on each.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Vibration isolators and bases:
   1. Mason Industries, Inc.
   2. Peabody Noise Control, Inc.
   5. Vibration Mountings and Controls, Inc.

2.02 VIBRATION ISOLATOR TYPES

A. Spring type:
   1. Spring isolators shall incorporate following:
      a. Minimum spring coil diameter of 0.8 of loaded operating height.
      b. Corrosion resistance where exposed to corrosive environment with:
         1) Springs cadmium plated and neoprene coated.
         2) Hardware cadmium plated.
         3) All other metal parts hot dip galvanized.
      c. Reserve deflection (from loaded to solid height) of 50% of rated deflection.
      d. Leveling device.
      e. Acoustical base pad.
         1) Ribbed or waffle neoprene.
         2) 1/4 in. thick.
         3) Maximum Shore-A durometer of 50.
      f. Designed and installed so that ends of springs remain parallel.
      g. Non-resonant with equipment forcing frequencies or support structure natural frequencies.
2. Type "A": Similar to Mason Type SLF
3. Type "B": same as Type "A" except:
   a. Provide built-in resilient vertical limit stops.
   b. Tapped holes in top plate for bolting to equipment.
   c. Capable of supporting equipment at fixed elevation during equipment erection.
   d. Similar to Mason Type SLR.

4. Type "C": spring hanger rod isolators shall incorporate the following:
   a. Spring element seated on steel washer within neoprene cup.
   b. Steel retainer box encasing spring and neoprene cup.
   c. Minimum ½ in. clearance between retainer box and spring hanger rod.
   d. Factory preloading to 75% of rated load.
   e. Minimum 15° angular clearance between rod and retainer box.
   f. Similar to Mason PC30.

5. Where operating weight differs from installed weight provide built-in adjustable limit stops to prevent equipment rising when weight is removed.
   a. Stops shall not be in contact during normal operation.

B. Elastomer mounting types:

1. Type "D": Double deflecting type incorporating following:
   a. Bolt holes for bolting to equipment base.
   b. Bottom steel plates for bolting to sub-base as required.
   c. Unit type design molded in black oil-resistant neoprene.
   d. Neoprene compounded to meet following:
      1) Not greater than 50 durometer.
      2) Minimum tensile strength 2000 psi.
      3) Minimum elongation 300%.
      4) Maximum compression set of 25% of the original deflection.
   e. Similar to Mason Type ND.

2. Type "E": Elastomer hanger rod isolators shall incorporate following:
   a. Molded unit type neoprene element.
   b. Compounding described in Type "D" above.
   c. Steel retainer box encasing neoprene mounting.
   d. Minimum ½ in. box.
   e. Similar to Mason Type HD.

3. Type "F": pad type elastomer mountings to incorporate following:
   a. 5/16 to 3/8 in. minimum thickness.
   b. 50 psi maximum loading.
   c. Ribbed or waffled design.
   d. 1/16 in. galvanized steel plate between multiple layers of pad thickness.
e. Suitable bearing plate to distribute load.
f. Similar to Mason Type W Series.

2.03 Rails for Rooftop Air Handling Units

A. Structural top rails.
B. Steel base plates.
C. Neoprene acoustical cup at top of springs.
D. Vertical limit stops.
E. Hold down bolts for RTU base.
F. Similar to Mason Type RSC.

PART 3 EXECUTION

3.01 GENERAL

A. Isolate all mechanical equipment from building structure by means of noise and vibration isolators.
B. Install isolators in accordance with manufacturer's written instructions.
C. Vibration isolators must not cause any change of position of equipment or piping resulting in piping stresses or misalignment.
D. Make no rigid connections between equipment and building structure that degrade noise and vibration isolation system herein specified.
   1. Electrical conduit connections to isolated equipment shall be looped to allow free motion of isolated equipment.
E. Do not use isolator leveling bolts as jacking screws.
F. Verify that all installed isolators and mounting systems permit equipment motion in all directions.

3.02 EQUIPMENT ISOLATION

A. General:
   1. Provide operating clearances:
      a. 2 in. between concrete inertia bases and housekeeping pad.
      b. 1 in. clearance between equipment or structural bases and housekeeping pad.
   2. Position equipment, structural base and concrete bases on blocks or wedges at proper operating height.
   3. Provide operating load conditions prior to transferring base isolator loads to springs and removing wedges.
   4. Adjust or provide additional resilient restraints to flexibly limit startup equipment lateral motion to 1/4 in.
   5. Prior to startup, clean out all foreign matter between bases and equipment.
   6. Verify that there are no isolation short circuits in the base, isolators or seismic restraints.
7. Position all corner or side seismic restraints with equipment operation for proper operating clearance:
   
   a. Weld or bolt seismic restraints to seismic anchor plates in housekeeping pad.

8. Thrust restraint installation - install at center of thrust, pre-compress spring to close to final load allow 1/4" gap.

B. Vibration isolation type and static deflection (minimum) as scheduled on Drawings.

3.03 DUCTWORK ISOLATION

A. Locate isolators:
   
   1. Close to building structure.
      
      a. Hanger boxes butted to ceiling structure.
   
   2. Between building structure and supplementary steel if required.

B. Suspend isolators from rigid and massive support points:
   
   1. See SECTION 15090: SUPPORTS AND ANCHORS.

C. Supplementary steel to be sized for maximum deflection of 0.08 in. at center span.

D. Ductwork:
   
   1. Suspended:
      
      a. Type "H" hanger rod isolators:
         
         1) Minimum static deflection: 1 in.
         2) Factory pre-loading for piping larger than 6 in. diameter.
   
   2. Adjust isolators to eliminate all contact of isolated rod with hanger rod box retainer or short circuiting of spring.

E. Wall and Floor Penetrations:
   
   1. Isolate piping to freely pass through walls and floors without rigid restraint, except when required.
   
   2. Provide sleeves and caulk airtight as specified in SECTION 15910: Ductwork and Accessories.

3.04 FIELD QUALITY CONTROL

A. Inspection by manufacturer's representative of all vibration isolating devices:
   
   1. After installation of all devices.
2. Written report by manufacturer regarding:
   a. Installation error.
   b. Improper selection of devices.
   c. Other fault that could affect performance of system.

B. Submit written report to Architect:
   1. Include manufacturer's report:
      a. Indicating required corrections.
   2. Include report on steps to properly complete isolation work.

END OF SECTION