

SECTION 15240

VIBRATION ISOLATION

PART 1 GENERAL

1.01 SUMMARY

A. Related Sections:

1. 15450 - Plumbing Equipment.
2. 15510 - Piping (HVAC).
3. 15515 - Valves, Hangers, and Specialties.
4. 15540 - Pumping Equipment (HVAC).
5. 15555 - Horizontal Fire Tube Boilers.
6. 15682 - Centrifugal Water Chillers.
7. 15684 - Rotary Screw Water Chiller.
8. 15855 - Air Handling Units.
9. 15861 - Air Moving Equipment.
10. 15890 - Ductwork.
11. 15970 - HVAC Control System.

1.02 SUBMITTALS

- A. Vibration Isolators: Provide catalog cuts, diameters, isolation efficiencies, deflections, free height, operating height, solid height, and lowest equipment speed for each isolator.
- B. Equipment Bases: Provide catalog cuts or drawings.
- C. Concrete Inertia Bases: Drawings showing required concrete steel reinforcing, construction details, and dimensions.

1.03 QUALITY ASSURANCE

- A. Vibration isolators and equipment bases shall be the products of 1 manufacturer who shall determine mounting sizes and provide field supervision and inspection to assure proper installation and performance.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Vibration Isolation:

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1. Consolidated Kinetics Corp., Columbus, OH.
2. Korfund Dynamics Corp., Westbury, NY.
3. Mason Industries, Inc., Hollis, NY.
4. Vibration Mountings and Controls, Inc., Butler, NJ.

2.02 MATERIALS

A. Rubber-in-Shear Type Isolators:

1. Molded mount shaped elements with bolt holes for bolting to equipment bases and mounted on bottom steel plates for bolting to foundations.
2. Double rubber-in-shear elements shall be mounted in series.
3. Metal surfaces shall be neoprene covered and have friction pads both top and bottom.

B. Spring Isolators:

1. Free-standing type, laterally stable without any housing, complete with rubber sound-deadening pads between active spring and its support, leveling adjustment bolts, and adequate facilities for bolting to both equipment and supporting structure.
2. Spring diameter not less than allowable compressed height of spring.
3. Spring base, minimum 1/4" thick rubber acoustical friction pads at underside.
4. Spring isolators for equipment with operating weight different from installed weight shall have built-in adjustable limit stops to prevent equipment rising when weight is removed.
5. Limit stops shall be out of contact during normal operation. Similarly, springs having a deflection of 2 inches or greater shall have neoprene limit stop to prevent undue motion during starting and stopping, but unrestrained otherwise.

C. Hanger-Type Isolators:

1. Rubber-in-shear or combination rubber-in-shear and springs, mounted in a hanger box, as required to meet static deflection.
2. Provide lockout plates when required.

D. Vertically Restrained Spring Isolators:

1. Incorporate a single spring vibration isolator having

characteristics specified and a steel mount assembly designed to limit vertical movement of isolated equipment.

2. Provide flat steel top load plate and base plate bonded to 1/4" thick neoprene noise-stop pad.

E. Inertia Blocks:

1. Reinforced concrete.
2. Provide a common support for motors and driven equipment.
3. Frames for inertia blocks shall be structural steel with reinforcing bars welded in place and shall be provided by the isolator manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mount equipment and piping on or suspended from accepted foundations and supports, as indicated in construction documents or as required. Mountings shall be non-resonant with equipment operating or with building structure natural frequencies.
- B. Concrete inertia bases and required reinforcing shall be furnished and installed under this section.
 1. Furnish shop drawings showing adequate concrete reinforcing steel details and templates for concrete foundations and supports, and required hanger bolts and other appurtenances necessary for proper installation of the equipment.
 2. Work shall be shown in detail on shop drawings, prepared under this section, and drawings submitted to A/E showing complete details of bases including necessary concrete and steel work and vibration isolation devices.
- C. Place floor-mounted equipment on 4 inch high concrete pads extending 6 inches beyond equipment outline, unless otherwise specified.
- D. Vibration Isolation Systems:
 1. Guaranteed to have deflection indicated on schedule on Construction Documents.

2. Mounting sizes shall be determined by vibration isolation manufacturer.
 3. Install according to manufacturer's instructions.
- E. Vibration isolation systems for each floor or ceiling supported equipment shall have a maximum lateral motion under equipment start-up or shut down conditions of 1/4". Motions in excess shall be restrained by accepted spring type mountings.
- F. Mounting systems exposed to weather and other corrosive environments shall be protected with factory corrosion resistant coatings. Metal parts of mountings (except springs and hardware) shall be hot dip galvanized. Springs shall be cadmium plated and neoprene coated. Nuts and bolts shall be cadmium plated.
- G. Where steel spring isolation systems are described in following paragraphs, mounting assemblies shall use bare springs with spring diameter not less than 0.8 of loaded operating height of spring. Each spring isolator shall be designed and installed with ends of spring to remain parallel. Spring deflection before becoming solid shall be at least 50 percent greater than specified minimum deflection.
- H. Factory Assembled Air Handling Units:
1. Mount units directly on stable bare steel spring isolators.
 2. Where units to be mounted are furnished with internal structural frames and external lugs, both of suitable strength and rigidity, or without any severe overhangs, no additional structural frame need be furnished and installed beneath unit.
 3. Motor shall be integrally mounted to unit and shall be mounted on slide rails. Mountings shall provide static deflection shown on drawings.
- I. Ceiling Supported Fans, Unit Ventilators, and Air Handlers:
1. Units shall be hung by means of vibration isolator hangers consisting of steel housing or retainer incorporating a steel spring and neoprene isolators.
 2. If equipment to be mounted is not furnished with integral structural frames and external mounting lugs, both of suitable strength and rigidity, accepted structural sub-base shall be installed in the field to

- support equipment to be hung and receive hangers.
3. Diagonal hanger rod isolators shall be provided as required to limit horizontal motion to 1/4" maximum under fan operating conditions.

J. Centrifugal Pumps:

1. Each pump with its driving motor shall be bolted and grouted to a spring supported concrete inertia base reinforced as required.
2. Concrete inertia base thickness shall be a minimum of 8 inches.
3. Spring supported concrete inertia foundation shall be poured within structural perimeter frame, reinforced as necessary, of required thickness specified above.
4. Mountings shall provide minimum static deflection as shown on drawings.
5. Structural perimeter frame, mounting templates, height saving brackets, and spring system shall be provided as an assembly by vibration control manufacturer.

K. Support Piping:

1. Water piping inside mechanical rooms shall be resiliently supported.
2. Resilient diagonal mountings or other accepted devices shall be provided as required to limit piping motion due to equipment start up or shut down, to a maximum deflection of 1/8".
3. Isolators for water piping shall be resiliently spring and neoprene supported with mountings providing a minimum static deflection of 1/2".
4. Where supplementary steel is required to support piping, supplementary steel shall be sized to limit maximum deflection between supports to 0.08" and shall be resiliently supported from building structure with mountings as specified. Supported piping from supplementary steel shall be rigidly suspended or supported.

L. Control Air Compressors:

1. Bolt and grout to reinforced concrete inertia block, 6 inches thick minimum mounted on bare steel spring isolators with 2 inch deflection.

M. Air Compressor Flexible Connectors:

1. Flexible stainless steel metal pipe connectors shall be installed in 2 planes 90 degrees to each other in discharge piping from compressor.
2. Flexible connectors shall have a minimum burst pressure of 4 times operating pressure.
3. Pipe sizes through 2 inch I.D. shall be furnished with hex male nipple fittings and pipe sizes 2-1/2" I.D. and larger shall be furnished with fixed steel flanges both sides.

N. Centrifugal Water Chillers and Rotary Water Chillers (Screw):

1. Each chiller shall be resiliently supported on vertical restrained steel spring vibration isolation mountings.
2. Spring mountings shall incorporate unrestrained stable springs with built-in leveling device and resilient vertical limit stops to prevent spring elongation when partial load is removed. The mountings shall be capable of providing rigid anchor, during erection of machine, so it can be erected at a fixed elevation.

O. Floor Mounted Centrifugal Fans:

1. Each fan with its driving motor shall be bolted to a spring supported structural steel base.
2. Mountings shall provide minimum static deflection as shown on construction documents.
3. Structural frame, height saving brackets, and spring system shall be provided as an assembly by vibration control manufacturer.

P. Roof Mounted Equipment:

1. No additional vibration isolation is required for curb mounted equipment.
2. Roof mounted equipment not installed on curbs shall be installed on a structural framing system as indicated on drawings. The clearance from the finished roof the bottom of the supporting steel shall be as follows:

<u>Width of Equipment</u>	<u>Clearance</u>
Up to 36"	18"
Above 36" to 48"	24"
Above 48" to 60"	30"
Above 60" and wider	48"

3. Isolators shall be as specified for floor mounted

equipment except spring isolators shall be the vertically restrained type.

END OF SECTION

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