SECTION 23 05 48

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:

1. Vibration Isolators

C. Related Sections:

1. Section 23 00 10 – HVAC General Requirements
2. Section 23 20 00 – HVAC Piping and Pumps
3. Section 23 30 00 – HVAC Air Distribution
4. Section 23 70 00 – Central HVAC Equipment
5. Section 23 80 00 – Decentralized HVAC Equipment
6. Division 26 - Electrical

1.2 QUALITY ASSURANCE

A. All vibration control apparatus shall be supplied by a single recognized manufacturer. The supplier of noise and vibration control equipment shall supervise, inspect and approve the installation of their equipment. The supplier shall submit a letter to the Engineer at the conclusion of the project stating that all items have been installed properly and that all equipment is adequately isolated.

1.3 SHOP DRAWINGS

A. Submit shop drawings and product data in accordance with Division 1.

B. Shop drawings, cuts, diagrams, catalog data sheets or such other data necessary to fully describe and substantiate compliance with the specifications shall be submitted for all (seismic restraints,) vibration isolation equipment and materials. The Contractor shall submit drawings for review stating the static deflection, load capacity and location of the isolators, inertia slab dimensions and installation instructions.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Kinetics Noise Control, Vibration Mountings and Control, Inc., Vibration Eliminator Co., Mason Industries, Vibro-Acoustics or Amber/Booth Company.

B. Model numbers used in this specification are those of Kinetics Noise Control and are included to establish a standard of quality.

2.2 SEISMIC RESTRAINTS [S]

A. This structure has been determined to be in Risk Category ___ and Seismic Design Category ___ as defined by the Georgia Uniform Statewide Building Code.

2.3 ISOLATOR TYPES

A. Floor Mounted Equipment:

1. Type S spring vibration isolators shall be free-standing, unhoused, laterally stabile, steel springs, wound using high strength heat treated spring alloy steel, and shall have a horizontal spring stiffness equal to or greater than 1.0 times the rated vertical spring stiffness. Springs shall be selected to provide the tabulated minimum operating static deflections and shall provide a 50% overload capacity before reaching a solid state. Springs shall be designed to reach a solid state before exceeding the spring steel fatigue point. Springs used to isolate floor mounted equipment shall include a drilled and tapped steel top load plate, and a steel bottom load plate bonded to a 1/4” thick ribbed neoprene noise stop pad. Each spring mount shall include a steel leveling bolt, locknuts, and washers for attachment to supported equipment. Type S units shall be Kinetics Model FDS. Springs shall have the following minimum outside diameters:

Spring Deflection,	Rated Capacities, Lbs.		
Inches	Up to 370	371 to 1600	1601 to 11000
Up to 1.5	1.75” dia.	3.00” dia.	3.00” dia.
1.51 to 2.25	3.50”	5.0”	5.0”

2. Type 3, vertically restrained, spring mounts shall incorporate a single spring vibration isolator having all of the characteristics of Type S spring isolators as previously specified in a steel mount assembly designed to limit vertical movement of isolated equipment. If equipment loads are reduced or equipment is subject to external loads, vertical movement shall be limited without degrading the vibration isolation of the spring element during normal equipment operating conditions. The mounts shall have a
3. flat steel top load plate, for welding to supporting equipment, vertically restrained by noise isolated bolts, connected to steel channel and drilled plated assemblies welded to a steel base plate. The base plate shall be bonded to a 1/4” thick ribbed

neoprene noise stop pad and drilled for bolting to supporting structures. Type 3 units shall be Kinetics FLS.

4. Type 1 fiberglass isolators shall be precompressed molded fiberglass noise and vibration isolation pads, individually coated with a flexible moisture impervious elastomeric membrane. The fiberglass pads shall have been stabilized by ten (10) compression cycles to three (3) times the maximum published load. Load range and natural frequency shall be as recommended by the isolator manufacturer for each specific application. But, in no case shall a natural frequency higher than 12 Hz be provided for applications intended to isolate sound, nor higher than 15Hz for applications intended to isolate impact noise and shock. Type 1 units shall be Kinetics Mo
5. del KIP.
6. Type N neoprene isolation mounts shall incorporate a cast-in tapped steel load plate, to permit bolting to supported equipment. The neoprene pad shall be molded using 2500 psi tensile strength, oil resistant compounds, and shall have no color additives in the compound. The neoprene isolator shall be selected to achieve the minimum operating static deflection tabulated, while not exceeding the published load capacity for the isolator used. Each neoprene isolation mount shall be externally color coded to i
7. dentify load capacity, and shall incorporate a cast-in drilled steel anchor/base plate. Type N units shall be Kinetics Model RD.
8. Type NIP neoprene isolation pads shall be single rib or crossed, double rib neoprene in shear pads in combination with steel shims. Neoprene pads shall be molded using 2500 psi tensile strength, oil resistant compounds. Type NIP units shall be Kinetics Model NPS, NPD, NGS, or NGD.

B. Suspended Equipment:

1. Type 2 hangers shall consist of a steel spring and a elastomer-in-shear isolator placed in series and encased in a welded steel bracket. The spring element of the hangers shall meet all specified characteristics of a “Type S” spring as previously specified. Springs shall be color coded for ease of load capacity identification and removable for field correction of overloaded hangers. The elastomer noise stop pad shall be selected to operate within the published load range for the pad for each spring capacity when placed in the bracket used. The hanger bracket shall be designed to carry five (5) times overload without failure, and shall allow up to 15° rod misalignment without metal to metal contact. Type 2 units shall be Kinetics Model SRH.
2. Type F hangers shall consist of an elastomer-in-shear isolator encased in a welded steel bracket. The elastomer shall be bonded to the hanger bracket and shall be selected to support the load within its published load rating. The hanger bracket shall be designed to carry a five (5) times overload without failure and allow up to 15° rod misalignment without short circuiting. Type F hanger shall be Kinetics Model RH.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Equipment: All equipment listed hereinafter shall be isolated from the structure and fixed parts by means of resilient vibration and noise isolators. Isolators for floor and roof mounted equipment shall be solidly anchored to the support base or floor and to the supported equipment unless indicated otherwise.

B. Piping and Conduit: All piping and electrical conduit connected to the chillers (including refrigerant piping), pumps, air handling units, or other pieces of moving equipment which are isolated from the structure by spring type vibration isolators shall be isolated from these units by flexible pipe connectors and shall be suspended on isolation hangers to a point 10 feet away. Use Type 2 hangers for suspended piping, Type S mounts for floor mounted piping. Flexible pipe connectors are specified as part o

C. f the piping work.

D. Ductwork: Flexible connections shall be incorporated in the ductwork adjacent to all air moving units as part of the sheet metal work. Ductwork shall be suspended on Type F hangers for a distance of (10) (20) (30) feet from these units (, except isolators shall not be required beyond wall surrounding the equipment room).

3.2 MINIMUM VIBRATION ISOLATOR STATIC DEFLECTION

Type of Equipment	Base Type	Isolator Type	Deflection, In.
Air Conditioning Units (Floor Mounted)			
Air Conditioning Units (Sus-pended)			
Rooftop Air Conditioning Units	8	S	1
Fans (Suspended)			

3.3 EQUIPMENT WITH INTERNAL ISOLATION

A. Where air handling units have fan and motor assembly internally isolated from the unit casing, using both spring isolators and flexible fan discharge connections, external isolators for the air handling unit shall not be provided.

END OF SECTION 23 05 48