PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
1. Isolation pads.
2. Spring isolators.
3. Restrained spring isolators.

B. Related Sections include the following:
1. Division 26 Section "Hangers and Supports for Electrical Systems" for commonly used electrical supports and installation requirements.

1.3 RESPONSIBILITY OF MANUFACTURER

A. Vibration isolation manufacturer shall have the following responsibilities:
1. Determine vibration isolation sizes and locations
2. Provide equipment isolation system as scheduled or specified
3. Guarantee specified isolation system deflection
4. Provide installation instructions and drawings
5. Provide calculations signed by a structural engineer licensed in the State in which the work is to take place certifying that the seismic restraints will act in accordance with the relevant State and local codes and will maintain equipment in captive position

1.4 VIBRATION ISOLATION AND NOISE CONTROL REQUIREMENTS

A. Floor-Mounted Transformers
1. Neoprene pads
2. Type HMN, 0.3 inch static deflection
3. Locate at 4 corners of transformer
4. Bolt to floor

B. Suspended Transformers
1. Type HN isolation hangers, 0.2 inch static deflection
2. Locate at 4 corners
3. Provide seismic restraints

C. Flexible Electrical Connections
1. At all transformers within buildings
2. At connections to motors or other vibrating equipment

D. Emergency Generator
1. Generator Set: Seismically restrained spring isolators provided by Emergency Generator Manufacturer equal to Type MSL
2. Generator exhaust: to meet noise requirement per section 263213
3. Noise level at property line shall meet requirements of section 263213.

1.5 ELECTRICAL BOX PADS

A. Provide at all junction boxes located within sound-insulated drywall partitions.

1.6 ACTION SUBMITTALS

A. Product Data: For the following:
1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.

B. Delegated-Design Submittal: For vibration isolation details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators.
a. Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other Division 26 Sections for equipment mounted outdoors.
2. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
3. Field-fabricated supports.

1.7 QUALITY ASSURANCE

A. Comply with CEC.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. California Dynamics Corporation.
2. Isolation Technology, Inc.
3. Mason Industries.

B. General Properties
1. All vibration isolators shall have either known undeflected heights or other markings so that, after adjustment, when carrying their load, the deflection under load can be verified, thus determining that the load is within the proper range of the device and that the correct degree of vibration isolation is being provided according to the design.
2. All isolators shall operate in the linear portion of their load versus deflection curve. Load versus deflection curves shall be furnished by the manufacturer and must be linear over a deflection range 50% above the design deflection.
3. The ratio of lateral to vertical stiffness shall not be less than 1.0 or greater than 2.0.
4. The vertical natural frequency for each support point, based upon the load per isolator and isolator stiffness, shall not differ by more than + or - 10%.

5. Wave motion through the isolator shall be reduced to the following extent: isolation above the resonant frequency shall follow the theoretical prediction based upon an undamped single degree of freedom system, with a minimum isolation of 50 decibels above 150 cycles per second.
6. All neoprene mountings shall have a shore hardness of 50 to 60 after minimum aging of 20 days or corresponding oven aging.
7. All vibration isolation equipment exposed to moisture or an outdoor environment shall be coated as follows:
   a. Standard paint applied to factory-assembled and -tested equipment before shipping.
   b. All hardware shall be zinc-plated. Springs and steel parts should be epoxy-powder-coated or electro-galvanized for exterior use.
   c. Baked enamel or powder coat for metal components on isolators for interior use.
8. All isolators shall be pre-approved by agency acceptable to the authority having jurisdiction.

C. Isolator Types and Descriptions
1. Type HN is a suspension hanger with a steel box frame and a molded neoprene in shear element. A neoprene grommet shall be provided at the location where the hanger rod passes through the hanger box so that no metal-to-metal contact occurs. The suspension hanger shall be Mason Industries Type “HD” or approved equal.
2. Type MSL is a bare, stable, steel spring with a ribbed neoprene pad under the base plate. Bolt holes shall be provided in the baseplate to permit attachment to the building structure. Limit stops shall be provided to prohibit spring extension if the load is removed. These stops may also serve as rigid blocking during erection so that the installed and operating heights shall be the same. Clearance shall be maintained around restraining bolts and between the limit stops and the housing so as not to interfere with the spring action. The vibration isolator shall be Mason Industries Type “SLR” or approved equal.
3. Type HMN is a neoprene isolator incorporating a steel housing capable of resisting a seismic load of 1.0 G in all directions. The mount shall consist of a captive steel insert embedded into a neoprene element which is enclosed by a steel housing which also includes floor mounting holes. The isolator shall have a rated deflection of 0.15 inches compression, 0.12 inches in tension and 0.09 inches in shear. The isolator shall be Mason Industries Type “BR” or approved equal.

D. Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
1. Resilient Material: Oil- and water-resistant neoprene.

E. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch-thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig.
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

F. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch-thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.2 FLEXIBLE CONNECTIONS

A. Conduit over 1 inch OD: Make electrical connections to vibrating equipment via flexible expansion/deflection conduit coupling sized as required. Coupling shall have a flexible and watertight outer jacket, an internal grounding strap, plastic inner sleeve to maintain smooth wireway, and end hubs with threads to fit standard threaded metal conduit. Acceptable units include:
1. XD Expansion Deflection Coupling by Crouse-Hinds of Syracuse, N.Y.
2. Type DF Expansion and Deflection fitting by Spring City Electrical Mfg. Co. of Spring City, PA.
3. For conduit under 1 inch OD, use flexible conduit.

2.3 ELECTRICAL BOX PADS

A. Minimum thickness - 1/8 inch.

B. Adhesion - adheres readily to metal or plastic.

C. Service temperature - 30º to 200º F.

D. Shall contain no asbestos.

E. Minimum shelf life - 1 year.

F. Non Fire-Rated
1. "Lowry's Outlet Box Pads" as manufactured by Harry A. Lowry & Associates, Inc.
2. "Sound Pad #68" as manufactured by L.H. Dottie Co.

G. Fire-Rated
1. "Flamesafe FSP 1077 Putty Pads" as manufactured by W.R. Grace & Co.
2. "Putty Pads" as manufactured by Specified Technologies Inc.
3. “Hilti CP617 Putty Pads” as manufactured by Hilti
4. “3M Fire Barrier Moldable Putty Pads type MPP-X” to fit box size as manufactured by 3M
5. "Metacaulk ® Putty Pads" as manufactured by RectorSeal

2.4 EMERGENCY GENERATOR NOISE CONTROL

A. Silencers, enclosure, etc. to meet maximum noise requirement at property line per section 263213.

2.5 FACTORY FINISHES

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation devices for compliance with requirements for 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.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.

6. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

C. Remove and replace malfunctioning units and retest as specified above.

D. Prepare test and inspection reports.

3.3 ADJUSTING

A. Adjust isolators after isolated equipment is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

END OF SECTION