

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Vibration isolation materials and components and associated installation methods.

1.2 RELATED SECTIONS

- .1 Section 21 00 00/26 00 00 – Specific Conditions – Mechanical/Electrical.
- .2 Section 23 05 49.01 – Seismic Restraint Systems.

1.3 REFERENCES

- .1 Unless otherwise indicated, all the works must be done in accordance with the latest edition of the Quebec Construction Code (QCC).
- .2 Furthermore, works must be carried out in accordance with any other code or standard having jurisdiction, as per the latest edition, including, but not limited to:
 - .1 American National Standards Institute (ANSI)/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).
 - .1 ANSI/ASHRAE Standard 171, Method of Testing Seismic Restraint Devices for HVAC/R Equipment.
 - .2 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).
 - .1 ASHRAE Handbook, HVAC Applications.
 - .2 Practical Guide to Seismic Restraint.
 - .3 National Fire Protection Association (NFPA).
 - .1 NFPA 13, Standard for the Installation of Sprinkler Systems.
 - .4 Health Canada / Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material safety data sheets (MSDS).
 - .5 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA).
 - .1 ANSI/SMACNA 001, Seismic Restraint Manual, Guidelines for Mechanical Systems.

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1.4 SUBMITTALS

- .1 Submit required documents, samples and shop drawings in accordance with Section 21 00 00/26 00 00 – Specific Conditions – Mechanical/Electrical.

1.5 QUALITY CONTROL

- .1 Submit the following documents in accordance with Section 21 00 00/26 00 00 – Specific Conditions – Mechanical/Electrical:
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: Submit manufacturer's installation instructions.
 - .3 Manufacturer's field reports: submit specified manufacturer's field reports.

PART 2 - PRODUCTS

2.1 GENERAL

- .1 Size and shape of bases and performance of vibration isolation as indicated.
- .2 All products must comply with aseismic standards.

2.2 ELASTOMERIC PADS

- .1 Type EP1: neoprene waffle or ribbed, 12 mm (0.5 in.) minimum thick, 50 durometer, maximum load 621 kPa (90 lb/in²).
 - .1 Acceptable products: Vibro-Acoustics, R type; Vibra-Sil; Ingenia "Amber/Booth".
- .2 Type EP2: rubber waffle or ribbed, 30 durometer, 12 mm (0.5 in.) minimum thick, maximum load 345 kPa (50 lb/in²).
 - .1 Acceptable products: Vibro-Acoustics, R type; Vibra-Sil; Ingenia "Amber/Booth".
- .3 Type EP3: neoprene-steel-neoprene, comprising two neoprene pads, waffle or ribbed, 50 durometer, 12 mm (0.5 in.) minimum thick, bonded to 1.71 mm (0.067 in.) steel plate, holes sleeved with isolation washers, maximum load 621 kPa (90 lb/in²).
 - .1 Acceptable products: Vibro-Acoustics, NSN type; Vibra-Sil; Ingenia "Amber/Booth".

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- .4 Type EP4: rubber-steel-rubber, comprising two natural rubber pads, waffle or ribbed, 30 durometer, 12 mm (0.5 in.) minimum thick, bonded to 1.71 mm (0.067 in.) steel plate, holes sleeved with isolation washers, maximum load 345 kPa (50 lb/ in²).
- .1 Acceptable products: Vibro-Acoustics, type RSR; Vibra-Sil; Ingenia “Amber/Booth”.

2.3 ELASTOMERIC MOUNTS

- .1 Type M1: colour coded; neoprene in shear; maximum durometer of 60, ribbed top and bottom surfaces, threaded insert and two bolt-down holes.
- .2 Acceptable products: Vibro-Acoustics, type MD; Vibra-Sil; Ingenia “Amber/Booth”.

2.4 SEISMIC CONTROL MEASURES

- .1 General:
 - .1 Seismic control devices and systems must comply with requirements set out in Section 23 05 49.01.
 - .2 Seismic control systems to work in every direction.
 - .3 Fasteners and attachment points to resist same maximum load as seismic restraints.
 - .4 Drilled or power driven anchors and fasteners not permitted.
 - .5 No equipment, equipment supports or mounts to fail before failure of structure.
 - .6 Supports of cast iron or threaded pipe not permitted.
 - .7 Seismic control measures must not interfere with integrity of fire-stopping devices.
- .2 Static equipment:
 - .1 Anchor equipment to equipment supports. Anchor equipment supports to structure.
 - .2 Suspended equipment:
 - .1 Use one or more of following methods depending upon site conditions and as indicated:
 - .1 Install tight to structure.

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- .2 Cross brace in every direction.
 - .3 Brace back to structure.
 - .4 Cable restraint system.
- .3 Seismic restraints:
 - .1 Earthquake-resistant devices and systems must provide cushioning action that is gentle and steady.
 - .2 Must never reach metal-like stiffness.
- .3 Elastomeric equipment (vibration isolated equipment):
 - .1 Seismic control measures not to jeopardize noise and vibration isolation systems. Provide 6 to 9 mm clearance during normal operation of equipment and systems between seismic restraint and equipment.
 - .2 Incorporate seismic restraints into vibration isolation system to resist complete isolator unloading.
 - .3 As indicated.
- .4 Piping systems:
 - .1 Fire protection systems: to NFPA 13.
 - .2 All other piping systems: hangers longer than 300 mm; brace at each hanger.
 - .3 Compatible with requirements for anchoring and guiding of piping systems.
- .5 Bracing methods: As approved by the Engineer.
 - .1 Structural angles or channels.
 - .2 Cable restraint system incorporating grommets, shackles and other hardware to ensure alignment of restraints and to avoid bending of cables at connection points. Incorporate neoprene into cable connections to reduce shock loads.
- .6 Service and utilities entrance into building: [____].

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

- .1 Seismic control measures to meet QCC requirements.
- .2 Install vibration isolation equipment in accordance with manufacturers' instructions and adjust mountings to level equipment.
- .3 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduits and ducts passing through walls and floors do not transmit vibrations.
- .4 Unless indicated otherwise, support piping connected to isolated equipment using spring mounts or hangers with 25 mm minimum static deflection, as follows:
 - .1 Up to NPS4: first 3 points of support; NPS5 to NPS8: first 4 points of support; NPS10 and over: first 6 points of support;
 - .2 First point of support: static deflection of twice deflection of isolated equipment, but no more than 50 mm.
- .5 Where isolation is bolted to floor use vibration isolation rubber washers.
- .6 Block and shim level bases so that ductwork and piping connections can be made to rigid system at operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.
- .7 Place ventilation units on elastomer pads selected for static deflection of 4 mm and spaced a maximum of 2,400 mm apart, centre to centre.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Arrange with manufacturer's representative to review work of this Section and submit written reports to verify compliance with Contract Documents.

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- .2 Manufacturer to provide product use recommendations and carry out periodic site visits to review installation, scheduled as follows:
 - .1 After delivery and storage of Products;
 - .2 After preparatory work and other preliminary work is complete, but before installation commences;
 - .3 Upon completion of installation.
- .3 Submit manufacturer's reports to the Engineer within three (3) days of manufacturer representative's site visit.
- .4 If needed, make adjustments and corrections in accordance with manufacturer's written report.
- .2 Inspection and certification of seismic restraints:
 - .1 Provide Engineer with 24-hour advance notice prior to commencement of tests.
 - .2 Assess adequacy of equipment isolation and acceptability of noise levels in occupied areas and, where appropriate, recommend corrective measures (including sound curves).
 - .3 Submit complete report of test results.

END OF SECTION