
Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 23 05 00 – CVCA – Common Work Results for HVAC.
- .2 Section 23 31 13 – Metal Ductwork

1.2 REFERENCES

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
- .2 ASTM International
 - .1 ASTM A653/A653M-[11], Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM C423-[09a], Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - .3 ASTM E90-[09], Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
 - .4 ASTM E477-[06a], Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers.
- .3 National Building Code of Canada (NBC) [2011].
- .4 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for duct silencer and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Canada and OIQ member.
 - .2 Submit complete system shop drawings of ducts silencer with product data.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties to meet the noise level of the spaces (NC criteria).

1.4 MATERIALS/EQUIPMENT REPLACEMENT

- .1 Where materials or products are specified by their trademark, consult the Instructions to Bidders document for the procedures to follow regarding the request for approval for materials or product replacement.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, ideally indoors or in a clean, dry, well ventilated area and in accordance with manufacturer's recommendations.
 - .2 Store and protect acoustical air plenums from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 PERFORMANCE REQUIREMENTS

- .1 Rating Data:
 - .1 Provide performance rating data, certified by professional engineer or accredited test laboratory and supported by calculations and verified by test results in accordance with referenced standards as follows:
 - .1 Silencer: insertion loss, pressure drop at design conditions, generated noise level.
 - .2 Acoustic plenums: transmission loss and acoustical absorption.
 - .3 Acoustical performance measurements in accordance with ASTM E477, ASTM E90 and ASTM C423, except where specified otherwise.

2.2 ABSORPTION AND INSULATING MEDIA

- .1 Acoustic quality, glass fibre, bacteria and fungus resistant; free of corrosion causing or accelerating agents; packed to density to meet performance requirements; and meet NBC fire requirements or requirements of authority having jurisdiction for duct lining.

2.3 SILENCERS

- .1 Factory manufactured of prime coated or galvanized steel, compatible with ductwork specified elsewhere and to ASHRAE and SMACNA standards.
- .2 Unless otherwise stated, outer casing and galvanized steel inner casing with clean cut circular perforations to enclose acoustic media. Inner casing to have half-splitters pods running full length of silencer where any cross sectional dimension exceeds 450 mm. Protect media from erosion with glass fibre cloth between media and perforated metal.
- .3 Performance: See mechanical table in drawings.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for duct silencer installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 INSTALLATION

- .1 Noise flanking: where indicated, install in wall sleeve with uniform clearance around to ensure no contact of silencer with wall sleeve. Pack with flexible, non hardening caulking on both sides of sleeves.
- .2 Instrument test ports: install at inlet and outlet to permit measurement of insertion loss and pressure loss.
- .3 Suspension: to manufacturer's instructions.

3.4 FIELD QUALITY CONTROL

- .1 Testing:
 - .1 Experienced and competent sound and vibration testing professional engineer to take sound measurement after start up and testing, adjusting and balancing of systems to Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
 - .2 Sound measurements to extend over frequency range of 63 to 8000 Hz and taken:
 - .1 Upstream and downstream of each duct silencer.
 - .2 In areas adjacent to mechanical equipment rooms, duct and pipe shafts.
 - .3 At 1800 mm above floor adjacent to first air terminal.
 - .3 Provide to the Departmental Representative a notice of 24 hours in advance of commencement of tests.
 - .4 Establish adequacy of equipment isolation, acceptability of noise levels in occupied areas, other conditions affecting acoustics and, where appropriate, recommendation for remedial measures and costs.
 - .5 Submit complete report of test results including sound levels curves juxtaposed with NC - ANSI S12.2-2008. Define the equivalent NC

- .2 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.
 - .2 Manufacturer's Field Services: consisting of product use recommendations and periodic site visits to review installation, scheduled as follows:
 - .1 After delivery and storage of products.
 - .2 After preparatory work is complete but before installation commences.
 - .3 Twice during the installation, at 25% and 60% completion stages.
 - .4 Upon completion of installation.
 - .3 Submit manufacturer's reports to Departmental Representative within 3 days of manufacturer representative's review.

3.5 ADJUSTING

- .1 Make adjustments and corrections in accordance with written report.
- .2 Provide Departmental Representative with notice 24 hours in advance of visit.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION