

**PART 1**      **GENERAL**

**1.1**            **SUMMARY**

- .1 Section includes:
  - .1 Materials and installation of low-pressure metallic ductwork, joints and accessories.

**1.2**            **RELATED SECTIONS**

**1.3**            **REFERENCES**

- .1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).
- .2 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM A 480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
  - .2 ASTM A 635/A635M, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.
  - .3 ASTM A 653/A653M, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .3 Department of Justice Canada (Jus).
  - .1 Canadian Environmental Protection Act (CEPA).
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .5 National Fire Protection Association (NFPA).
  - .1 NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.
  - .2 NFPA 90B, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
  - .3 NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- .6 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
  - .1 SMACNA HVAC Duct Construction Standards - Metal and Flexible.
  - .2 SMACNA HVAC Air Duct Leakage Test Manual.
  - .3 IAQ Guideline for Occupied Buildings Under Construction, 1st Edition.
- .7 Transport Canada (TC).
  - .1 Transportation of Dangerous Goods Act (TDGA).

**1.4 SUBMITTALS**

- .1 Submit shop drawings and product
- .2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets -Hazardous Materials for the following:
  - .1 Sealants.
  - .2 Tape.
  - .3 Proprietary Joints.

**1.5 QUALITY ASSURANCE**

- .1 Certification of Ratings:
  - .1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.
- .2 Health and Safety:
  - .1 Do construction occupational health and safety.
  - .2 During construction meet or exceed the requirements of SMACNA IAQ Guideline for Occupied Buildings under Construction.

**1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Protect on site stored or installed absorptive material from moisture damage.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for reuse and recycling.
  - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  - .3 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
  - .4 Separate for reuse and recycling and place in designated containers steel, metal, plastic waste in accordance with Waste Management Plan.
  - .5 Place materials defined as hazardous or toxic in designated containers.
  - .6 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
  - .7 Fold up metal and plastic banding, flatten and place in designated area for recycling.

**PART 2 PRODUCTS**

**2.1 SEAL CLASSIFICATION**

- .1 Classification as follows:

Maximum Pressure Pa	SMACNA Seal Class
> 1000	A
750	B
500	C
250	C
125	C

- .2 Seal classification:
  - .1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.
  - .2 Class B: longitudinal seams, transverse joints and connections made airtight with sealant tape or combination thereof.
  - .3 Class C: transverse joints and connections made air tight with gaskets, sealant tape or combination thereof. Longitudinal seams unsealed.

## **2.2 SEALANT**

- .1 Sealant: oil resistant, polymer type flame resistant duct sealant. Temperature range of minus 30°C to plus 93°C.

## **2.3 TAPE**

- .1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm wide.

## **2.4 DUCT LEAKAGE**

- .1 In accordance with SMACNA HVAC Duct Leakage Test Manual.

## **2.5 FITTINGS**

- .1 Fabrication: to SMACNA.
- .2 Radiused elbows:
  - .1 Rectangular: Centreline radius: 1.5 times width of duct.
  - .2 Round: smooth radius or five piece. Centreline radius: 1.5 times diameter.
- .3 Mitred elbows, rectangular:
  - .1 To 400 mm: with single thickness turning vanes.
  - .2 Over 400 mm: with double thickness turning vanes.
- .4 Branches:
  - .1 Rectangular main and branch: with radius on branch 1.5 times width of duct or 45<sup>0</sup> entry on branch.
  - .2 Round main and branch: enter main duct at 45<sup>0</sup> with conical connection.
  - .3 Provide volume control damper in branch duct near connection to main duct.
  - .4 Main duct branches: with volume control damper.
- .5 Transitions:

- .1 Diverging: 20<sup>0</sup> maximum included angle.
- .2 Converging: 30<sup>0</sup> maximum included angle.
- .6 Offsets:
  - .1 Full short radiused elbows as indicated.
- .7 Obstruction deflectors: maintain full cross-sectional area. Maximum included angles: as for transitions.
- .8 Firestopping material and installation must not distort duct.

**2.6 GALVANIZED STEEL**

- .1 Lock forming quality: to ASTM A653, G90 zinc coating.
- .2 Thickness, fabrication and reinforcement: to SMACNA.
- .3 Joints: to SMACNA or proprietary manufactured duct joint. Proprietary manufactured flanged duct joint to be considered to be a class A seal.

**2.7 HANGERS AND SUPPORTS**

- .1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct. Maximum size duct supported by strap hanger: 500 mm.
- .2 Hanger configuration: to SMACNA.
- .3 Hangers: galvanized steel angle with black steel rods to ASHRAE or SMACNA following table:

Duct Size (mm)	Angle Size (mm)	Rod Size (mm)
up to 750	25x25x3	6
751 to 1050	40x40x3	6
1051 to 1500	40x40x3	10
1501 to 2100	50x50x3	10
2101 to 2400	50x50x5	10
2401 and over	50 x 50 x 6	10

- .4 Upper hanger attachments:
  - .1 For concrete: manufactured concrete inserts.
    - .1 Acceptable Product: Myatt, Grinnell, Hunt.
  - .2 For steel joist: manufactured joist clamp steel plate washer.
    - .1 Acceptable Product: Myatt, Grinnell, Hunt.
  - .3 For steel beams: manufactured beam clamps:
    - .1 Acceptable Product: Myatt, Grinnell, Hunt.

**PART 3      EXECUTION**

**3.1      GENERAL**

- .1 Do work in accordance with NFPA 90A, NFPA 90B, and SMACNA.
- .2 Do not break continuity of insulation vapour barrier with hangers or rods. Insulate strap hangers 100 mm beyond insulated duct.
- .3 Support risers in accordance with SMACNA.
- .4 Install breakaway joints in ductwork on sides of fire separation. Do not place fire stopping material in expansion space between damper sleeve and fire partition.
- .5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.
- .6 Manufacture duct in lengths and diameter to accommodate installation of acoustic duct lining.

**3.2      HANGERS**

- .1 Strap hangers: install in accordance with SMACNA.
- .2 Angle hangers: complete with locking nuts and washers.
- .3 Hanger spacing: in accordance with SMACNA or as follows:

Duct Size (mm)	Spacing (mm)
to 1500	3000
1501 and over	2500

**3.3      WATERTIGHT DUCT**

- .1 Provide watertight duct for:
  - .1 Dishwasher exhaust.
  - .2 Fresh air intake.
  - .3 Minimum 3000 mm from duct mounted humidifier in all directions.
  - .4 As indicated.
- .2 Form bottom of horizontal duct without longitudinal seams. Solder or weld joints of bottom and side sheets. Seal other joints with duct sealer.
- .3 Slope horizontal branch ductwork down towards fume hoods served. Slope header ducts down toward risers.
- .4 Fit base of riser with 150 mm deep drain sump and NPS 1 ½ drain connected, with deep seal trap and valve and discharging to open funnel drain or service sink or as approved by Owner's Representative.

**3.4 KITCHEN EXHAUST SYSTEMS**

- .1 Install to NFPA 96 and as indicated.

**3.5 SEALING AND TAPING**

- .1 Apply sealant to outside of joint to manufacturer's recommendations.
- .2 Bed tape in sealant and recoat with minimum of one coat of sealant to manufacturers recommendations. Sealant and tape to be applied to full perimeter of duct.

**3.6 LEAKAGE TESTS/COMMISSIOONING**

- .1 In accordance with SMACNA HVAC Duct Leakage Test Manual.
- .2 Do leakage tests in sections.
- .3 Make trial leakage tests as instructed to demonstrate workmanship.
- .4 Install no additional ductwork until trial test has been passed.
- .5 Test section minimum of 30 m long with not less then three branch takeoffs and two 90° elbows.
- .6 Complete test before insulation or concealment.

**END OF SECTION**