

1 General

1.1 REFERENCE STANDARDS

- .1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
 - .1 SMACNA HVAC Duct Construction Standards, Metal and Flexible, 1995.
 - .2 SMACNA HVAC Air Duct Leakage Test Manual, 1985.
- .2 Canadian Standards Association (CSA).
 - .1 CSA B228.1-1968, Pipe Ducts and Fittings for Residential Type Air Conditioning Systems.
- .3 American Society for Testing and Materials (ASTM).
 - .1 ASTM A480/A480M-90, Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
 - .2 ASTM A525M-87, Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process. (Metric).
 - .3 ASTM A621/A621M-82 (1988), Specification for Steel Sheet and Strip, Carbon, Hot-Rolled, Drawing Quality.
- .4 National Fire Protection Association (NFPA).
 - .1 ANSI/NFPA 90A-1989, Installation of Air Conditioning and Ventilating Systems.
 - .2 ANSI/NFPA 90B-1989, Installation of Warm Air Heating and Air Conditioning Systems.
 - .3 ANSI/NFPA 96-1991, Vapour Removal from Cooking Equipment.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate following:
 - .1 Sealants.
 - .2 Tape.
 - .3 Proprietary Joints.

1.3 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 Products

2.1 SEAL CLASSIFICATION

- .1 Ductwork classification as follows:

Pressure Class (Pa)	Seal Class	Leakage Class		Systems Applicability
		Rectangular	Round	
250	C	24	24	All systems

- .2 Seal classification:
 - .1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant.

- .2 Class B: longitudinal seams, transverse joints and connections made airtight with sealant.
- .3 Class C: transverse joints and connections made air tight with sealant. 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 All ductwork in accordance with SMACNA HVAC Duct Leakage Test Manual.

2.5 FITTINGS

- .1 Fabrication: to SMACNA.
- .2 Radiused elbows:
 - .1 Rectangular: standard radius or short radius with single thickness turning vanes.
 - .2 Round: smooth radius 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 45° entry on branch.
 - .2 Round main and branch: enter main duct at 45°.
 - .3 Provide balancing dampers as indicated.
- .5 Transitions:
 - .1 Diverging: 20° maximum included angle.
 - .2 Converging: 30° maximum included angle.
- .6 Offsets:
 - .1 Short radiused elbows as indicated.
- .7 Obstruction deflectors: maintain full cross-sectional area. Maximum included angles: as for transitions.

2.6 FIRESTOPPING

- .1 Retaining angles all around duct, on both sides of fire separation.
- .2 Firestopping material and installation must not distort duct.

2.7 GALVANIZED STEEL

- .1 To ASTM A525M, ASTM A90, ASTM G90 zinc coating.

- .2 Lock forming quality: to ASTM A527.
- .3 Thickness, fabrication and reinforcement: to ASHRAE and SMACNA.
- .4 Joints: to ASHRAE and SMACNA and proprietary manufactured duct joint. Proprietary manufactured flanged duct joint shall be considered to be a class A seal.

2.8 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: 510 mm.
- .2 Hanger configuration: to ASHRAE and SMACNA.
- .3 Hangers: black steel angle with black steel rods to the following table:

Duct Size (mm)	Angle Size (mm)	Rod Size (mm)
up to 750	25 x 25 x 3	6
751 to 1050	40 x 40 x 3	6
1051 to 1500	40 x 40 x 3	10
1501 to 2100	50 x 50 x 3	10
2101 to 2400	50 x 50 x 5	10
2401 and over	50 x 50 x 6	10

3 Execution

3.1 GENERAL

- .1 Do work in accordance with ASHRAE and SMACNA and as indicated.
- .2 Do not break continuity of insulation vapour barrier with hangers or rods.
- .3 Support risers in accordance with ASHRAE and SMACNA.
- .4 Install breakaway joints in ductwork on each side of fire separation.
- .5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

3.2 HANGERS

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

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

3.3 SEALING AND TAPING

- .1 Apply sealant to outside of joint to manufacturer's recommendations.
- .2 Bed tape in sealant and recoat with minimum of 1 coat of sealant to manufacturers recommendations.
- .3 Form bottom of horizontal duct without longitudinal seams. Weld joints of bottom and side sheets. Seal all other joints with duct sealer.

3.4 LEAKAGE TESTS

- .1 Leakage test not required.

END OF SECTION

- 1 General
 - 1.1 REFERENCE STANDARDS
 - .1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
 - .1 SMACNA HVAC Duct Construction Standards, Metal and Flexible.
 - 1.2 PRODUCT DATA
 - .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- 2 Products
 - 2.1 GENERAL
 - .1 Manufacture to SMACNA standards.
 - 2.2 SINGLE BLADE DAMPERS
 - .1 Of same material as duct, but one sheet metal thickness heavier. V-groove stiffened.
 - .2 Size and configuration to recommendations of SMACNA, except maximum height 250 mm.
 - .3 Locking quadrant.
 - .4 Inside and outside nylon or bronze end bearings.
 - .5 Channel frame of same material as adjacent duct, complete with angle stop.
 - 2.3 MULTI-BLADED DAMPERS
 - .1 Factory manufactured of material compatible with duct.
 - .2 Opposed blade: configuration, metal thickness and construction to recommendations of SMACNA.
 - .3 Maximum blade height: 100 mm.
 - .4 Bearings: pin in bronze bushings.
 - .5 Linkage: shaft extension with locking quadrant.
 - .6 Channel frame of same material as adjacent duct, complete with angle stop.
- 3 Execution
 - 3.1 INSTALLATION
 - .1 Install where indicated.
 - .2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
 - .3 All dampers to be vibration free.
 - .4 Provide access doors in ductwork at balance dampers.

END OF SECTION

1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate the following:
 - .1 Capacity.
 - .2 Throws.
 - .3 NC level.
 - .4 Material and Finish.
 - .5 Static Pressure Loss.
 - .6 Connection Size.

1.2 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

1.3 MAINTENANCE DATA

- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 MAINTENANCE MATERIALS

- .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Include:
 - .1 Keys for volume control adjustment.
 - .2 Keys for air flow pattern adjustment.

1.5 MANUFACTURED ITEMS

- .1 Grilles, registers and diffusers shall be product of one manufacturer for generic type, i.e., grilles and registers by one, diffusers by one, or same.

1.6 CERTIFICATION OF RATINGS

- .1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

2 Products

2.1 GENERAL

- .1 Provide standard product to meet capacity, noise level and neck size as indicated. NC = 35 max., S.P. drop = 25 Pa (0.1" w.g.).
- .2 Where grilles and registers penetrate fire walls and fire partitions, provide approved steel sleeve secured to structure in accordance with NFPA 90A.
- .3 Frames:
 - .1 Steel: standard with exposed welded joints and mitered corners.

- .2 Aluminum: extruded satin finish with mechanical fasteners and mitered corners.
- .3 Provide full perimeter gaskets.
- .4 Provide plaster frames as plaster stops where set into plaster or gypsum board at all locations.
- .4 Sizes and capacities: as indicated on drawings.

2.2 EXHAUST GRILLES

- .1 Steel construction, 152 mm x 305 mm (6" x 12"), louvered grille with 12mm spacing, deflected down at thirty-five degrees (35°), blades parallel to long dimension, white in colour, c/w optional steel opposed blade damper. Frame to be suitable for installation in drywall ceiling.

3 Execution

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Install with flat head oval head SS cadmium plated screws in countersunk holes where fastenings are visible.

3.2 COMMISSIONING

- .1 Field adjust air pattern controllers in diffusers to suit comfort conditions and throw requirements.

END OF SECTION