

SECTION 23 80 90

DUCTWORK (LOW & MEDIUM PRESSURE)

PART ONE – GENERAL:

- 1.01 Ductwork, including exhaust, shall conform to all applicable requirements of the latest issue of NFPA Pamphlet No. 90A. All ductwork, elbows, take-offs, transitions and etc. shall conform to the recommendations of SMACNA duct construction standards as a minimum requirement, unless otherwise indicated by the contract documents.
- 1.02 Ductwork shall be installed to operate without noise or vibration and shall be air tight. The Contractor shall be responsible for measuring at the building all conditions, space available, piping, light fixtures, ceiling heights, etc. that affect ductwork installation prior to fabrication. Ductwork shall be constructed as job progresses, not in advance.

PART TWO – PRODUCTS:

2.01 LOW PRESSURE DUCTWORK:

- A. Low pressure and exhaust ductwork shall be galvanized sheet steel constructed to the requirement of SMACNA Table 1-5 for 2" W.G. static pressure, unless otherwise noted. Duct and fitting sealing requirements shall be in accordance with SMACNA Table 1-2, Seal Class "A". Duct tape is not allowed. Seismic restraints shall be provided for all ducts with a cross sectional area of six (6) square feet and larger in accordance with the Standard Building Code, Section 1206. Gauges and reinforcing shall be as follows:

MAXIMUM SIDE INCHES	STEEL U.S. STANDARD GAUGE*	TYPE OF TRANSVERSE JOINT CONNECTIONS	BRACING
Up to 24	24	S, Drive, Pocket or Bar Slips, 7'-10" o.c.	None
25 to 30	24	S, Drive, Pocket or 1" Bar Slips, 7' – 10" o.c.	1" x 1" x 1/8" Angles 4' o.c.
31 to 40	22	Drive, 1" Pocket or 1" Bar Slips on Centers	1" x 1" x 1/8" Angles 4' o.c.

41 to 60	22	1 ½" Angle Connections, 1 ½" Pocket or 1 ½" Bar Slips with 1 3/8" x 1/8" Bar reinforcing 7' 10" o.c.	1 ½" x 1 ½" x 1/8" Angles 4' o.c.
61 to 90	20	1 ½" Angle Connections, 1 ½" Pocket or 1 ½" Bar Slips with 1 3/8" x 1/8" Bar reinforcing 7' 10" o.c.	1 ½" x 1 ½" x 1/8" Angles 2' o.c.
91 and Up	18	2" Angle Connections, 1 ½" Pocket or 1 ½" Bar Slips with 1 3/8" x 1/8" Bar reinforcing 3' 9" o.c.	1 ½" x 1 ½" x 1/8" Angles 2' o.c.

- B. Double wall round ducts shall be manufactured by United Sheet Metal, Monroe Metals, Inc. or Eastern Sheetmetal. Construction shall be as follows:

Round Duct Diameter in Inches	Spiral Seam Gauge	Longitudinal Seam Gauge
3" - 8"	30	28
9" - 14"	28	26
15" - 26"	26	24
27" - 36"	24	22
37" - 50"	22	20
51" - 60"	20	18
61" - 84"	--	16

C. Notes for Round Duct Construction:

1. The inside diameter and outside diameter of duct and fittings must be controlled for proper mating of components.
2. Fittings and requirements for sealing shall be in accordance with SMACNA Standards.
3. Ducts shall be provided with a "grip-tight" finish suitable for final painting by the Contractor.

4. All components, fittings and boots of double wall duct system shall be submitted as shop drawings for approval.

2.02 ROUND INSULATED FLEXIBLE DUCTS & SPIN-IN COLLARS:

- A. Insulated flexible ducts shall consist of an inner core of acoustically transparent CPE inner film or perforated corrugated aluminum with sound attenuating features complete with a factory applied exterior jacket of R 4.5 fiberglass insulation and reinforced metalized vapor barrier with 0.05 ASTM E96 permeance rating. Duct shall be UL listed as Class 1 air duct, standard UL 181 with flame spread and smoke developed ratings of 25 and 50 respectively.
Minimum working pressure shall be 4" W.G. positive. Flexible ducts shall be:
 - (1) Flexmaster 8M – Acoustical Insulated
 - (2) Clevaflex – Clevaform DB-series-type DBA acoustical duct
- B. Spin-in collars shall be constructed of galvanized steel with scoop and damper.

2.03 MEDIUM PRESSURE DUCTWORK:

- A. All supply ductwork from the air handling units to VAV boxes, and ductwork connected to units capable of 1" W.G. or greater static pressure shall be classified medium pressure.
- B. Rectangular ducts shall be constructed to the requirements of SMACNA Table 1-6 for 3" W.G. static pressure.
- C. Round ducts to VAV boxes shall be constructed to the requirements of SMACNA Table 3.2 for 3" W.G. static pressure. All such duct shall be single wall spiral seam. No "snap-lock" seams are permitted. Round duct takeoffs shall be bell mouth type.
- D. Duct and fitting sealing requirements shall be in accordance with SMACNA Table 1-2, Seal Class "B".

PART THREE – EXECUTION:

- 3.01 Gauge Stamps: Turned out and on bottom of ducts.
- 3.02 All supply and return duct elbows with an inside radius of less than $\frac{3}{4}$ of duct width shall have single thickness turning vanes. All square elbows shall have double thickness turning vanes.
- 3.03 All exhaust duct elbows shall have not less than 6" inside radius. All square elbows shall have single thickness turning vanes.

- 3.04 Splitter dampers and branch take-off extractors shall be installed where indicated and shall be adjustable and shall have locking quadrants.
- 3.05 Flexible duct connections shall be provided where ductwork connects to equipment and shall be Ventglas 30 oz. woven glass fabric double coated with neoprene, fire retardant, waterproof, air tight and UL listed.
- 3.06 Duct sizes indicated on plans are interior dimensions. Increase metal duct sizes as required for acoustical or interior insulation.
- 3.07 All ductwork shall be supported by 1" x 1/8" galvanized iron straps with a maximum spacing of 8'. Straps shall be bolted or clamped to the structure and be turned and fastened to bottom of the duct so that duct weight is not on the fastening screws.
- 3.08 Provide 1/2" diameter test slots with cover for insertion of thermostat or test instruments at all locations required to perform operations under paragraph "Balancing."
- 3.09 Provide duct access doors to afford easy access to entering air side of items requiring maintenance or inspection (such as thermostats, fire damper, etc.). Doors shall be of ample size for service required (18" x 12" minimum) and provided with frame, brass hinges, handle, clamping device and gasket for air tight joint.
- 3.10 Round flexible ducts shall be installed in extended condition free of sags and kinks using only the minimum length required to make the connection. Abrupt bends and turns that crimp the duct and restrict the air flow will not be permitted. Horizontal supports shall be 3/4" wide 22-gauge flat galvanized steel sheet banding material. Flexible ducts shall be supported on 36" centers. Maximum allowable length of a flexible duct shall be 8'. If extended run-out is indicated, round galvanized steel shall be used for run-out length in excess of 8'.
- 3.11 The entire duct system shall be free from rattles. If rattles exist after ductwork has been installed, the labor and materials necessary to eliminate rattles shall be done at the expense of this Contractor.
- 3.12 Air flow stations shall be provided to modulate outside air to air handling units as indicated on plans. Stations shall be Brandt Instrument Model 8000 Series "E-Bar." Coordinate interface with controls.
- 3.13 All return duct connections to air devices shall be rectangular unless otherwise indicated on plans. Use of flexible duct is prohibited on any return or exhaust ductwork.
- 3.14 Prior to insulation of medium pressure ductwork, Contractor shall perform duct air leak test in conformance with Specification Section 15990.
- 3.15 Where ceiling plenum returns are used, the return duct shall be fitted with a bell-mouth entry covered with 1" x 1" galvanized hardware cloth.

- 3.16 All rectangular branch takeoffs shall be 45-degree entry type per SMACNA Fig. 2-6. No straight tap or butt fittings allowed.
- 3.17 Prior to substantial completion, Contractor shall retain an independent licensed and professional testing agency that specializes in indoor air quality that will test for excessive dust and/or debris that may be present in the duct system. If it is determined that cleaning of duct is necessary, the Contractor shall employ a qualified duct cleaning agency to perform the work at no additional cost to the Owner.
- 3.18 Kitchen hood exhaust ductwork systems shall be constructed to the requirements of NFPA 96. Ductwork shall be a minimum of 18-gauge, 316 stainless steel with all seam and joints sealed liquid tight with a continuous external weld.

END OF SECTION