

SECTION 15600

DUCTWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Ductwork for HVAC systems:
 - a) Metal
 - b) Flexible

- B. Related Sections:
 - 1. Section 00700 "General Conditions."
 - 2. Section 00800 "Supplementary General Conditions."
 - 3. Section 07800 "Roof Penetrations."
 - 4. Section 15100 "Mechanical Materials & Methods."
 - 5. Section 15700 "Covering and Insulation."
 - 6. Section 15800 "Testing, Adjusting & Balancing."

1.02 REFERENCES

- A. Comply with the following standards:
 - 1. SMACNA "HVAC Duct Construction Standards," 2nd ed., 1995.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Flexible Ducts

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Metal Duct:
 - 1. Sheet metal shall be lock-forming quality, ASTM A 527, with G 90 galvanized coating. Provide mill phosphatized finish for ducts exposed to view. (All ductwork serving "Patient Treatment Area" and "Water Treatment Storage Areas" to have no duct liner or interior insulation. No exposed fiberglass insulation or liner in total system.)

- B. Flexible Duct:
 - 1. Factory fabricated, insulated, round duct with an outer jacket enclosing 1-1/2 inch thick glass fiber insulation around a continuous inner liner (no exposed fiberglass). Duct shall have a steel-wire helix encapsulated in the inner liner. Outer jacket shall be glass-reinforced, silver mylar with a continuous hanging tab, integral fiberglass tape and nylon hanging cord.

C. Tie Rods:

1. Galvanized steel, 1/4 inch diameter minimum for up to 36 inch lengths, 3/8 inch diameter minimum for lengths over 36 inches.

2.02 FABRICATIONS

A. Shop Assembly:

1. Except as otherwise specified, ductwork shall conform to the following Tables and Contract Drawings:

a. Rectangular:

1) 1" W.G.	<u>Duct Dimension</u>	<u>Metal Gauge</u>
	10" & less	26
	11" - 12"	26
	13" - 14"	24
	15" - 18"	22
	19" - 20"	20
	20" & greater	18

2) 2" W.G.	<u>Duct Dimension</u>	<u>Metal Gauge</u>
	10" & less	26
	11" - 12"	24
	13" - 14"	22
	15" - 18"	20
	19" - 20"	18
	20" & greater	16

- 3) Dimensions larger than 24 inches shall be reinforced to SMACNA Grade "D."

b. Round (positively pressured):

<u>Max. Diameter</u>	<u>Spiral Seam</u>	<u>Long. Seam</u>
8"		28ga.
14"	28ga.	26ga.
26"	26ga.	24ga.

c. Round (negatively pressured):

<u>Max. Diameter</u>	<u>Spiral Seam</u>	<u>Long. Seam</u>
10"		28ga.
13"		26ga.
15"	28ga.	
17"	26ga.	24ga.
20"		22ga.
23"	24ga.	
26"	22ga.	20ga.

1. Mitered elbows shall be square throat type with turning vanes. Maximum unsupported vane length shall be 36 inches. Vanes shall be mechanically fastened to the elbow in such a manner that no noise from vibration is produced. Ducts 18 inches in width and smaller shall use small vanes. Ducts larger than 18 inches shall use large vanes.
2. Smooth radius elbows shall be constructed with a centerline radius equal to one and one half times the nominal duct width in the plane of direction change.
3. Rectangular transitions shall be constructed with a maximum convergence of 15 degrees on the transition edge.
4. All butt joints shall be of the standing seam type with a continuous application of duct sealant mastic applied along the entire length of the joint.
5. Longitudinal joints shall be "Pittsburgh lock" or grooved seam type with a full continuous mastic seal provided prior to the final closure.
6. Reinforcements shall be as required by SMACNA standards.
7. All ducts not internally lined shall be cross-broken.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

1. All ducts shall be installed in accordance with SMACNA "HVAC Duct Construction Standards", 2nd ed., 1995 for the duct pressure class which they were designed for.
2. Ducts shall be installed with the fewest possible joints, fittings, changes in direction, sizes, shapes and connections as possible.
3. Ducts shall be run vertically, horizontally, parallel and perpendicular to building lines as much as possible except as indicated otherwise. Install ducts and duct systems in the shortest routes that do not obstruct useable space or block access for servicing the building and equipment.
4. Install ducts with sufficient clearance from walls, ceilings, floors and other permanent structures to maintain the full, installed thickness of the duct insulation plus an additional one inch clearance. Install non-insulated ducts with a one inch clearance.
5. Install ducts concealed from view in finished and occupied spaces by locating ducts in mechanical shafts, hollow wall construction or above suspended ceilings.

6. Coordinate diffuser, return grille and exhaust grille layouts with suspended ceiling, lighting and sprinkler heads layouts.
- B. Seam and Joint Sealing:
1. Seal all transverse joints and longitudinal seams with the specified duct sealant. Externally insulated ducts shall be sealed prior to insulation installation.
- C. Hanging and Supporting:
1. Rigid round, rectangular and flat oval metal ducts shall be installed with support systems in accordance with tables 4-1 to 4-3 and figures 4-1 to 4-8 of the SMACNA “HVAC Duct Construction Standards - Metal and Flexible”, 2nd ed., 1995. Additionally, horizontal ducts shall be supported within two feet of each elbow and within four feet of each branch intersection. Vertical ducts shall be supported at each floor and at a maximum interval of sixteen feet.
- D. Connections:
1. Branch connections shall comply with SMACNA “HVAC Duct Construction Standards - Metal and Flexible”, 2nd ed., 1995, figures 2-5 and 2-6.
 2. Offsets and transitions shall comply with SMACNA “HVAC Duct Construction Standards - Metal and Flexible”, 2nd ed., 1995 figure 2-7.

3.02 FIELD QUALITY CONTROL

- A. Conduct leakage tests, in the presence of the owners authorized representative, at static pressures equal to but not exceeding duct system design pressure. Maximum permissible leakage shall be as described in the 1989 ASHRAE Handbook, “Fundamentals” volume, chapter 32 and the following table:

<u>Duct Type</u>	<u>Leakage Classification</u>
Round	3
Flat Oval	3
Rectangular	6

- B. Repair and remake any seams and joints that do not comply with the acceptable leakage class.
- C. Any positively pressured exhaust ductwork serving the Isolation and Medical Waste Storage rooms shall be positively sealed 100 percent. No leakage shall be permitted.

3.03 CLEANING

- A. Prior to commissioning duct system, clean all interior surfaces of all dust and debris generated as a result of the construction. Where systems are started in finished space, install filter media over diffusers and outlet terminals to entrain dust dislodged from fan pressure. Remove filter media after running the fan for a minimum of ten minutes.

END OF SECTION