

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Bidding Requirements and General Conditions of Contract Division 01
- .2 Common Work Results for HVAC Section 23 05 00

**1.2 ALTERNATIVES**

- .1 Size round ducts installed in place of rectangular ducts indicated from ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration of sizes permitted except by written permission.

**1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS**

- .1 Ductwork and Breeching Insulation Section 23 07 00
- .2 Access doors in Walls/Ceilings Section 23 05 06
- .3 Wet Chemical Fire Extinguisher Systems Section 21 23 80
- .4 Ductwork Cleaning Section 23 01 30
- .5 Breeching and Chimneys Section 23 51 00
- .6 Ductwork Accessories: Section 23 31 30

**1.4 DEFINITIONS**

- .1 Low Pressure: Static pressure in duct less than 0.5 kPa and velocities less than 10 m/s.
- .2 Duct Sizes: Inside clear dimensions. For acoustically lined or internally insulated ducts, maintain sizes inside ducts.
- .3 Exposed Ducts: Ducts that are not concealed in ceiling plenums, shafts or furrings are considered exposed.

**1.5 SUBMITTALS**

- .1 Submit shop drawings and samples of duct fittings for approval, including particulars such as thicknesses, welds and configurations prior to start of work. Submit in accordance with Section 01 33 10.
- .2 This Contractor shall produce a series of shop drawings called "Interference Drawings" for areas of shafts, rooms and ceilings which are highly congested and for which site workers could not solve construction coordination issues early on. These drawings are to propose solutions for all trades affected. Duct equivalents and alternate routes are to be proposed to and approved by the Departmental Representative. Submit prior to ductwork fabrication.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Galvanized Steel Ducts: Galvanized steel, lock forming quality, with galvanized coating to ASTM A525 G90 designations on both sides.
- .2 Stainless Steel Ducts: Type 316 stainless steel, to ASTM 480M. Finish exposed ductwork to a No. 4 finish.
- .3 Carbon Steel Ducts: not less than 1.37 mm thick carbon steel material.
- .4 Fasteners: Use rivets and bolts throughout; sheet metal screws accepted on low pressure ducts.
- .5 Sealant: Water resistant, fire resistive, compatible with mating materials. All sealants to be low VOC to the current limits of SCA.QMD Rule #1168.
- .6 Flexible Ducts: Corrugated aluminum or fabric supported by helically wound steel wire or flat steel strips.

### **2.2 FABRICATION**

- .1 Complete metal duct conduits unique with no single partition between ducts. Where width of duct exceeds 450 mm cross break for rigidity. Open corners are not acceptable.
- .2 Lap metal ducts in direction of air flow. Hammer down edges and slips to leave smooth duct interior. Alternately, jointing systems for round and rectangular ducts as manufactured by "Ductmate" (or equal) may be used, subject to conformance with the manufacturer's recommended installation procedures. Jointing is acceptable on systems up to 2500 Pa.
- .3 Construct tees, bends, and elbows with radius of not less than 1 ½ times width of duct on centre line. Where not possible and where rectangular elbows used, provide approved type air foil turning vanes. Where acoustical lining is provided, provide turning vanes of perforated metal type with fibreglass inside.
- .4 Increase duct sizes gradually, not exceeding 15 degree divergence wherever possible. Maximum divergence upstream of equipment to be 30 degree and 45 degree convergence downstream.
- .5 Rigidly construct metal ducts with joints mechanically tight, substantially airtight, braced and reinforced with stiffeners so as not to breathe, rattle, vibrate or sag. Caulk duct joints and connections with sealant as ducts are being assembled.
- .6 Provide necessary baffling in mixed air plenums to ensure good mixed air temperature with variations of not more than  $\pm 15^{\circ}\text{C}$  under all operating conditions.

- .7 Fabricate continuously welded medium and high pressure round and oval duct fittings of one gauge heavier than gauges indicated for duct size. Joints shall be 100 mm cemented slip joint, brazed or electric welded. Prime coat welded joints. Fabricate elbows of five piece construction. Provide 45° take-offs unless otherwise indicated, in which case conical 90° tee take-off connections may be used. Adequately brace with truss couplings or comparison angle flanges with gaskets bolted at 150 mm centers.
- .8 Fabricate plenums and casings to configurations shown on drawings. Construct plenums of galvanized panels joined standing seams on outside of casing rivetted or bolted on approximately 300 mm centers. Reinforce with suitable angles and provide diagonal bracing as required. Tightly fit at apparatus and caulk with sealant.
- .9 Provide 75 mm reinforced concrete curb for plenum walls and floor mounted casings. At floor, rivet panels on 200 mm centers to angles. Where floors are acoustically insulated, provide liner at 1.2 mm galvanized expanded metal mesh, turned up 300 mm at sides with sheet metal shields.
- .10 Reinforce door frames with angle iron tied to horizontal and vertical plenum supporting angles. Install hinged access doors where shown, specified or where required for access to equipment for cleaning and inspection.
- .11 Fabricate acoustic plenums of galvanized steel. Provide 1.6 mm back facing and 0.8 mm perforated front facing with 3 mm diameter holes on 4 mm centers. Construct panels 75 mm thick packed with 72 kg/m<sup>3</sup> minimum fibrous glass media, on inverted channels of 1.6 mm on 75 mm reinforced concrete curb.
- .12 Construct stainless steel and carbon steel ductwork assemblies using metal thickness one gauge heavier than that listed for galvanized steel duct construction. Weld joints and seams to seal liquid tight to AWS D9-84. Preserve corrosion resistance in the weld and adjacent area. Protect metal surfaces from contamination during fabrication process. Ensure surfaces and joints are free from foreign metal particles and dirt. Grind and polish welds to ensure a smooth finish on exterior and interior.

### **Part 3 Execution**

#### **3.1 INSTALLATION**

- .1 Fabricate and install ductwork in accordance with SMACNA Duct Manuals, ASHRAE and Alberta Building Code requirements and the requirements specified in this section.
- .2 Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install a metal ring inside insulation material.
- .3 Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- .4 Provide floor drains in fresh air and humidifier sections with deep seal traps.

- .5 Set plenum doors 150 mm to 300 mm above floor. Arrange door swings so that fan static holds door in closed position.
- .6 Install duct inlets to terminal units using round sheet metal duct; diameter equal to the inlet diameter of the terminal unit. Provide a straight duct at terminal inlet not less than four (4) duct diameters.
- .7 Connect diffusers to low pressure ducts with 1.5 m maximum length of flexible duct. Hold in place with caulking compound and strap or clamp.

**3.2 LOW PRESSURE DUCT THICKNESSES (MINIMUM)**

.1	Rectangular Ducts		
	Maximum Width	mm	
	Up to 300 mm	0.6	
	330 mm to 760 mm	0.8	
	790 mm to 1370 mm	0.8	
	1400 mm to 2130 mm	1.0	
	2160 mm and Over	1.2	
.2	Round Ducts		
	Duct Diameter	mm	
	Up to 330 mm	0.6	
	350 mm to 550 mm	0.8	
	580 mm to 1270 mm	0.8	
	890 mm to 910 mm	1.0	
	1300 mm to 1520 mm	1.2	
	1550 mm to 2130 mm	1.6	
.3	Underground Ducts		
		Spiral Lock Seam	Longitudinal Seam
	<i>Duct Diameter</i>	<i>mm</i>	<i>mm</i>
	Up to 380 mm	0.8	0.8
	400 to 510 mm	0.8	1.0
	530 to 890 mm	1.0	1.2
	Over 910 mm	1.2	1.6

**3.3 OVAL DUCTWORK (FACTORY MADE WITH SPIRAL LOCK SEAMS)**

.1	Maximum Width	mm	Centers	Reinforcement
	Up to 500 mm	0.8	none	
	280 to 500 mm	0.8	1220 mm	L50 x 50 x 3 mm
	530 to 1020 mm	1.2	760 mm	L50 x 50 x 5 mm
	1040 to 1830 mm	1.6	600 mm	L75 x 75 x 5 mm

**3.4 PLENUM GAUGES**

- .1 Fabricate fan plenums and plenums downstream of fan in accordance with duct gauges.

- .2 Fabricate plenums upstream of fan between apparatus of 1.6 mm.
- .3 Fabricate plenums upstream of filters of 1.2 mm

**END OF SECTION**