1.1. REFERENCE STANDARDS

1.1.1. American Society for Testing and Materials (ASTM):

1.1.1.1. A653-01 Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy coated (Galvannealed) by the Hot-Dip process
1.1.1.2. A1011-02 Standard Specification for Steel Sheet and Strip Hot rolled Carbon structural, High-Strength Low- Alloy and High Strength Low-Alloy with Improved Formability
1.1.1.3. B209 01 Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate
1.1.1.4. C1071-00 Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)
1.1.1.5. E84-01 Standard Test Method for Surface Burning Characteristics of Building Materials

1.1.2. National Fire Protection Association (NFPA):

1.1.2.1. 90A-99 Standard for the Installation of Air Conditioning and Ventilating Systems
1.1.2.2. 96-01 Ventilation Control and Fire Protection of Commercial Cooking Operations

1.1.3. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

1.1.3.1. HVAC Duct Construction Standards, Metal and Flexible
1.1.3.2. HVAC Air Duct Leakage Test Manual
1.1.3.3. Fibrous Glass Duct Construction Standards

1.2. GENERAL

1.2.1. Constructed duct and fittings in compliance with SMACNA standards and recommendations and per the additional requirements indicated.

1.2.2. Duct dimensions are inside dimensions. The sheet metal dimensions shall be increased an equivalent amount to accommodate internal liner where liner is required.

1.3. DUCT MATERIALS

1.3.1. Except for systems specified otherwise, construct ducts, casings, and accessories of galvanized sheet steel, ASTM A527, coating G90; or, aluminum sheet, ASTM B209, alloy 1100, 3003 or 5052.

1.3.2. Specified Corrosion Resistant Systems: Stainless steel sheet, ASTM A167, Class 302 or 304, Condition A (annealed) Finish No. 4 for exposed ducts and Finish No. 2B for concealed duct or ducts located in mechanical rooms.

1.4. GALVANIZED STEEL - RECTANGULAR DUCTWORK

1.4.1. G-90 coated galvanized of lockforming grade conforming to ASTMA653 and A924 Standards. Minimal yield strength for steel sheet and reinforcements shall be 30,000 PSI (207 kPa).

1.4.2. Thickness: to ASHRAE and SMACNA.

1.4.3. Fabrication: to ASHRAE and SMACNA.

1.4.4. Joints: to ASHRAE and SMACNA or proprietary manufactured duct joint. Proprietary manufactured flanged duct joint shall be considered to be a class B seal.

1.4.5.

1.4.6. Crossbreak or bead rectangular ductwork.

1.4.7. Rectangular duct longitudinal seams shall be Pittsburgh lock 10 mm (3/8 in.) minimum pocket.

1.4.8. Bolts and Fasteners

1.4.8.1. Carbon steel, zinc coated per ASTM A153 for G-90 and stainless steel for aluminum and stainless steel ducts.

1.4.9. Fittings Fabrication: to SMACNA.

1.4.10. Radiused elbows: standard radius.

1.4.11. Square elbows: Elbows shall be installed with vanes in accordance with Related Section "Sheet Metal Accessories." Over 400 mm (16") with double thickness vanes. Not to be used unless specifically required by local conditions governing the work.

1.4.12. Main supply duct branches with splitter damper. If splitter damper is not used, provide branch and main duct balancing damper.

1.4.13. Sub branch duct with 45^{O} entry and balancing damper on branch.

1.4.14. Transitions:

1.4.14.1. Diverging: 20^{O} maximum included angle.
1.4.14.2. Converging: 30^{O} maximum included angle.

1.4.15. Offsets: radiussed elbows as indicated.

1.4.16. Obstruction deflectors: maintain full cross- sectional area. Maximum included angles as for transitions.

1.5. GALVANIZED STEEL - ROUND DUCTWORK

1.5.1. All round ductwork up to 1500 mm (60") in diameter shall be of spiro lockseam construction with an intermediate standard rib to provide the rigidity equivalent to ASHRAE standard gauge spiral duct.

1.5.2. G-90 coated galvanized of lockforming grade conforming to ASTM A653 and A924 Standards. Minimum yield strength for steel sheet and reinforcements shall be 30,000 PSI (207 KPA) with a thickness not less than for 24 gauge for duct diameters 250 mm to 425 mm (10" to 17"), 22 gauge for 450 mm to 600 mm (18'' to 24"), 20 gauge for 650 mm to 800 mm (26'' to 30'') and 18 gauge for 850 mm to 1500 mm (32'' to 60") diameters.

1.5.3. For duct diameters less than 250 mm (10"), use 26 gauge spiro duct without ribs.

1.5.4. Tees shall be conical. Laterals shall be straight. Taps through 2590 mm (10 in.) diameter in size shall have a machine drawn entrance and fittings shall have longitudinal seams, continuously welded. Both sides of welds shall be primed with zinc chromate. Tap entrances shall be free of weld build-up.

1.5.5. Elbows 100 mm to 200 mm (4" to 8") diam., shall be die stamped. Die-stamped elbows are to be two piece construction with fully welded longitudinal seam.

1.5.6. Elbows 250 mm (10") and larger shall be standing seam construction.

1.5.7. Fittings shall be one gauge thicker than standard ductwork.

1.6. FLEXIBLE DUCT

1.6.1. Flexible duct shall be ULC listed, and shall maintain shape when installed. Sagging shall not exceed 12 mm (½ in.) per linear 300 mm (linear foot) when installed horizontally.

1.6.2. Flexible duct shall not be used where system pressure is greater than plus or minus 50 Pa (2 in. w.g).

1.6.3. Insulated flexible ductwork shall have a gray fire retardant polyethylene outer jacket with an 8 oz. density, 1-1/3 in. thick fiberglass insulation blanket, factory wrapped.

1.6.4. Flexible duct used on negative pressure systems shall be specifically rated for negative pressure use.