

SECTION 15890

METAL DUCTWORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1, apply to work of this Section
- B. Division 15, Basic Mechanical Materials and Methods sections apply to work of this Section.

1.2 SECTION INCLUDES

- A. Rectangular and round metal ducts and plenums for heating, ventilating and air conditioning system from minus 2 inch to plus 5 inch water gage.

1.3 RELATED SECTIONS

- A. Refer to other Division 15 sections for ductwork accessories; not work of this section.
- B. Refer to other Division 15 sections for fans; not work of this section.
- C. Refer to other Division 1 testing, adjusting and balancing of metal ductwork systems; not work of this section.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for metal ductwork materials and products.
- B. Record Drawings: At project closeout, submit record drawings of installed metal ductwork and ductwork products, in accordance with requirements of Division 1.
- C. Maintenance Data: Submit maintenance data and parts lists for metal ductwork materials and products. Include this data, shop drawings, and record drawings in maintenance manual; in accordance with requirements of Division 1.
- D. Catalog cuts and data sheets on the specific sound traps utilized.

1.5 QUALITY ASSURANCE

- A. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with metal ductwork systems similar to that required for project.
- B. Codes and Standards:
 - 1. SMACNA Standards: Comply with SMACNA "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork.
 - 2. ASHRAE Standards: Comply with ASHRAE Handbook, Equipment Volume, Chapter 1, "Duct Construction", for fabrication and installation of metal ductwork.
 - 3. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" and NFPA 90B "Standard for the Installation of Warm Air Heating and Air Conditioning Systems".
 - 4. CMC State of California Compliance.

- C. Field Reference Manual: Have available for reference at project field office, copy of SMACNA "HVAC Duct Construction Standards, Metal and Flexible", current edition.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protection: Protect shop fabricated and factory fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings.
- B. Storage: Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

PART 2 PRODUCTS

2.1 DUCTWORK MATERIAL

- A. Low Pressure Duct Construction Schedule: (2 inch" S.P. and below). Include all return, exhaust, supply branches and ductwork downstream of terminal units.

Duct Dimension (Inches)	Material Gauges	Construction of Transverse Joints, Bracing and Reinforcing
0 to 12	26	Hemmed S slip spaced not more than 10' apart
13 to 30	24	Ductmate Jr.**, or 1" G lock spaced not more than 10' apart
31 to 42	22	Ductmate Jr.**, spaced not more than 5' apart
43 to 54	22	Ductmate**, spaced not more than 4' apart
55 to 60	20	Ductmate**, spaced not more than 4' apart
61 to 84	20	Ductmate**, spaced not more than 4' apart
85 and up	18	Ductmate**, spaced not more than 4' apart. Provide intermediate bracing for low pressure ductwork 85" and larger

Note: * Based on maximum of 2.0" WG.
 **The Lockformer Company TDC or approved equal

1. Provide intermediate bracing for low pressure ductwork 85 inches and larger.
 2. All ducts over 18 inches in either dimension shall be stiffened with beads on 24 through 20 gage. Cross break on 18 and 16 gage. Longitudinal seams shall be Pittsburgh locks Snap-Lock shall be limited to 12 inch maximum width of ducts.
- B. Strap hanger shall be a minimum of 1 inch, #18 gauge galvanized steel attached to the bottom of ducts at 8'-0" OC and as required by CMC/UMC and SMACNA guidelines.
 - C. Elbows shall have an inside radius equal to 1/2 duct width. Square throat elbows shall have turning vanes, beaded at the edges and securely riveted to the cheeks of the ell to prevent rattling. Vane spacing shall be 4 inches or less, based upon the duct dimension.
 - D. Provide Ductmate and Ductmate, Jr. with all required material including metal cleats, corner bolts and nuts, angles, clips and gaskets, all installed in accordance with manufacturer's recommendations and supervision.
 - E. Tape the clips, Snaplock seams and joints or connections of the metal supply, return and exhaust ducts, and the grille and diffuser connections with 4" strips of 6 oz. canvas attached with Arabol or Hardcast adhesive. Tape the filter frames the same as ducts. Coat all canvas exposed to the weather with Tuff Bond #12. Taping of Pittsburgh seams is required.
 - F. Quadrant volume damper blades in fittings shall be two gauges heavier than the fittings.
 - G. Install heavy volume dampers at all main supply, return and exhaust duct branch connections or as indicated on the drawings. Heavy volume dampers shall be Pottorff Series 400 AF with handle, or approved equal.

- H. Duct hangers shall be attached to horizontal slabs with steel angle clips secured with inserts, strapped to vertical walls, bolted to beams and joists, as per SMACNA guidelines, or as approved by the Architect.
- I. All ducts and equipment shall be blown out prior to operating.
- J. Round ducts shall be continuous spiral seam pipe type with factory slip fittings and couplings, secured with sheet metal screws or drive rivets. Gage of round ducts per CMC.
- K. Static-Pressure Classes: Unless approved by the University's Representative, construct ducts according to the following:
 - 1. Supply Ducts: 2-inch wg.

2.2 FLASHING

- A. Provide watertight soldered sheet metal flashings at all wall and roof openings.
- B. All voids around duct penetrations through floors and walls shall be properly sealed, smoke and fireproof.

2.3 FLEXIBLE CONNECTIONS

- A. Isolate the fans from the ducts with 6 inches of Glasseal manufactured by Duro-Dyne, or approved equal. Install weather cover over outdoor connections.
- B. Provide Insulflex as manufactured by Duro-Dyne, or approved equal, for ductwork crossing seismic building joints; see detail on drawings.

2.4 SCREENS

- A. Screens shall be 1 inch mesh, 12 gauge stainless steel wire set in 1 inch galvanized channel frames for all openings.

2.5 TURNING VANES

- A. Manufactured turning vanes: Provide turning vanes constructed of 1-1/2 inch wide curved blades set at 3/4 inch OC., supported with bars perpendicular to blades set at 2 inch, and set into side strips suitable for mounting in ductwork.
- B. Manufacturers: Subject to compliance with requirements, provide turning vanes of one of the following:
 - 1. Aero Dyne Co.
 - 2. Airsan Corp.
 - 3. Anemostat Products Div.; Dynamics Corp. of America
 - 4. Barber Coleman Co.
 - 5. Duro Dyne Corp.
 - 6. Environmental Elements Corp.; Subs, Kopper's Co., Inc.
 - 7. Hart & Cooley Mfg. Co.
 - 8. Register & Grille Mfg. Co., Inc.
 - 9. Southern, Inc.

2.6 DUCT HARDWARE

- A. General: Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:
1. Test holes: Provide in ductwork at fan inlet and outlet, and elsewhere as indicated, duct test holes, consisting of slot and cover, for instrument tests.
 2. Quadrant locks: Provide for each damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12 inch. Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.
- B. Manufacturer: Subject to compliance with requirements, provided duct hardware of one of the following:
1. Ventfabrics, Inc.
 2. Young Regulator Co.
 3. Duro Dyne

2.7 DUCT ACCESS DOORS

- A. General: Provide duct access doors where required.
- B. Construction: Construct of same or greater gage as ductwork served, provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one side hinged, other side with one handle type latch for doors 12 inch high and smaller, 2 handle type latches for larger doors.
- C. Manufacturer: Subject to compliance with requirements, provide duct access doors of one of the following:
1. Air Balance, Inc.
 2. Duro Dyne Corp.
 3. Register & Grille Mfg. Co., Inc.
 4. Ruskin Mfg. Co.
 5. Ventfabrics, Inc.
 6. Zurn Industries, Inc.; Air Systems Div.

PART 3 EXECUTION

3.1 INSPECTION

- A. General: Examine areas and conditions under which metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.2 INSTALLATION OF METAL DUCTWORK

- A. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (5% leakage for systems rated 3 inch and under; 1% for systems rated over 3 inch) and noiseless (no objectionable noise) systems capable of performing each indicated service. Install each run with a minimum number of joints. Align ductwork accurately at connections, within 1/8 inch misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.
- B. Field Fabrication: Complete fabrication of work at project as necessary to match shop fabricated work and accommodate installation requirements.

- C. Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, column, and other structural and permanent enclosure elements of building. Limit clearance to 1/2 inch where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1 inch clearance. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.
- D. Electrical Equipment Spaces: Do not route ductwork through transformer vaults and their electrical equipment spaces and enclosures.
- E. Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.
- F. Installation: Install metal ductwork in accordance with SMACNA Duct Construction Standards.
- G. Tape the clips, Snaplock seams and joints or connections of the metal supply, return and exhaust ducts and the grilled and diffuser connections with 4 inch strips of 6 oz. canvas attached with Arabol or Hardcast adhesive. Tape the filter frames the same as ducts. Coat all canvas exposed to the weather with Tuff Bond #12. Taping of Pittsburgh seams is required.
- H. Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter.
- I. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.3 EQUIPMENT CONNECTIONS

- A. General: Connect metal ductwork to equipment as indicated. Provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotary machinery. Provide access doors as indicated.

3.4 ADJUSTING AND CLEANING

- A. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances that might cause corrosive deterioration of metal, or where ductwork is to be painted, might interfere with painting or cause paint deterioration.
- B. Strip protective paper from stainless steel ductwork surfaces, and repair finish wherever it has been damaged.
- C. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure or polyethylene film or other covering which will prevent entrance of duct and debris until time connections are to be completed.
- D. Balancing: Refer to Division 15 "Testing, Adjusting and Balancing" for air distribution balancing of metal ductwork; not work of this section. Seal any leaks in ductwork that become apparent in balancing process.

END OF SECTION