

SECTION 15800 - AIR DISTRIBUTION

PART 1 - GENERAL

1.01 ITEMS INCLUDED:

A. Power roof and wall ventilators, ductwork, duct liner, flexible connections, duct access panels and doors, dampers, grilles, registers and diffusers.

1.02 RELATED WORK:

- A. Louvers
- B. Section 15010 - General Provisions - Mechanical.
- C. Section 15100 - Basic Materials and Methods - Mechanical.
- D. Section 15400 - Plumbing System.
- E. Section 15450 - Plumbing Fixtures and Trim.
- F. Section 15650 - Heating, Ventilation and Air Conditioning.
- G. Division 16 - Electrical.

1.03 SUBMITTALS:

- A. See Section 01340 and Section 15010 - General Provisions - Mechanical.

PART 2 - PRODUCTS

2.01 DUCTWORK:

A. Sheet metal for air conditioning systems shall be galvanized sheet metal, lock forming quality conforming to ASTM A-525, manufactured by Armco, Granite City, Youngstown or US Steel. Aluminum shall not be used for ductwork.

B. Low velocity duct construction, gauges and reinforcing shall conform to "Low Velocity Duct Construction Standards", first edition 1985, published by Sheet Metal and Air Conditioning Contractors National Association, Inc., with exception of button punch snap lock longitudinal seams, which will not be acceptable.

C. Duct reinforcing shall be galvanized steel, with gauges, spacing and configuration in accordance with current SMACNA standards.

2.02 DUCT LINER:

A. Duct work systems shall be lined with 1-1/2 pound density duct liner complying with NFPA 90A, with flame spread under 25, smoke developed under 50, and fuel contribution under 50. Liner shall be 1" thick in attic or third floor ceiling, 1/2" thick in furr downs and space between floors at first and second floor ceilings, dark color, neoprene-coated, rated for velocities up to 2500 fpm, and be Certain-Teed Products #150 Ultra Lite or approved equal.

B. Liner shall be applied to flat sheets with 100% coverage of Benjamin Foster 85-20 adhesive 3M #37 adhesive or approved equal. In all housings, casings, plenums, and on horizontal runs, ducts over 1'-0" in width or over 1'-4" in height shall be additionally secured with Gripnail or approved equal, or welded pins

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and speed clips 1'-0". Mechanical fasteners shall start within 2" of leading edge of each section. Mechanical fasteners shall be flush with liner surfaces. All exposed edges of liners shall be coated with Benjamin Foster 30-36 or 85-20 or approved equal.

2.03 FLEXIBLE CONNECTIONS:

A. Duct connections to fans and where required elsewhere shall be sound-isolation flexible connections made with neoprene coated glass fabric manufactured by Ventfabrics, Inc., or approved equal. Connections shall be 4" long minimum, have suitable metal collar frames at each end and made with 1" slack minimum in material to prevent transmission of vibration. All connections shall be sealed with approved duct sealer.

2.04 ACCESS PANELS AND DOORS:

A. Latched, hinged access doors shall be installed in duct or housing where required for access to equipment. Insulated doors shall be installed in insulated duct or housing. Hardware for access panels and doors shall be "ventlok" manufactured by Ventfabrics, Inc. or approved equal.

2.05 FLEXIBLE INSULATED DUCT:

A. Low pressure (2" S. P. and under) shall be constructed as follows:

1. Core liner: Flexible acoustically transparent plastic sheet liner bonded to galvanized spring steel wire helix.
2. Insulation: 2" thick glass fiber 1 lb. density.
3. Vapor Jacket: Flexible copolymer seamless sheet having perm rating 0.05.
4. Rating: U/L-181 Class 1 Air Duct, rated and labeled 2.0" static pressure, 4,000 FPM velocity.
5. Duct shall be Glenflex, Type IL, or approved equal.
6. Maximum length of flexible duct permitted is 3'0". Metal elbow shall be installed in all flex duct bends exceeding 30 degrees.

2.06 INTERIOR DAMPERS:

- A. Dampers shall be manufactured by Vent Products, Inc., or approved equal, and be opposed blade design or splitter type damper as indicated.
- B. Frames shall be 14 gauge galvanized steel with welded corners.
- C. Blades shall be 16 gauge galvanized steel with press formed "V" reinforcements, mounted on 1/2" diameter x 2" long plated steel axles, mounted on 1/2" diameter self-lubricating porous bronze bearings.
- D. Each damper shall be provided with locking-quadrant or locking- push-rod.

2.07 GRILLES, REGISTERS AND DIFFUSERS:

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- A. Units shall be manufactured by Price, Tuttle and Bailey, Krueger, or equal. Color and finish as selected by Architect.

PART 3 - EXECUTION

3.01 DUCTWORK - GENERAL:

- A. Transitions in ductwork shall be constructed with angle of change in sized at no more than 15 degrees. Ductwork and housings shall be airtight under all pressures that occur in systems.
- B. Ducts shall not be punched or cut for installation of pipes and ceiling hangers except approved by Architect/Engineer. Where possible, ducts shall be offset or changed in size to ducts of equivalent size to clear interference's whether shown on drawings or not. Ductwork shall be airtight as practical openings and corners shall be patched or soldered as required. Sheet metal screws shall be cadmium plated.
- C. All supply ductwork shall be constructed under 2" pressure SMACNA construction requirements; return ductwork 1" pressure requirements.
- D. Sheet metal ductwork shall be constructed and installed in neat manner parallel with building lines. Where construction is not specifically indicated herein, the "Duct Manual and Sheet Metal Construction Manuals", (Low Pressure) prepared by Sheet Metal and Air Conditioning Contractors National Association, Inc. shall be followed.
- E. At each point where exposed ducts not externally insulated pass through finished walls, floors or ceilings, sheet metal collars shall be provided around the ducts, screwed to ducts sufficient in size to cover rough openings in walls, floors. or ceilings.
- F. Where ducts pass through walls, floors or partitions, spaces between ducts and openings shall be caulked with mineralwool, or other approved non-combustible materials.
- G. All seam and joints in all ducts exposed to weather that are subject to leakage, and at other required locations, shall be soldered.
- H. Duct sizes indicated on drawings are net free area dimensions. Increase sheet metal size to accommodate internal insulation or acoustic lining.
- I. In each duct connection to each piece of rotating equipment, a fire-resistant flexible connector, properly clamped to ducts and equipment, shall be provided.
- J. Expansion joints, consisting of a fireproof canvas, properly secured to ducts with bolted angle iron clamps for rectangular ducts, and steel draw bands and clamping bolts for round ducts, shall be provided where required by project conditions. Except in equipment spaces, ductwork shall be installed within chases, behind furring, or above suspended ceilings. Interiors of all ducts without liners that can be seen through grilles shall be coated with dead black paint applied to clean surfaces.

3.02 LOW VELOCITY DUCTWORK:

- A. Galvanized steel sheet metal weights for low velocity duct construction shall be in accordance with the following table for listed maximum side dimensions:

<u>Maximum Side</u>	<u>Standard Gauge</u>
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1'-0" (30.48cm)	26
2'-6" (76.2cm)	24
4'-6" (137cm)	22
7'-0" (213cm)	20
Over 7'-0" (213cm)	18

- B. Construction of low velocity ducts shall be in accordance with Table 1 of Low Pressure, Sheet Metal Air Conditioning Contractor's National Association Manual (SMACNA). Longitudinal seams shall be Pittsburgh lock or button lock seams. Hangers for ducts shall be attached to construction conditions encountered. All hangers and component parts shall be galvanized. Hangers shall conform to requirement below except where special conditions are encountered, in which case SMACNA Manual shall be referred to.
1. Size 1'-6" x 1'-0" with 18 gauge bands at 8'-0" on center.
 2. 2'-6" x 1'-3" with 16 gauge bands at 8'-0" on center.
 3. Size 3'-0" x 1'-3" with 3/8" rods and 1-1/2" x 1-1/2" x 1/8" angles at 8'-0" on center.
 4. Size 4'-0" x 1'-6" with 1/2" rods and 2" x 2" x 1/8" angles at 8'-0" on center.
 5. Size 5'-0" x 2'-0" with 1/2" rods and 2" x 2" x 3/16" angles at 6'-0" on center.
- C. Construction and gauge of round ductwork to be in accordance with SMACNA Low Pressure Manual.
- D. Band hangers shall be turned in bottoms of ducts. Trapeze hangers shall have treated rods for leveling adjustments.
- E. Vaned elbows shall be used only as required by project conditions or where space dictates; all others shall be radius elbows. Vanes shall be 4" minimum width with hemmed edges. Care shall be taken in elbows that change sizes to ensure vane edges are at 90 degrees to sides of ducts. See details on drawings.
- F. All manual dampers, splitter dampers and adjustable deflectors shall have heavy duty type indexed quadrants mounted on ducts where installed exposed or above ceiling access panels or doors.
- G. Flush ceilings mounted regulators shall be used where dampers are installed in ducts not accessible. Splitter damper areas shall be equal to 75% of close off on larger of two ducts. Dampers other than splitter dampers shall be opposed blade type. Blades for splitter dampers and opposed blade dampers shall be 18 gauge minimum.
- H. Supply, return and outside air ducts shall be lined with fiberglass, 1-1/2 pound per cubic foot coated duct liner glued and buttoned in place with minimum of one button every two square feet. Duct liner installation shall comply with National Bureau of Fire Underwriters' Pamphlets 90A and 90B. (Drawing dimensions shall be sheet metal sizes.) All supply and return ducts shall have 1" thick duct liner.
- I. All concealed transverse joints shall be taped with 1-1/2" wide high velocity duct tape, Hardcast type PS-S or approved equal. No taping will be required on longitudinal joints.

3.03 FLEXIBLE INSULATED DUCTS:

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- A. Install in accordance with SMACNA "Flexible Insulated Duct Construction Standards".
- B. Draw bands at ends of duct shall be non-ferrous metal.
- C. Where ends of duct butt other insulation or lined metal ducts, seal the vapor jacket to the adjacent surface with permanent adhesive. Use no "duct-tape".
- D. Maximum duct length allowed is 3'-0".

3.04 DAMPERS:

- A. All damper rods shall be permanently and clearly marked to indicate damper positions. All operating rods for dampers in externally insulated ductwork shall be required lengths to place operating arms, linkwork, quadrants, entirely clear of insulation. Dampers in internally insulated ducts shall be arranged to avoid interference's with internal insulation.
- B. Accessible approved damper regulators shall be installed on each manually operated damper in accessible ductwork. Indicating locking quadrants shall be installed on each manually operated damper in accessible ducts.
- C. UL approved fire dampers, with replaceable fusible links and automatic closing and latching mechanism with access openings and screwed on panels shall be installed at locations required by project conditions , locations where ducts pass through fire rated floors and walls, and at all other locations where required by local authorities. All fire dampers shall be constructed in accordance with requirements of NFPA code, Pamphlet 90A.

3.05 EQUIPMENT INSTALLATION:

- A. See Section 15100, Basic Materials and methods - Mechanical.
- B. Equipment shall be installed, complete with accessories, in strict accordance with manufacturer's written instructions.
- C. All equipment shall be arranged for ease in servicing filters, oil and grease points, belts, motors, etc.
- D. Necessary disconnect switches, motor starters, and control devices mounted/installed separately from equipment shall be properly provided and installed.

3.06 SYSTEM OPERATING AND BALANCING:

- A. Upon completion of installations, contractor shall have an independent test and balance agency, balance and test all systems.
- B. Using standard air balance equipment and devices, measure and adjust all air outlets and inlets to within 5% of the design flow indicated.
- C. Record CFM measured at final balance for each new air supply and exhaust device. Provide report of air balance in triplicate to Owner's representative. Show both design and measured air flow on air balance.

END OF SECTION 15800