

PART I – GENERAL

WORK SPECIFIED HEREIN

- Ductwork, air devices, and associated equipment and materials.

SUBSTITUTIONS

In accordance with Section 01600.

SUBMITTALS

- Unless otherwise noted, the contractor shall prepare all shop drawings, product literature, etc. only as required to properly coordinate and construct the project.
- Review of submittals by the Professional of Record is limited to specific shop drawings as called for in the Project Manual.
- Shop drawings for review by the Professional of Record are not required for this section.

PART II – PRODUCTS

DUCTWORK:

- All exposed supply and return ductwork and all exhaust ductwork shall be fabricated of galvanized steel of lock forming quality with uniform galvanized coating of not less than 1-1/4 oz./sq. ft. Duct joining system shall comply with SMACNA standards.
- Antimicrobial duct board, manufactured by Johns Mansville, Mat-Faced Micro-Aire, Fiberglass Duct Board Type 475 and Type 800.

FLEXIBLE DUCTWORK:

- All concealed supply and return ductwork shall be wiremold type WG insulated flexible air duct. (United Sheet Metal, Thermoflex). Use ONLY where allowed by local code, if not approved use galvanized sheet metal spiral ductwork as specified for exposed ductwork.

TURNING VANES:

- Single thickness vanes per Figure 2.3 with runners screwed to the ductwork per SMACNA Duct Standards.

VOLUME DAMPERS:

- Manual opposed blade type with damper lock and indicating quadrant (Airstream, Ruskin, Louvers & Dampers, Inc.).

FIRE DAMPER:

- Provide suitable access panels. Construct in accordance with Code requirements. Air Balance Model 119 AL Type B or approved equal, sized with open damper out of air stream. Install per manufacturers directions and SMACNA manual on fire dampers.

GRILLES, REGISTERS, DIFFUSERS (KRUEGER):

- Grilles, diffusers, and registers shall be as indicated on the schedule on the Drawings, and shall be furnished with frame style suitable for the type of ceiling in which installed. Refer to drawing for finish color. Provide Neoprene gasketing around the inside of the frame of all units.

ACOUSTICAL DUCT LINER:

- The inside of the supply return ducts from the air conditioner to a distance of 10'-0" from the unit, all transfer ductwork and return air plenums shall be lined with Owens-Corning QuietR AcoustiTex Duct Liner Type 200, 1" thick or other approved duct liner acoustical board (Certainteed, Schuller).

SPIN-IN BRANCH DUCT CONNECTOR:

- Flexmaster West Model FLDE or approved equal, including adjustable locking type quadrant damper.

BIRD GRILLES:

- At all exhaust fan openings and other miscellaneous mechanical openings, provide maximum 1/4" square bird grilles.

FILTERS:

- Unit filters shall be CAM-FARR 30/30 (2") or Equal.

PART III – EXECUTION

WORKMANSHIP

- All ductwork installation shall conform to latest edition of the applicable SMACNA Duct Construction Standards, except where more stringent requirements are called for herein. At all times keep available at the Project Site for reference purposes, a minimum of one SMACNA manual pertaining to the specific duct system used.
- Do all cutting and patching necessary to accommodate air conditioning. Cut structural members only where permitted, attain written permission from the Structural Professional of Record before the cutting of any structural member.
- Coordinate with others to provide necessary holes, slots, chases, etc., to accommodate ductwork as work progresses. Obtain Professional of Record's approval for sizes of all openings. If structural difficulties prevent installation of work as shown, make variations thereon, only as directed by the Professional of Record, with no change in Contract amount.
- Rough-in work shall proceed, as rapidly as general construction of building will permit.

- Run all ductwork parallel to building elements. Conceal all ductwork in walls, floors, ceiling, chases, unless otherwise shown or noted on drawings. Install work accurately to fit the rough-in drawings of heating equipment, cooling equipment, etc., into which it connects.
- Locate duct out of the way of all doors, windows, service areas, access holes, access spaces, etc.
- Care must be taken to keep the inside of all ducts clean during and after erection.
- No pipes or other obstructions shall pass through air ducts.
- Poorly made joints, splits, visible holes, etc., shall be reworked or new pieces of ductwork installed as directed by the Professional of Record. Where excessive pulsating of ductwork or plenum housing is found, additional stiffeners shall be added as directed.
- All changes in the cross section of ducts shall be made by transformations without contracting the area of the ducts. Necessary changes in cross section, offsets, etc., shall be made throughout the system whether or not specifically shown on the Drawings.
- Centerline radius of curves, bends, offset, branch connections, etc., equal to 1-1/2 times the width of duct or larger.
- Install single thick turning vanes in all square elbows and tees (and elsewhere when shown), on both supply and return ductwork.
- The angle for transformation at connections to equipment of plenums must not exceed 20 degrees from a line parallel to the air flow. The angle of approach may be increased to meet space conditions when the transformation is within reasonable limits and the angle of approach must be approved by the Professional of Record prior to fabrication of the ductwork.
- All grilles, registers, and diffusers shall set flush and true to the wall or ceilings to prevent air leakage around the edges. Provide plaster frames for all outlets in plaster or gypsum board.
- Provide barometric dampers in the neck of all exhaust air fans and elsewhere as indicated on the drawings.
- Provide volume dampers where shown or specified.
- Exhaust fan discharge shall be a minimum of 10'-0" removed from any fresh air inlets.
- Construct duct openings at outlets so that plaster will not crack, chip, or peel beyond flange.
- Acoustical Duct Liner: Secure 1" thick duct liner to duct interior with 3-M, EC-K-4, coated side facing air stream. Form longitudinal joints in one corner of duct with all joints tightly butted and heavily sized. Where duct liner leading edge is exposed to air stream, (protect with sheet metal closure per SMACNA) size heavily same as joints. Duct sizes shown on Drawings are clear inside dimensions. Increase duct size to allow for liner.

- Apply insulation over surfaces which have been wiped clean and dry. Impale insulation over weld pin fasteners on 12" x 18" centers with a minimum of 2 rows of fasteners per duct side and not less than 2 fasteners per section of insulation. Use no remnant less than 12" x 12" by duct side if the duct side is less than 12". Secure insulation with a speed washer (round beveled) or clip on each weld pin, applied flush to the face of the insulation without depressing the surface. Cut off weld pins as close to the washer as possible. Apply corner angle of not lighter than 28 gauge galvanized sheet metal or 26 gauge aluminum with 1/2" lag to all corners and secure to the insulation. But all joints firmly together and seal all joints, breaks, cracks and perforations in the vapor barrier to insure a continuous vapor barrier surface. Seal with 4" wide embossed aluminum foil vapor barrier type embedded in a coat of mastic. Seal all self pin penetrations of vapor barrier with a 4" x 4" patch of aluminum foil tape.
- All ductwork above roof or outside building walls, as indicated, to be weatherproofed.
- Where ducts pass through walls or floors the opening between the duct and wall or floor shall be packed firm with fiberglass insulating material. Where ducts pass through fire partitions, the packing shall conform to all state and local codes. Furnish and install galvanized steel angles on all sides of the duct on both sides of floor or wall. Angles to be sufficient size to cover the openings between the wall or floor and the duct. Angles to be securely fastened to the duct with sheet metal screws.
- Manual dampers above inaccessible ceilings shall be provided with Young Regulator #315A adjustable cover regulator complete with rods and damper operator. Provide access doors in place of Young regulators when building elements, ducts, or lights make it impossible to install regulators.
- Inlet and outlet connections to all air handling equipment shall be made with glass fiber flexible connection not less than 4" full length with 1" slack, installed as per Figure 3-5 of the SMACNA Duct Standards.

SHEET METAL DUCT FABRICATION

- Use the following gauges:

<u>Largest Duct Dimension</u>	<u>Galvanized Steel Gauge</u>
Up to 12"	26
13" to 30"	24
31" to 48"	22
49" to 60"	20
61" to 84"	18
84" and above	16

- Cross-break all sides of ducts over 18" maximum dimension, except exhaust ducts which shall be reinforced with standing seam locking.

- Cross-joints and bracing shall be in accordance with Table 1 or the SMACNA Duct Standards. Longitudinal seams shall be Pittsburgh lock or button punch snap lock. Longitudinal seam shall be heavily sealed with Arabol.
- Protect all exposed couplings for rotating machinery and belt drives with a substantial belt or coupling guard.
- Paint the inside of all supply, return and exhaust ducts and dampers one coat of flat black paint wherever the duct is visible through the opening. Where the duct insulation is visible from the room below, the insulation must have a black finish.

HANGING OF DUCTWORK

- All ducts shall have hangers or supports at joints and every six feet or less.
- Hangers for rectangular and square ductwork smaller than 35" shall be with strap hangers screwed to the ductwork as indicated at Figure 5-4. If strap length from top of duct to support exceeds 36" trapeze duct hangers shall be utilized. Hanger strap shall be sized and supported in accordance with Table 5-1.
- Hangers for rectangular and square ductwork larger than 36" in size shall be with trapeze hangers. Trapeze hangers shall incorporate threaded rod and steel angle iron support as shown at Figure 5-5. Design of the trapeze hangers shall as per Figure 5-5 for load diagram, Table 5-1 for rod sizes and Table 5-3 for trapeze loading at angles.
- Hangers for round ductwork smaller than 23" diameter shall be with strap hangers as shown at Figure 5-4. Straps shall be screwed or bolted to a band which will be the same size as the strap hanger.
- Sizes for the strap hanger shall be in accordance with Table 5-1.
- Hangers for round ductwork larger than 24" shall be with trapeze hangers as called for at paragraph above.
- Refer to the Structural Drawings for structural attachment requirements. At precast tee construction use manufactured concrete inserts provided. At beams and purlins use beam clamps. At open web joists use required angles and straps. Metal decking shall not be penetrated.
- Where ductwork risers are supported from the floor, install as per Figures 5-6 and 5-7.
- All figures and tables referred to above shall be from the edition of the SMACNA low pressure duct standards, 5th Edition.

END OF SECTION

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