SECTION 15910

DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Duct Access Doors.

B. Duct Test Holes.

C. Fire Dampers.

D. Flexible Duct Connections.

E. Smoke Dampers.

F. Volume Control Dampers.

G. Casings and Plenums.

H. Drip Pans.

I. Duct Sleeves, Prepared Openings and Closure Collars

J. Turning Vanes and Spin-in Fittings

1.02 RELATED SECTIONS

A. Section 07841 - Through-Penetration Firestop Systems.

B. Section 15245 - Vibration Isolation.

C. Section 15890 - Ductwork.

D. Division 16 - Electrical: Electrical characteristics and wiring connections.

1.03 REFERENCES

A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

B. NFPA 92A - Smoke Control Systems.

C. NFPA 70 - National Electrical Code.

D. SMACNA - HVAC Duct Construction Standards - Metal and Flexible (HVACDCS).

E. SMACNA - Seismic Restraint Manual - Guidlines for Mechanical Systems (SRMGMS).

F. UL 33 - Heat Responsive Links for Fire-Protection Service.

G. UL 555 - Fire Dampers and Ceiling Dampers.

H. UL 555S - Leakage Rated Dampers for Use in Smoke Control Systems.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers, duct access doors and duct test holes.

C. Product Data: Provide for shop fabricated assemblies including volume control dampers, duct access doors, duct test holes and hardware used. Include electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions: Indicate for fire dampers and combination fire and smoke dampers.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01700.

B. Record actual locations of access doors and test holes.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years experience.

1.07 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories Inc., as suitable for the purpose specified and indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01600.

B. Protect dampers from damage to operating linkages and blades.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Dampers:
1. Ruskin.
2. Air Balance, Inc.
3. Arrow.
4. Cesco.
5. Greenheck.
6. NCA.
7. Prefco.
8. Tamco.
9. Vent Products, Inc.

B. Duct Access Doors:
1. Ruskin.
2. Air Balance, Inc.
3. Arrow.
4. Cesco.

5. DuctMate.
6. Greenheck.
7. NCA.
8. Prefco.
9. Vent Products, Inc.

C. Flexible Connectors and Duct Test Holes:
1. Ductmate.
2. Ventfabrics.
3. Duro-Dyne.

D. Locking Quadrants for Shop-Fabricated Volume Dampers:
1. Ventfabrics.

E. Turning Vanes and Vane Rails:
1. Barber-Colman.
2. Duro-Dyne.

2.02 DUCT ACCESS DOORS

A. Fabricated in accordance with SMACNA HVACDCS, and as specified or as indicated on the drawings. Standard access doors may be shop-fabricated. Pressure rating shall be equal to the rating of the associated ductwork.

B. Fabrication: Removable, with retainer chain. Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum 1 inch (25 mm) thick insulation with galvanized steel sheet metal airstream-side cover.
1. Less Than 12 inches (300 mm) Square: Secure with sash locks.
2. Up to 18 inches (450 mm) Square: Provide two hinges and two sash locks.
3. Larger Sizes: Lift-out hinges and two compression latches with outside and inside handles.
4. Clamping-type doors with knob handles, as manufactured by Ductmate, may be substituted for standard sizes.

C. Medium- and High-Pressure Positive-Pressure Ducts: Ruskin ADHP-3 high pressure access door rated up to 12 in. WG (2985 Pa), with spring latches to allow the door to open temporarily to relieve negative pressures.

D. Access doors with sheet metal screw fasteners are not acceptable.

2.03 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.04 FIRE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555, and as specified or as indicated on the drawings.

B. Fire dampers shall be of the dynamic closure type, shall have been successfully tested to UL Standard 555 - 4th Edition as to their ability to close under dynamic airflow conditions and shall bear the UL label stating that they are suitable for that application. Static fire dampers designed to operate with no airflow in the ductwork shall not be acceptable. Dynamic closure fire dampers shall have been successfully tested in both horizontal and vertical mounting positions and to maximum static pressures of 8" w.g. (1.99 kPa). Dynamic closure fire dampers shall be installed in accordance with the manufacturer's instructions.

C. Ceiling Dampers: Galvanized steel, 22 gauge (0.76 mm) frame and 16 gauge (1.5 mm) flap, two layers 0.125 inch (3.2 mm) ceramic fiber on top side, and one layer on bottom side for round flaps, with locking clip. Dampers shall be dynamic type, rated for closure under air flow conditions.

D. Horizontal Dampers: Type B, with blades out of the air stream. Galvanized steel, 22 gauge (0.76 mm) frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket. Dampers shall be dynamic type, rated for closure under air flow conditions.

E. Curtain Type Dampers: Type B, with blades out of the air stream. Galvanized steel with interlocking blades. Provide stainless steel closure springs. Dampers shall be dynamic type, rated for closure under air flow conditions. Configure with blades out of air stream.

F. Multiple Blade Dampers: 16 gauge (1.5 mm) galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch (3.2 x 12.7 mm) plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

G. Fusible Links: UL 33, separate at 165 °F (74 °C) with adjustable link straps for combination fire/balancing dampers. Provide links melting at 212 °F (100 °C) within 75 feet downstream of heating coils

2.05 SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555S, and as specified or as indicated on the drawings.

B. Dampers: UL Class 1 multiple blade type fire damper, normally closed automatically operated by electric actuator.

2.06 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA HVACDCS, and as specified or as indicated on the drawings.

B. Connector: Fabric crimped into metal edging strip.
1. Connectors shall be Ductmate PROFLEX or approved equal.
2. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd (1.0 kg/sq m).
3. Net Fabric Width: Approximately 6 inches (150 mm) wide.
4. Metal: 3 inch (75 mm) wide, 24 gauge (0.6 mm thick) galvanized steel.
5. Connectors shall have double fold seams. Single fold seams (metal folded once only) shall not be accepted.

2.07 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA HVACDCS, and as specified or as indicated on the drawings.

B. Shop fabrication is permitted for single blade dampers and splitter dampers.

C. Single Blade Dampers: For duct sizes (height x width) up to 7 x 30 inch (175 x 760 mm).

D. Multi-Blade Damper: Opposed blade pattern with maximum blade sizes (height x width) 8 x 72 inch (200 x 1825 mm). Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

E. End Bearings: Except in round ductwork 12 inches (300 mm) and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

F. Quadrants:
1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
3. Where rod lengths exceed 30 inches (750 mm) provide regulator at both ends.

2.08 CASINGS AND PLENUMS

A. Factory fabricate components with field installation. The plenum or casing manufacturer shall provide certified testing data, obtainable directly from an independent acoustical laboratory, listing sound absorption and transmission loss characteristics of panel assembly. Sound absorption coefficients and sound transmission loss, determined by an independent laboratory, shall be in accordance with ASTM C 423 and ASTM E 90 respectively.

2.09 DRIP PANS

A. Provide each cooling coil section in both field-and-factory assembled casings with a stainless or galvanized steel drip pan not less than 18 gauge (1.31 mm) with drain connections. Drip pans shall collect, confine, and dispose of condensate from cooling coils and attachments, including headers, return bends, distributors, and uninsulated pipe and fittings. Slope pans toward the drain pipe connection(s) to ensure complete drainage. Where individual coil fins [or eliminator blades] are in section (not in one piece from top to bottom of coil bank), provide auxiliary drip troughs at bottom of each section with drains to drip pans. Insulate drip pans with water impervious insulation of sufficient thickness to prevent condensate formation on the exterior at ambient conditions to be encountered.

2.10 DUCT SLEEVES, PREPARED OPENINGS AND CLOSURE COLLARS

A. Duct Sleeves and Closure Collars: Fabricate from minimum 20-gauge (1.0 mm) galvanized steel. Where sleeves are installed in bearing walls, provide structural steel sleeves.

B. Prepared Openings: Provide one-inch clearance between the duct and the sleeve.

C. Closure Collars: Fabricate from minimum 20-gauge (1.0 mm) galvanized steel.

2.11 TURNING VANES AND SPIN-IN FITTINGS

A. Factory-fabricated and factory-or-field-assembled units consisting of curved turning vanes for uniform air distribution and change of direction with minimum turbulence and pressure loss. Provide curved single thickness vanes for square elbows, conforming to SMACNA HVACDCS single vane schedule for small vanes. Each vane shall form a 90-degree arc. Fill the entire duct cross-section with vanes. Orient leading edge of vanes parallel to the side of the duct (directed straight into the entering airstream). Turning vanes shall be minimum 16 gauge (1.61 mm), regardless of gauges that are recommended by SMACNA. Double thickness turning vanes are not allowed.

B. For round ducts taking off from rectangular ducts, provide factory fabricated, galvanized sheet metal, spin-in fittings with conical or bellmouth taps. 45 degree rectangular-to-round branch fittings may be substituted for spin-ins.

2.12 UNIFORMITY OF MATERIALS

A. Ductwork accessories, including but not limited to volume dampers, smoke dampers, fire dampers, combination fire/smoke dampers, backdraft dampers and motorized dampers, shall be fabricated of materials that are similar to the ductwork in which they are installed.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVACDCS. Refer to Section 15890 for duct construction and pressure class.

B. Provide duct access doors for inspection and cleaning before filters, before and after coils, before and after fans, before automatic dampers, at fire dampers, at multiple blade volume dampers and elsewhere as specified or as indicated on the drawings. Provide at changes in direction of kitchen exhaust ductwork and as otherwise required for cleaning kitchen exhaust ductwork in accordance with NFPA 96. Provide minimum 8 x 8 inch (200 x 200 mm) size for hand access, 18 x 18 inch (450 x 450 mm) size for shoulder access, and as specified or as indicated on the drawings. Review locations prior to fabrication.

C. Access doors installed for access to fire dampers shall be provided with identification labels with letters of minimum 1/2 inch (13 mm) height to indicate the presence of fire protection devices within. Refer to specification section 15190 for labeling materials specifications.

D. Provide duct access doors in horizontal return air, exhaust air and fresh air intake ductwork to facilitate the removal of accumulations of dust and combustible materials in accordance with NFPA 90A. Install access doors at maximum 20 foot (6 m) intervals and at the base of each vertical riser.

E. Provide duct test holes where indicated and required for testing and balancing purposes.

F. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

G. Demonstrate operation and re-setting of each fire damper to Owner's representative.

H. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment, and support by vibration isolators. Staple and seal connections airtight.

I. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

J. Provide balancing dampers on duct take-offs to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly. Where branch duct is completely above non-accessible wallboard ceiling and the Architect has not approved the use of access doors, duct mounted balancing dampers shall not be required.

K. For volume dampers located above suspended ceilings and in areas that are not visible to building occupants (e.g. mechanical rooms), provide fluorescent orange colored surveyors tape. Permanently attach tape to damper handles and run tape down to 10 in. (254 mm) above ceiling or 12 in. (304 mm) below damper handle where ceilings do not exist (e.g. mechanical rooms).

L. Duct Sleeves and Prepared Openings: Install for ducts passing through roofs, ceilings, walls and floors. Field determine the proper size and location of sleeves and prepared openings.
   1. Duct Sleeves: Allow one-inch (25 mm) clearance between duct and sleeve or one-inch (25 mm) clearance between insulation and sleeve for insulated ducts, except at grilles, registers, and diffusers.
   2. Prepared Openings: Allow one-inch (25 mm) clearance between duct and opening or one-inch (25 mm) clearance between insulation and opening for insulated ducts, except at grilles, registers, and diffusers.

M. Closure Collars:
   1. Provide not less than 4 inches (100 mm) wide on each side of walls or floors where sleeves or prepared openings are installed. Fit collars snugly around ducts. Grind smooth edges of collar to prevent tearing or puncturing insulation covering or vapor barrier.
   2. Where insulated ducts penetrate non-fire-rated walls, insulation shall be continuous through the closure collars and the closure collars shall be installed tight to the insulation.
   3. Where insulated ducts penetrate fire rated walls, insulate ducts on both sides of closure collars and seal points of contact between closure collar and insulation with vapor proof adhesive.
   4. Where ducts penetrate fire rated walls, provide fire proof sealant at closure collar. Refer to specification section 07841 - Through-Penetration Firestop Systems, for fire proof sealant requirements.
   5. Secure closure collars to ducts with sheet metal screws at maximum 6-inch (152 mm) centers and secure closure collars to walls or floors with sheetrock screws, nails or other appropriate fastener at maximum 6-inch (152 mm) centers.

N. Packing: Pack with non-combustible glass fiber insulation in spaces between sleeve/opening and duct/duct insulation. Cover or seal edges of packing to contain loose fibers.

O. Duct Hangers and Supports: SMACNA HVACDCS, Section 4. Hang ducts up to and including 36 inches (914 mm) in width by a minimum of 1 in x 16 gauge (25 mm x 1.61 mm) flat straps on each side of the duct on 4 ft (1.22 m) centers, bent under bottom of duct a minimum of 2 inches (50 mm) and securely fastened to duct. Hang ducts larger than 36 inches (914 mm) in width by 3/8 inch (9.5 mm) steel rods and 2 x 2 x 1/4-inch (50x50x6.3 mm) steel angle trapeze hangers, spaced 4 ft (1.22 mm) on center. Anchor risers in the center of the vertical run to allow ends of riser free vertical movements. Attach supports only to structural framing members and concrete slabs. Do not anchor supports to metal decking unless a means is provided and approved for preventing the anchors from puncturing the metal decking. Where supports are required between structural framing member, provide suitable intermediate metal framing. Where C clamps are used, use retainer clips.
   1. Flexible Ducts: Support ducts by hangers every 3 feet (0.9 m), unless supported by ceiling construction. Use stretch flexible air ducts to smooth out corrugations, and long radius elbows, where possible, using a minimum length to make connections.
   2. Flexible Connectors: Provide flexible connectors between fans and ducts or casings and where ducts are of dissimilar metals. For round ducts, securely fasten flexible connectors by zinc-coated steel clinch-type draw-bands. For rectangular ducts, lock flexible connectors to metal collars.
   3. Ducts with Extra Weight Such As Lead Lining or Lagging: Include the extra weight in determination of suitable hangers and supports.

P. Drain (Drip) Pans, Drain Connections, and Drain Lines: Provide coils with drain and drain connections. Where coils are sectionalized, with one section above the other, provide intermediate drain pans. There shall be no entrainment of water in air stream. Drain condensate from drain pans to the nearest floor drains. Equip drain lines with U-traps and a seal height one-inch greater than the maximum static pressure rating of the fan system. Insure pans drain completely under operating conditions.

END OF SECTION