

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Back-draft dampers.
2. Combination fire-and-smoke dampers.
3. Duct access doors.
4. Dynamic fire dampers.
5. Smoke dampers.
6. Volume control dampers.
7. Remote cable control damper.
8. Flexible duct connections.
9. Duct test holes.
10. Dial thermometers.
11. Static pressure gages.

B. Related Sections:

1. Section 23 09 00 - Instrumentation and Control for HVAC: Execution and Product requirements for connection and control of Combination Smoke and Fire Dampers for placement by this section.
2. Section 23 09 23 - Direct-Digital Control System for HVAC: Execution and Product requirements for connection and control of Combination Smoke and Fire Dampers for placement by this section.
3. Section 23 31 00 - HVAC Ducts and Casings: Requirements for duct construction and pressure classifications.
4. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for connection of electrical Combination Smoke and Fire Dampers specified by this section.

1.02 REFERENCES

A. Air Movement and Control Association International, Inc.:

1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.

- B. ASTM International:
 - 1. ASTM E1 - Standard Specification for ASTM Thermometers.
- C. National Fire Protection Association:
 - 1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
 - 2. NFPA 92A - Recommended Practice for Smoke-Control Systems.
- D. Sheet Metal and Air Conditioning Contractors:
 - 1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
 - 2. SMACNA – Fire, Smoke and Radiation Damper Installation Guide
- E. Underwriters Laboratories Inc.:
 - 1. UL 555 - Standard for Safety for Fire Dampers.
 - 2. UL 555C - Standard for Safety for Ceiling Dampers.
 - 3. UL 555S - Standard for Safety for Smoke Dampers.

1.03 SUBMITTALS

- A. Division 01 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers, duct access doors, and duct test holes.
- C. Product Data: Submit data for shop fabricated assemblies and hardware used.
- D. Product Data: Submit for the following. Include where applicable electrical characteristics and connection requirements.
 - 1. Fire dampers including locations and ratings.
 - 2. Smoke dampers including locations and ratings.
 - 3. Backdraft dampers.
 - 4. Flexible duct connections.
 - 5. Volume control dampers.
 - 6. Cable control dampers.
 - 7. Duct access doors.
 - 8. Duct test holes.

- E. Product Data: For fire dampers, smoke dampers, and combination fire and smoke dampers, submit the following:
 - 1. Include UL ratings, dynamic ratings, leakage, pressure drop and maximum pressure data.
 - 2. Indicate materials, construction, dimensions, wiring diagrams and installation details.
 - 3. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.
- F. Manufacturer's Installation Instructions: Submit for Fire and Combination Smoke and Fire Dampers.
- G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.04 CLOSEOUT SUBMITTALS

- A. Division 01 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of access doors, test holes.
- C. Operation and Maintenance Data: Submit for Combination Smoke and Fire Dampers.

1.05 QUALITY ASSURANCE

- A. Dampers tested, rated and labeled in accordance with the latest UL requirements.
- B. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.
- C. Perform Work in accordance with IBC-NJ.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Division 01 - Product Requirements: Product storage and handling requirements.
- B. Protect dampers from damage to operating linkages and blades.
- C. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.

- D. Storage: Store materials in a dry area indoor, protected from damage.
- E. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

1.08 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.09 COORDINATION

- A. Division 01 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work where appropriate with building control Work.

1.10 WARRANTY

- A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five (5) year manufacturer warranty for duct accessories.

1.11 EXTRA MATERIALS

- A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two (2) of each size and type of fusible link.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR ALL ACCESSORIES

- A. All accessories shall have a pressure rating equivalent to the duct system that they are installed in.
- B. Material construction shall match system that accessories are installed in. All accessories in stainless steel ductwork shall be stainless steel including fasteners and hardware.

2.02 BACK-DRAFT DAMPERS

- A. Manufacturers: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
 - 1. Ruskin.
 - 2. Greenheck.
 - 3. Air Balance, Inc.

4. Substitutions: Division 01 - Product Requirements.
- B. Product Description: Multi-Blade, back-draft dampers: Parallel-action, gravity-balanced, Galvanized 16 gage (1.5 mm) thick steel. Blades, maximum 6 inch (150 mm) width, center pivoted, with felt or flexible vinyl sealed edges. Blades linked together in rattle-free manner with 90-degree stop, steel ball bearings, and plated steel pivot pin. Furnish dampers with adjustment device to permit setting for varying differential static pressure.

2.03 COMBINATION FIRE AND SMOKE DAMPERS

- A. Manufacturer: Subject to requirements of the specification, provide the following manufacturer's products by one of the following or approved equal:
1. Ruskin.
 2. Greenheck.
 3. Air Balance, Inc.
 4. Substitutions: Division 01 - Product Requirements.
- B. Fabricate in accordance with NFPA 90A, UL 555, and UL 555S.
- C. Fire Resistance: [1-1/2 hours] [3 hours].
- D. Leakage Rating: Class I, maximum of 8 cfm (3.8 L/s) at 4 inches wg (1 kPa) differential pressure.
- E. Damper Temperature Rating: 350 degrees F (176 degrees C) for smoke control systems.
- F. Frame: 13 gage (1.5 mm), galvanized steel.
- G. Blades:
1. Style: Airfoil-shaped, single piece, double skin.
 2. Action: Opposed.
 3. Orientation: Horizontal.
 4. Material: Minimum 16 gage (1.5 mm) equivalent thickness, galvanized steel.
 5. Width: Maximum 6 inches (150 mm).
- H. Bearings: Stainless steel pressed into frame.
- I. Seals: Silicone blade edge seals and flexible stainless steel jamb seals.

- J. Linkage: Concealed in frame.
- K. Release Device: Close in controlled manner and allow damper to be automatically reset.
- L. Actuator:
 - 1. Type: Electric 120 volt, 60 hertz, two-position, fail close.
 - 2. Mounting: External.
 - 3. Each combination fire smoke damper shall be equipped with a UL Classified "Fire Stat" to permit damper to reopen during dynamic smoke control and shall mechanically and electrically close damper upon reaching the damper's maximum degradation test temperature in accordance with UL555S. Damper can be opened via the Fire Alarm System for smoke purge. The damper operation and construction shall meet requirements of UL555S, latest edition.
 - 4. All wiring material required to interconnect the operator with detection and/or alarm or other systems shall be furnished by this Contractor.
- M. Fall-safe design shall enable damper to automatically assume the desired position when power is interrupted.
- N. Finish: Mill galvanized.
- O. Damper switch package to remotely indicate blade positions.
- P. Factory installed sleeve and mounting angles per local codes. Furnish silicone caulk factory applied to sleeve at damper frame to comply with leakage rating requirements.

2.04 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Fabrication: Rigid and close fitting of galvanized steel or stainless steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, furnish minimum 1 inch (25 mm) thick insulation with sheet metal cover, minimum 22 gage interior casing.
 - 1. Less than 12 inches (300 mm) square, secure with sash locks.
 - 2. Up to 18 inches (450 mm) Square: Furnish two hinges and two sash locks.
 - 3. Up to 24 x 48 inches (600 x 1200 mm): Three hinges and two compression latches.
 - 4. Larger Sizes: Furnish additional hinge.

5. Access doors located on the bottom of ducts shall have cam fasteners in lieu of hinges in order to avoid interference with ceiling channel supports.
6. Provide access doors upstream and downstream of reheat coils.
7. Provide access door for all dampers including volume dampers, fire dampers, smoke dampers, combination dampers and motorized dampers.
8. Access panels with sheet metal screw fasteners are not acceptable.

2.05 DYNAMIC FIRE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555.
- B. Fire Resistance: 1-1/2 hours.
- C. Dynamic Closure Rating: Dampers classified for dynamic closure to 2000 fpm (10 m/s) and 4 inches wg (1 kPa) static pressure.
- D. Construction:
 1. Integral Sleeve Frame: Minimum 14 gage (0.9 mm) roll formed galvanized steel. Length: 12 inches (305 mm).
 2. Blades:
 - a. Style: Curtain type.
 - b. Action: Spring closure upon fusible link release.
 - c. Material: Minimum 24 gage (0.6 mm) roll formed, galvanized steel.
 3. Closure Springs: Type 301 stainless steel, constant force type.
- E. Fusible Link Release Temperature: 212 degrees F (100 degrees C).
- F. Mounting: Vertical or horizontal as indicated on Drawings.
- G. Duct Transition Connection, Damper Style:
 1. B style - rectangular connection, blades out of air stream, high free area.
 2. G style - A style connection, grille mounting tabs at end of sleeve for grille.
- H. Finish: Mill galvanized.

2.06 SMOKE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555S.
- B. Fire Resistance: 1-1/2 hours.

- C. Leakage Rating: Class I, maximum of 8 cfm (3.8 L/s) at 4 inches wg (1 kPa) differential pressure.
- D. Damper Temperature Rating: 350 degrees F (176 degrees C) for smoke control systems.
- E. Frame: 16 gage (1.5 mm), galvanized steel.
- F. Blades:
 - 1. Style: Airfoil-shaped, single piece, double skin.
 - 2. Action: Opposed.
 - 3. Orientation: Horizontal.
 - 4. Material: Minimum 16 gage (1.5 mm) equivalent thickness, galvanized steel.
 - 5. Width: Maximum 6 inches (150 mm).
- G. Bearings: Stainless steel pressed into frame.
- H. Seals: Silicone blade edge seals and flexible stainless steel jamb seals.
- I. Linkage: Concealed in frame.
- J. Actuator:
 - 1. Type: Electric 120 volt, 60 hertz, two-position, fail close and Electric 24 volt, 60 hertz, two-position, fail close.
- K. Sleeve: Factory installed 20 gage (0.9 mm) sleeve, minimum 12 inches (305 mm) long.
- L. Finish: Mill galvanized.

2.07 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch (200 x 1825 mm). Assemble center and edge crimped blades in prime coated or galvanized frame channel with suitable hardware.
- C. End Bearings: Except in round ductwork 12 inches (300 mm) and smaller, furnish end bearings. On multiple blade dampers, furnish oil-impregnated nylon or sintered bronze bearings. Furnish closed end bearings on ducts having pressure classification over 2 inches wg 500 Pa.

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

2.08 REMOTE CABLE CONTROL VOLUME DAMPERS

- A. Provide cable control system for all volume dampers located above gypsum board and other inaccessible ceilings.
- B. Bowden cable control kit shall provide all required hardware that shall be mounted onto all rectangular and round volume dampers and provide all interlocking gears and cabling for ceiling mounted control. Coverplate shall be 7/8" diameter cold rolled steel cover with zinc plating for painting by General Contractor. Provide five (5) 12" wrenches for operation.

2.09 FLEXIBLE DUCT CONNECTIONS

- A. Provide a suitable flexible connection in both the intake and discharge sides of each fan and air handling unit, where they connect to ductwork.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- C. Connector: Fabric crimped into metal edging strip.
1. Fabric: UL 181 Class 0 listed fire-retardant neoprene coated woven glass fiber fabric conforming to NFPA 90A, minimum density 30 oz per sq yd (1.0 kg/sq m).
 2. Net Fabric Width: Minimum 6 inches (150 mm) wide; maximum 10 inches (250 mm) wide.
 3. Metal: 3 inch (75 mm) wide and 24 gage (0.6 mm thick) galvanized steel.
- D. High Density Vinyl Sheet: Minimum 0.55 inch (14 mm) thick, 0.87 lbs. per sq ft (4.2 kg/sq m), 10 dB attenuation in 10 to 10,000 Hz range.

2.10 DUCT TEST HOLES

- A. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Furnish extended neck fittings to clear insulation.
- B. Provide tappings in ducts for thermometers where specified. In addition, provide an airtight plugged tapping located as follows:

1. Upstream of each reheat coil.
2. Downstream of each reheat coil.
3. In each supply and return air duct at each floor.

2.11 DIAL THERMOMETERS

- A. Thermometer: ASTM E1, stainless steel case, bimetallic helix actuated with silicone fluid damping, white with black markings and black pointer hermetically sealed lens, stainless steel stem.
 1. Size: 3 inch (76 mm).
 2. Lens: Clear Lexan.
 3. Accuracy: 1 percent.
 4. Calibration: Degrees F.

2.12 STATIC PRESSURE GAGES

- A. Dial Gages: 3-1/2 inch (89 mm) diameter dial in metal case, diaphragm actuated, black figures on white background, front calibration adjustment, 2 percent of full scale accuracy.
- B. Accessories: Static pressure tips with compression fittings for bulkhead mounting, 1/4 inch (6 mm) diameter tubing.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Division 01 - Administrative Requirements: Coordination and project conditions.
- B. Verify rated walls are ready for fire damper and fire smoke damper installation. Verify the framed opening size in dry walls.
- C. Verify ducts and equipment installation is ready for accessories.
- D. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.02 INSTALLATION

- A. Install in accordance with NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
- B. Install dampers and accessories where indicated on Drawings.

- C. All duct accessories includes, but not limited to, access doors, dampers, etc. in stainless steel ducts shall be stainless steel.
- D. Access Doors: Install access doors at the following locations and as indicated on Drawings:
1. Spaced every 50 feet (15 m) of straight duct.
 2. Upstream of each reheat coil.
 3. Before and after each duct mounted filter.
 4. Before and after each duct mounted coil.
 5. Before and after each duct mounted fan.
 6. Before and after each automatic control damper.
 7. Before and after each fire damper, smoke damper, combination fire and smoke damper.
 8. Downstream of each VAV box.
 9. Install at locations for cleaning kitchen exhaust ductwork in accordance with NFPA 96.
- E. Access Door Sizes: Install 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 indicated on Drawings. Install 4 x 4 inch (100 x 100 mm) for balancing dampers only. Review locations prior to fabrication.
- F. Install temporary duct test holes where indicated on Drawings and required for testing and balancing purposes. Cut or drill in ducts. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- G. Install fire dampers, combination fire and smoke dampers and smoke dampers at locations as indicated on Drawings and where required. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
1. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92A UL555 and UL555S.
 2. Install dampers square and free from racking with blades running horizontally.
 3. Do not compress or stretch damper frame into duct or opening.
 4. Handle damper using sleeve or frame. Do not lift damper using blades, actuator, or jack shaft.
 5. Install bracing for multiple section assemblies to support assembly weight and to hold against system pressure. Install bracing as needed.

3.03 INSTALLATION - THERMOMETERS

- A. Install thermometers in air duct systems on flanges.
- B. Locate duct-mounted thermometers minimum 10 feet (3 m) downstream of mixing-dampers, coils, or other devices causing air turbulence.
- C. Install static pressure gages to measure across filters and filter banks, (inlet to outlet). On multiple banks, provide manifold and single gage.
- D. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- E. Install thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- F. Adjust thermometers to final angle, clean windows and lenses, and calibrate to zero.
- G. Install thermometers in the following locations:
 - 1. Each supply air zone.
 - 2. Outside air.
 - 3. Return air.
 - 4. Mixed air.

3.04 DEMONSTRATION

- A. Division 01 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate re-setting of fire dampers and fire smoke dampers to Owner's representative.

3.05 Static Pressure and Filter Gages:

- A. Install filter and static pressure gages in the following locations:
 - 1. Built up filter banks.
 - 2. Unitary filter sections.
 - 3. Supply fan discharge.

END OF SECTION