

**SECTION 23 33 00
AIR DUCT ACCESSORIES**

PART 1 GENERAL

1.1 REFERENCES

- A. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems
- B. SMACNA: HVAC Duct Construction Standards
- C. UL 33: Heat Responsive Links for Fire Protection Service
- D. UL 555: Fire Dampers
- E. UL 555S: Smoke Systems

1.2 SUBMITTALS

- A. Submit under provisions of Section 23 05 00
- B. Product Data: For each product used in this project, provide catalog data and installation instructions.
- C. Samples: Not required

PART 2 PRODUCTS

2.1 BALANCING DAMPERS

- A. Provide factory manufactured balancing dampers that meets or exceeds SMACNA standards, and as indicated.
 - 1. Shop fabricated balancing dampers are NOT acceptable.
- B. For rectangular duct heights 10" or less, provide single blade balancing damper with the following features:
 - 1. Frame: 22-gage galvanized steel, 3" wide.
 - 2. Blade: 22-gage galvanized steel, maximum 1/8" gap between the blade and frame.
 - 3. Control Shaft/Hand Quadrant: 3/8" square axle shaft, secured tight to the blade; molded synthetic end bearings; locking hand quadrant.
 - 4. Standoff Bracket, for externally insulated ducts, uses a 2" high with hand locking quadrant.
 - 5. Performance specifications are based on Ruskin MD25.
 - a. Nailor or other products satisfying the specifications are acceptable.
- C. For rectangular duct heights over 10", provide opposed blade balancing damper with the following features:
 - 1. Frame shall be 16-gage galvanized steel channel with corner braces.
 - 2. Blade shall be 8" maximum width, 16-gage galvanized steel.
 - 3. Axles shall be 3/8" hex axle shaft, secured tight to the blade; molded synthetic bearings.
 - 4. Control Shaft/Hand Quadrant, provide a 3/8" square control shaft with locking hand quadrant.
 - 5. Standoff Bracket, for externally insulated ducts uses a 2" high, with hand locking quadrant.
 - 6. Performance specifications are based on Ruskin MD35.
 - a. Other products satisfying the specifications are acceptable.
- D. For round ducts, provide single blade balancing damper with the following features:
 - 1. Frame: 20-gage galvanized steel, 7" long.
 - 2. Blade: 20-gage galvanized steel, maximum 1/8" gap between the blade and frame.
 - 3. Control Shaft/Hand Quadrant: 3/8" square axle shaft, secured tight to the blade; molded synthetic end bearings; locking hand quadrant.
 - 4. Standoff Bracket, for externally insulated ducts, uses a 2" high, with hand locking quadrant.
 - 5. Performance specifications are based on Ruskin MDRS25.

- a. Other products satisfying the specifications are acceptable.

2.2 CONTROL DAMPERS

- A. Except for outdoor air control dampers, provide control dampers with the following features:
 1. Frame: 16-gage galvanized steel channel with corner braces.
 2. Blade: 6" maximum width, opposed blade, 16-gage galvanized steel.
 3. Axles: $\frac{3}{8}$ " hex axle galvanized steel shaft, secured tight to the blade; non-stick, non-corrosive, molded synthetic bearings.
 4. Control Shaft: 6" x $\frac{1}{2}$ " diameter galvanized steel control shaft with outboard support bearing.
 5. Actuator Bracket: Frame mounted galvanized steel.
 6. Seals: None
 7. Leakage Rates: Maximum leakage rates shall not exceed the following values when tested at 1" WG pressure differential per AMCA Publication 500.

Damper Width	Leakage Rate
12"	65 CFM/SF
24"	50 CFM/SF
36"	40 CFM/SF
48"	40 CFM/SF

- 8. Performance specifications are based on Ruskin CD50.
 - a. Other products satisfying the specifications are acceptable.
- B. Provide outdoor air control dampers with the following features:
 1. Frame shall be aluminum T-flange type with boltholes in the corners.
 2. Blade shall be 6" maximum width, opposed blade, aluminum airfoil.
 3. Axles: $\frac{1}{2}$ " hex axle stainless steel shaft, secured tight to the blade; non-stick, non-corrosive, molded synthetic bearings.
 4. Control Shaft: 6" x $\frac{1}{2}$ " diameter galvanized steel control shaft with outboard support bearing.
 5. Actuator Bracket: Conceal in damper frame, galvanized steel.
 6. Seals: edge and jam seals.
 7. Leakage Rates: Maximum leakage rates shall not exceed the following values when tested at 1" WG pressure differential per AMCA Publication 500.

Damper Width	Leakage Rate
12"	65 CFM/SF
24"	50 CFM/SF
36"	40 CFM/SF
48"	40 CFM/SF

- 8. Performance specifications are based on Ruskin CD50.
 - a. Other products satisfying the specifications are acceptable.

2.3 FIRE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- B. For openings in fire-rated walls and floors, provide curtain type dampers of galvanized steel with interlocking blades.
 1. Provide stainless steel closure springs and latches for horizontal installations.
 2. Provide 165°F fusible link in accordance with UL 33.
 3. Provide type "B" fire dampers with blades configured out of the air stream.
 4. Type "A" fire dampers with blades intruding into the air stream, allowable in low velocity ducts with duct depth greater than 13".
 5. The Engineer shall determine proper type of fire dampers.

- C. For diffuser and grille openings in fired rated ceilings, floor-ceiling assemblies, and roof-ceiling assemblies, provide ceiling type dampers with UL classified insulation as required.

- 1. Provide 165°F fusible link in accordance with UL 33.

2.4 COMBINATION FIRE AND SMOKE DAMPERS

- A. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.

- B. Provide factory sleeve for each damper.

- 1. Install damper operator on exterior of sleeve and link to damper operating shaft.

- C. Fabricate with multiple blades with 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, $\frac{1}{8}$ " x $\frac{1}{2}$ " plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and $\frac{1}{2}$ " diameter actuator shaft.

- D. Operators shall be spring return electric type suitable to operate on 120 VAC.

- 1. Operators shall be UL listed and labeled, provide end switches to indicate damper position.

- 2. To ensure compatibility, coordinate actuator selection with the EMCS contractor.

- E. Combination fire/smoke dampers shall have a fail-safe design that enables the dampers to assume desired fail-safe position.

- 1. When a smoke detector detects smoke, during testing or if power failure occurs, the damper shall close and remain closed.

- 2. When the smoke signal ceases (smoke detector resets), the test is complete or power restored the damper shall automatically reset to open position.

- 3. The damper shall automatically reset after the reset of the alarm system from a nuisance alarm.

2.5 SMOKE DAMPERS

- A. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.

- B. Provide factory sleeve for each damper.

- 1. Install damper operator on exterior of sleeve and link to damper operating shaft.

- C. Fabricate with multiple blades with 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, $\frac{1}{8}$ " x $\frac{1}{2}$ " plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and $\frac{1}{2}$ " diameter actuator shaft.

- D. Operators shall be spring return electric type suitable to operate on 120 VAC.

- 1. Operators shall be UL listed and labeled.

- 2. Provide end switches to indicate damper position.

- 3. To ensure compatibility, coordinate actuator selection with the EMCS contractor.

- E. Combination fire/smoke dampers shall have a fail-safe design that enables the dampers to assume desired fail-safe position.

- 1. When a smoke detector detects smoke, during testing or if power failure occurs, the damper shall close and remain closed.

- 2. When the smoke signal ceases (smoke detector resets), the test is complete or power restored the damper shall automatically reset to open position.

- 3. The damper shall automatically reset after the reset of the alarm system from a nuisance alarm.

2.6 BACKDRAFT DAMPERS

- A. Gravity backdraft dampers furnished with fans may be fan manufacturer's standard construction.

- B. For gravity relief air systems, provide counterbalanced, multi-blade, parallel action, gravity backdraft dampers with the following features:

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1. Frame shall be 6063T5 extruded aluminum, 0.090" thick wall, mitered corners.
2. Blades shall be 0.025" thick aluminum blade, vinyl edge seals.
3. Bearings shall be Non-stick, non-corrosive, synthetic.
4. Counterbalance shall be adjustable and factory set to open at 0.05"WG differential pressure.
 - a. Mechanical contractor shall verified factory setting during installation.
5. Performance specifications are based on Ruskin CBD2.
 - a. Other products satisfying the specifications are acceptable.

2.7 AIR TURNING DEVICES

- A. Multi-blade device with airfoil blades aligned in the short dimension; steel construction with fixed blades.
- B. Where not possible to construct tees, bends, and elbows with radius of not less than 1.5 times the width of the duct on centerline, and where square throat radius or mitered elbows are used, provide airfoil-turning vanes.
 1. Do not provide turning vanes in the kitchen hood exhaust system.
- C. Install the turning vanes in accordance with SMACNA construction standards.

2.8 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.
- B. NFPA 90A, UL listed, fire-retardant neoprene coated woven glass fiber fabric, minimum density 36 oz per sq. yd., approximately 3" wide, crimped into metal edging strip.
- C. Vinyl sheet a minimum 0.55" thick, 0.87 lbs per sq, ft 10-dB attenuation in 10 to 10,000-Hz range.

2.9 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.
 1. Frame: 22 gage galvanized steel with foam gasket seal.
 2. Door: Removable type with locks and safety chain, 22 gage galvanized steel, single skin for non-insulated ducts, double skin with 1" thick fiberglass insulation for insulated ducts.
 3. Locks: Sash type; one lock for doors 16" and smaller; two locks for doors larger than 16".
 4. Maximum Leakage Rates for double skin door 0.25 CFM/SF single skin door 0.45 CFM/SF.
 5. Performance specifications are based on Ruskin ADC12 and ADC22.
 - a. Nailor or other products satisfying the specifications are acceptable.
- B. Access doors with sheet metal screw fasteners are not acceptable.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions.
- B. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction.
 1. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings, and hinges.
- C. Demonstrate resetting of fire dampers to authorities having jurisdiction and District's representative.
- D. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

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- E. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.
 - 1. Air handler units with fan modules that are internally isolated do not require flexible connections.
 - 2. Cover connections to medium and high-pressure fans with vinyl sheet, held in place with metal straps.
 - F. Provide duct access doors for inspection, cleaning and maintenance service at control dampers, backdraft dampers, fire dampers, combination fire and smoke dampers, smoke dampers, smoke detectors, electric heaters, EMCS sensors and devices, and as indicated.
 - 1. Access door size shall be at least $\frac{3}{4}$ the width of the duct.
- 3.2 DEMONSTRATION AND TRAINING
- A. Training of the Owner's operation and maintenance personnel is required in cooperation with the Owner's Representative.
 - 1. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems.
 - 2. Schedule the instruction in coordination with the Owner's Representative after submission and approval of formal training plans.
 - 3. Refer to Section 01 91 00, Commissioning, for further contractor training requirements
 - B. Demonstration and training shall be provided for the following equipment covered by this section:
 - 1. Control Dampers
 - 2. Fire Dampers
 - 3. Combination Fire and Smoke Dampers
 - 4. Smoke Dampers
 - 5. Backdraft Dampers

END OF SECTION