

1.1. REFERENCE STANDARDS

- 1.1.1. Products in this section shall be built, tested, and installed in compliance with the following quality assurance standards; latest editions, unless noted otherwise.
 - 1.1.1.1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
 - 1.1.1.2. SMACNA "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.
 - 1.1.1.3. UL 555C "Standard for Fire Dampers."
 - 1.1.1.4. UL 555S "Standard for Smoke Dampers."

1.2. GENERAL DAMPER CONSTRUCTION REQUIREMENTS

- 1.2.1. Dampers shall be rated for the maximum close-off pressure at the installed location, but not less than the rating as indicated in the Damper Construction and Application Schedule.
- 1.2.2. Dampers installed in galvanized ductwork shall be all galvanized construction including blades, shafts, bearings, linkages, etc. or as indicated in other sections.

1.3. FIRE DAMPERS

1.3.1. Construction:

- 1.3.1.1. Devices shall be of the appropriate service for the partition rating into which they are installed.
- 1.3.1.2. Dampers shall meet the requirements of NFPA 90A and labeled in accordance with the latest editions of UL 555, UL 555S, and UL 555C.
- 1.3.1.3. Each damper shall be rated to close against the maximum design air velocity and pressure at its installed location, with an additional 2 m/s (400 fpm) velocity and 125 Pa (0.5 in. w.g.) static pressure safety factor.
- 1.3.1.4. Dampers of all ratings and types shall be of the nominal 100 percent face area type, with blade package and frame components out of the airstream (type B). Dampers shall include the required oversize enclosures that shall be sealed by the damper manufacturer for the appropriate duct pressure class. Dampers shall have rectangular, flat oval or round duct collars for connection to mating ductwork.
- 1.3.1.5. Furnish sleeves and mounting accessories as required per code.

1.3.2. Equipment

- 1.3.2.1. Fusible link temperature rating for fire dampers shall be 74 deg.C (165 degrees F), or 28 deg.C (50 degrees F) above the highest duct system temperature, whichever is greater.



- 1.3.2.2. Provide sleeves and mounting angles, minimum 1.9 mm (14 gage), required to provide installation equivalent to the damper manufacturer's UL test installation

1.4. BALANCE DAMPERS

- 1.4.1. For pressure dependent systems, as a minimum, provide balance dampers at each branch duct, at each outlet or inlet, and as indicated for supply air, return air, and exhaust air duct systems.
- 1.4.2. For pressure independent systems, as a minimum, balance dampers shall be provided at each branch for each outlet downstream of each supply air terminal.
- 1.4.3. Comply with SMACNA requirement and provide continuous rod and bearings on each end of shaft regardless of pressure class.

1.5. BACKDRAFT DAMPERS

- 1.5.1. Frames shall be flanged, a minimum of 75 mm (3 inches) wide, and a minimum of 20 gauge roll formed galvanized steel or 0.125 inch extruded aluminum with pre-punched mounting holes and welded corner clips for maximum rigidity.
- 1.5.2. Blades shall be a single piece, with a maximum width of 6 inches, counter-balanced, and shall be constructed of a minimum of 28 gauge roll formed galvanized steel or 0.070 inch extruded aluminum. Blade ends shall overlap for maximum weather protection.
- 1.5.3. Axles shall be stainless steel.
- 1.5.4. Mounting shall be suitable for the required orientation.

1.6. ACCESS DOORS IN DUCTWORK

- 1.6.1. Provide access doors in ductwork to permit access to the linkage side of automatic dampers, fire dampers, smoke damper, combination fire/smoke dampers, upstream side of coils, filters, humidifiers, airflow measuring stations, other equipment or devices requiring access or other locations as indicated on Drawings for cleaning, maintenance, or inspection purposes.
- 1.6.2. Hang access doors on heavy gauge continuous hinges and secure in the closed position by means of metal clinching type cam latches. Hinges shall move freely. Where space conditions preclude hinges, provide four heavy duty cam-lock type latches, in addition to a retainer chain.
- 1.6.3. Access doors shall be of double wall insulated construction of not less than 20 gauge sheet metal, neoprene gasketed around the entire perimeter. Insulation between the



metal panels shall be of the same thickness as the duct or panel adjacent to the access doors. Doors shall match duct material type, and at a minimum, the pressure class of the duct system in which they are installed.

- 1.6.4. Minimum Size: 600 mm x 600 mm (24" x 24") when permitted by duct size. For smaller ducts, provide largest size access door that can be accommodated by duct height or width

1.7. DUCT TEST HOLES

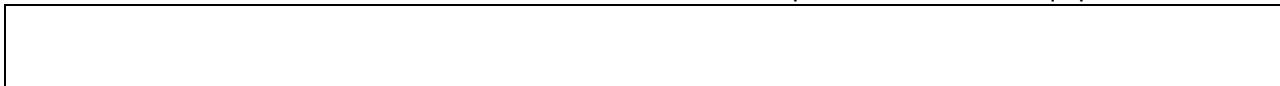
- 1.7.1. Permanent, factory fabricated duct test holes, with air-tight flanged fittings and screw cap. Provide extended neck fittings to clear insulation.

1.8. DUCT AIR TURNING VANES

- 1.8.1. Provide factory manufactured turning vanes in each elbow where inside radius is less than the width of the duct, and in all square elbows located in duct construction of greater than 50 Pa (2 inches w.g.)
- 1.8.2. Turning vane assemblies shall be adequately supported and affixed to prevent rattling, breakaway, and shall not deform. Assemblies longer than 300 mm (12 inches) shall be double wall.
- 1.8.3. Turning vanes in negative pressure ductwork with pressure rating above 50 Pa (2 inches) shall be installed in accordance with SMACNA Industrial Duct Construction Standard.
- 1.8.4. Turning vanes shall match the duct material construction.

1.9. FLEXIBLE CONNECTORS

- 1.9.1. Where duct connections are made to fans and air handling units (not internally isolated), install a non combustible flexible connection of 822 g (29 ounce) neoprene coated fiberglass fabric approximately 150 mm (6 inches) wide.
- 1.9.2. For connections exposed to sun and weather provide hypalon coating in lieu of neoprene.
- 1.9.3. Burning characteristics shall conform to NFPA 90A.
- 1.9.4. Securely fasten flexible connections to round ducts with stainless steel or zinc coated iron draw bands with worm gear fastener. For rectangular connections, crimp fabric to sheet metal and fasten sheet metal to ducts by screws 50 mm (2 inches) on center. Fabric shall not be stressed other than by air pressure. Allow at least 25 mm (one inch) slack during operation to insure that no vibration is transmitted.
- 1.9.5. Flexible connectors shall be rated for the same pressure as duct or equipment.



1.10. SOUND ATTENUATORS

- 1.10.1. All silencers shall be factory fabricated and supplied by the same manufacturer. Inlet and outlet dimensions must be equal to duct sizes shown whether rectangular or round. Duct transitions at silencers are not permitted unless shown.
- 1.10.2. Outer casing shall be a minimum of 1.0 mm (20 gauge) G-90, galvanized steel or 1.3 mm (18 gage) aluminum fitted with suitable flanges to make clean airtight connections to ductwork. Inner partitions shall be minimum of 24 gauge G-90 galvanized steel. Casings shall be airtight.
- 1.10.3. Sound absorbent material faced with glass fiber cloth and covered with not less than 0,6 mm (24 gage) or heavier galvanized perforated sheet steel, or 0.85 mm (22 gage) or heavier perforated aluminum. Perforations shall not exceed 4 mm (5/32 inch) diameter, approximately 25 percent free area. Sound absorbent material shall be long glass fiber acoustic blanket meeting requirements of NFPA 90A.
- 1.10.4. Sound absorbent material shall be inert, vermin-proof, moisture-proof.
- 1.10.5. Mounting shall be suitable for the required orientation. Entire unit shall be completely air tight and free of vibration and buckling at internal static pressures up to 200 Pa (8 inches W.G.) at operating velocities.

