

1. GENERAL

1.1 Scope

- .1 Ductwork and plenums.
- .2 Fasteners.
- .3 Sealants.
- .4 Duct cleaning.

1.2 Definitions

- .1 Low Pressure: Static pressure in duct less than 500 Pa (2 in wg) and velocities less than 10 m/s (2000 fpm).
- .2 Medium Pressure: Static pressure in duct less than 1500 Pa (6 in wg) and velocities greater than 10 m/s (2000 fpm).
- .3 High Pressure: Static pressure over 1500 Pa (6 in wg) and less than 2500 Pa (10 in wg) and velocities greater than 10 m/s (2000 fpm).
- .4 Duct sizes shown on plans are inside clear dimensions. For acoustically lined or internally insulated ducts, maintain sizes inside ducts.

1.3 Quality Assurance

- .1 Ductwork shall meet the requirements of NFPA No. 90A - Air Conditioning and Ventilating Systems; *NFPA No. 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems.
- .2 Fabricate in accordance with SMACNA duct manuals and ASHRAE handbooks.
- .3 Flexible air duct shall conform to NFPA 90A and UL181 standard for factory made air duct materials and air duct connectors.

1.4 Submittals

- .1 Submit shop drawings and samples of duct fittings for review, including particulars such as gauge sizes, welds and configurations prior to start of work.

1.5 Alternatives

- .1 Obtain written permission from the Contract Administrator prior to making variations in duct configuration or sizes. Size alternatives using ASHRAE table for circular equivalents of rectangular ducts.

2. PRODUCTS

2.1 Materials

- .1 Ducts: Galvanized steel lock forming quality, having galvanized coating of *380 g/m² (1.25 oz/ft²) for both sides.
- .2 Fasteners: Use rivets and bolts throughout; sheet metal screws accepted on low pressure ducts.
- .3 Sealant: Water resistant, fire resistive, compatible with mating materials.

2.2 Plenums

- .1 Plenums to be double wall construction.
- .2 Provide 150 mm (6 in) base rail of similar construction to the air handling units.
- .3 Plenums to be watertight.

3. EXECUTION

3.1 Installation

- .1 Fabricate ductwork from field measurements and not from plans and shop drawings exclusively. Failure to do so will not constitute an extra to the Contract.
- .2 Complete metal ducts within themselves with no single partition between ducts. Where width of duct exceeds *450 mm (18 in) crossbrace for rigidity. Open corners are not acceptable.
- .3 Lap metal ducts in direction of air flow. Hammer down edges and slips to leave smooth duct interior.
- .4 Construct tees, bends and elbows with radius of not less than 1-1/2 times width of cut on centre line. Where not possible and where rectangular elbows are specified, provide double wall air foil type turning vanes. Where acoustical lining is provided, provide turning vanes of perforated metal type with fibreglass inside.
- .5 Increase duct sizes gradually, not exceeding 15° divergence wherever possible. Maximum divergence upstream of equipment to be 30° and 45° convergence downstream.
- .6 Rigidly construct metal ducts with joints mechanically tight, substantially airtight, braced and stiffened so as not to breathe, rattle, vibrate or sag. Caulk duct joints and connections with sealant as ducts are being assembled. Seal seams on fresh air and exhaust ducts watertight with mastic or low velocity duct sealant.

3.2 Plenum Gauges

- .1 Fabricate fan plenums and plenums downstream of fan in accordance with SMACNA manual.
- .2 Fabricate plenums between fan and upstream apparatus of 1.6 mm (16 ga) thick material.

3.3 Duct Sealing

- .1 All supply, return and exhaust duct joints, longitudinal as well as transverse, should be sealed using:
 - .1 Low Pressure Ductwork:
 - .1 Slip Joints: Apply heavy brush-on high pressure duct sealant. Apply second application after the first application has completely dried out. Where metal clearance exceeds 1.5 mm (0.06 in) use heavy mastic type sealant.
 - .2 Flanged Joints: Soft elastomer butyl or extruded form of sealant between flanges followed by an application of heavy brush-on high pressure duct sealant.
 - .3 Other Joints: Heavy mastic type sealant.
 - .2 Medium and High Pressure Ductwork: Combination of woven fabrics and sealing compound followed by an application of high pressure duct sealant.
- .2 Duct tapes as sealing method are not permitted.
- .3 Surfaces to receive sealant should be free from oil, dust, dirt, moisture, rust and other substances that inhibit or prevent bonding.
- .4 Prior to sealing all ductwork, demonstrate sealing of a section of each type of duct to the satisfaction of the Contract Administrator.
- .5 Do not insulate any section of the ductwork until it has been inspected and accepted of duct sealant application.

3.4 Installation

- .1 Locate ducts with sufficient space around equipment to allow normal operation and maintenance activities.
- .2 Co-ordinate the location of duct access doors. Refer to Section 15835 - Duct Accessories and 15840 - Ductwork Cleaning.
- .3 Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

DUCTWORK

- .4 Interrupt duct linings at fire, balancing backdraft and smoke dampers so as not to interfere with operation of devices. Provide sheet metal edge protection over linings on both sides of damper device.
- .5 Shield ductwork from dust and construction material during construction. Clean any ductwork found to be dirty at no extra cost to the Contract.
- .6 Protect carbon steel ductwork exposed to weather by painting or coating with suitable weather resistant material.
- .7 Install ducts associated with fans subject to forced vibration with flexible connections immediately adjacent to equipment. Refer to Section 15835 - Duct Accessories.
- .8 Do not use flexible duct to change direction. Provide a minimum of three (3) duct diameters of straight metal duct between box inlet and flexible connector.
- .9 Prove that ductwork is substantially air tight before covering or concealing.
- .10 Clean duct systems and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with filters or bypass during cleaning.
- .11 Clean systems with power vacuum machines. Refer to Section 15840 - Ductwork Cleaning.

END OF SECTION