

CHASE
SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general Provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification sections, apply to Work of this Section.

1.2 WORK INCLUDED

- A. This Contractor shall furnish all labor, material, equipment and services required to execute, install and complete, ready for use, all plumbing work including sanitary and water systems for the project, according to the drawings and these specifications.

1.3 SUBMITTALS

- A. Submit product data on duct liner, sealing materials, and fire-stopping materials.

1.4 COMPLIANCE

- A. Comply with NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems," except as indicated otherwise.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS, GENERAL

- A. Provide the following materials where indicated. Package and mark sheet metal materials as specified in ASTM A 700.
- B. Galvanized Sheet Steel: Lock-forming quality, ASTM A527, Coating Designation G90, mill phosphatized finish for exposed surfaces of ducts exposed to view.

2.2 REINFORCEMENT SHAPES AND PLATES

- A. Unless otherwise indicated, provide galvanized steel reinforcing where installed on galvanized sheet metal ducts.

2.3 TIE RODS

- A. Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 JOINT AND SEAM TAPE

- A. 2 inches wide, glass-fiber-fabric reinforced.

2.5 TAPE SEALING SYSTEM

- A. Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with the tape to form a hard, durable, airtight seal.

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2.6 JOINT AND SEAM SEALANT

- A. One-part, nonsag, solvent-release-curing, polymerized butyl sealant complying with FS TT-S-001657, Type I; formulated with a minimum of 75 percent solids.

2.7 FLANGED JOINT MASTICS

- A. One-part, acid-curing, silicone elastomeric joint sealants, complying with ASTM C920, Type S, Grade NS, Class 25, Use O.

2.8 FIRE-STOPPING

- A. Refer to Division 7 Section "Joint Sealers."

2.9 FIRE-RESISTANT SEALANT

- A. Provide two-part, foamed-in-place, fire-stopping silicone sealant formulated for use in a through-penetration fire-stop system for filling openings around duct penetrations through walls and floors, having fire-resistance ratings indicated as established by testing identical assemblies per ASTM E 814 by Underwriters Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.

2.10 FIRE-RESISTANT SEALANT

- A. Provide one-part elastomeric sealant formulated for use in a through-penetration fire-stop system for filling openings around duct penetrations through walls and floors, having fire-resistance ratings indicated as established by testing identical assemblies per ASTM E 814 by Underwriters Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. "Dow Corning Fire Stop Foam"; Dow Corning Corp.
 - 2. "Pensil 851"; General Electric Co.
 - 3. "Dow Corning Fire Stop Sealant"; Dow Corning Corp.
 - 4. "3M Fire Barrier Caulk CP-25"; Electrical Products Div./3M.
 - 5. "RTV 7403"; General Electric Co.
 - 6. "Fyre Putty"; Standard Oil Engineered Materials Co.

2.11 HANGERS AND SUPPORTS

- A. Provide the following hanger and support components as indicated.
- B. Building Attachments:
 - 1. Concrete inserts, powder actuated fasteners, or structural steel fasteners appropriate for building materials.
 - 2. Do not use powder actuated concrete fasteners for lightweight aggregate concretes or for slabs less than 4 inches thick.
- C. Hangers:
 - 1. Galvanized sheet steel, or round, uncoated steel, threaded rod.
 - 2. Hangers Installed In Corrosive Atmospheres:

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- a. Electro-galvanized, all-thread rod or hot-dipped-galvanized rods with threads painted after installation.
- 3. Straps and Rod Sizes:
 - a. Conform to Table 4-1 in SMACNA HVAC Duct Construction Standards, 1985 Edition, for sheet steel width and gage and steel rod diameters.
- D. Duct Attachments:
 - 1. Sheet metal screws, blind rivets, or self-tapping metal screws, compatible with duct materials.

2.12 TRAPEZE AND RISER SUPPORTS

- A. Steel shapes conforming to ASTM A36.
- B. Where galvanized steel ducts are installed, provide hot-dipped-galvanized steel shapes and plates.
- C. For stainless steel ducts, provide stainless steel support materials.
- D. For aluminum ducts, provide aluminum support materials, except where materials are electrolytically separated from ductwork.

2.13 RECTANGULAR DUCT FABRICATION

- A. Except as otherwise indicated, fabricate rectangular ducts with galvanized sheet steel, in accordance with SMACNA "HVAC Duct Construction Standards," Tables 1-3 through 1-19, including their associated details.
- B. Conform to the requirements in the referenced standard for metal thickness, reinforcing types and intervals, tie rod applications, and joint types and intervals.
- C. Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
- D. Provide materials that are free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.

2.14 RECTANGULAR DUCT FITTINGS

- A. Fabricate elbows, transitions, offsets, branch connections, and other duct construction in accordance with SMACNA "HVAC Metal Duct Construction Standard," 1985 Edition, Figures 2-1 through 2-10.

2.15 ROUND AND FLAT OVAL DUCT FABRICATION

- A. "Basic Round Diameter" as used in this article is the diameter of the size of round duct that has a circumference equal to the perimeter of a given sized of flat oval duct. Except where interrupted by fittings, provide round and flat oval ducts in lengths not less than 12 feet.
- B. Round Ducts:
 - 1. Fabricate round supply ducts with spiral lockseam construction, except where diameters exceed 72 inches.

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2. Fabricate ducts having diameters greater than 72 inches with longitudinal butt-welded seams.
 3. Comply with SMACNA "HVAC Duct Construction Standards," Table 3-2 for galvanized steel gages.
- C. Round Ducts:
1. Fabricate round supply ducts using seam types identified in SMACNA "HVAC Duct Construction Standards," 1985 Edition, Figure 3-1, RL-1, RL-4, or RL-5.
 2. Seams Types RL-2 or RL-3 may be used if spot-welded on 1-inch intervals.
 3. Comply with SMACNA "HVAC Duct Construction Standards," Table 3-2 for galvanized steel gages.
- D. Flat Oval Ducts:
1. Fabricate flat oval supply ducts with standard spiral lock seams (without intermediate ribs) or with butt-welded longitudinal seams in gages listed in SMACNA "HVAC Duct Construction Standards," Table 3-4.
- E. 90-Degree Tees and Laterals and Conical Tees: Fabricate to conform to SMACNA "HVAC Duct Construction Standards," 1985 Edition, Figures 3-4 and 3-5 and with metal thickness specified for longitudinal seam straight duct.
- F. Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from the body onto branch tap entrance.
- G. Elbows: Fabricate in die-formed, gored, pleated, or mitered construction. Fabricate the bend radius of die-formed, gored, and pleated elbows 1.5 times the elbow diameter.
1. Round Elbows - 8 Inches and Smaller: Die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend angle configurations or 1/2-inch-diameter (e.g. 3-1/2- and 4-1/2-inch) elbows with gored construction.
 2. Round Elbows - 9 Through 14 Inches: Gored or pleated elbows for 30, 45, 60, and 90 degrees, except where space restrictions require a mitered elbow. Fabricate nonstandard bend angle configurations or 1/2-inch-diameter (e.g. 9-1/2- and 10-1/2-inch) elbows with gored construction.
 3. Round Elbows - Larger Than 14 Inches and All Flat Oval Elbows: Gored elbows, except where space restrictions require a mitered elbow.
 4. Die-Formed Elbows for Sizes Through 8 Inches and All Pressures: 20 gage with 2-piece welded construction.
 5. Round Gored Elbows Gages: Same as for non-elbow fittings specified above.
 6. Flat Oval Elbows Gages: Same as longitudinal seam flat oval duct.
 7. Pleated Elbows Sizes Through 14 Inches and Pressures Through 10 Inches: 26 gage.

PART 3 - EXECUTION

3.1 DUCT SYSTEM PRESSURE CLASS

- A. Construct and install each duct system for the specific duct pressure classification indicated.

3.2 INSTALLATION

- A. Install ducts with the fewest possible joints.

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- B. Use fabricated fittings for all changes in directions, changes in size and shape, and connections.
- C. Install couplings tight to duct wall surface with projections into duct at connections kept to a minimum.
- D. Locate ducts, except as otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs. Install duct systems in shortest route that does not obstruct useable space or block access for servicing building and its equipment.
- E. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- F. Provide clearance of 1 inch where furring is shown for enclosure or concealment of ducts, plus allowance for insulation thickness, if any.
- G. Install insulated ducts with 1-inch clearance outside of insulation.
- H. Conceal ducts from view in finished and occupied spaces by locating in mechanical shafts, hollow wall construction, or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown.
- I. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

3.3 ELECTRICAL EQUIPMENT SPACES

- A. Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

3.4 NON-FIRE-RATED PARTITION PENETRATIONS

- A. Where ducts pass interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct.
- B. Overlap opening on 4 sides by at least 1-1/2 inches.

3.5 SEAM AND JOINT SEALING

- A. Seal duct seams and joints as indicated in this specification.
- B. Pressure Classifications Greater Than 3 Inches Water Gage:
 - 1. All transverse joints, longitudinal seams, and duct penetrations.
- C. Pressure Classification 2 and 3 Inches Water Gage:
 - 1. All transverse joints and longitudinal seams.
- D. Pressure Classification Less than 2 Inches Water Gage:
 - 1. Transverse joints only.
- E. Seal externally insulated ducts prior to insulation installation.

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3.6 HANGING AND SUPPORTING

- A. Install and support ducts as follows unless indicated otherwise:
- B. Rigid Round, Rectangular, and Flat Oval: As indicated in SMACNA "HVAC Duct Construction Standards," Tables 4-1 through 4-3 and Figures 4-1 through 4-8.
- C. Horizontal Ducts: Within 2 feet of each elbow and within 4 feet of each branch intersection.
- D. Vertical Ducts: At a maximum interval of 16 feet and at each floor.
- E. Upper Attachments To Structures: Allow for a load not exceeding 1/4 of the failure (proof test) load, but are not limited to the specific methods indicated.
- F. Install concrete insert prior to placing concrete.
- G. Install powder actuated concrete fasteners after concrete is placed and completely cured.

3.7 CONNECTIONS

- A. Make duct connections as specified below unless indicated otherwise:
- B. Equipment Connections: Connect equipment with flexible connectors in accordance with Division 15 Section "Duct Accessories."
- C. Branch Connections: Comply with SMACNA "HVAC Duct Construction Standards," Figures 2-7 and 2-8.
- D. Outlet and Inlet Connections: Comply with SMACNA "HVAC Duct Construction Standards," Figures 2-16 through 2-18.
- E. Terminal Units Connections: Comply with SMACNA "HVAC Duct Construction Standards," Figure 2-19.

3.8 ADJUSTMENTS AND CLEAN-UP

- A. Adjust volume control devices as required by the testing and balancing procedures to achieve required airflow.
- B. Refer to Division 15 Section "TESTING, ADJUSTING, AND BALANCING" for requirements and procedures for adjusting and balancing air systems.
- C. Vacuum ducts systems prior to final acceptance to remove dust and debris.

END OF SECTION