SECTION 23 31 13

METAL DUCTSMETAL DUCTS

This document is intended to note the Owners Design Requirements (ODR) for the titled specification section. Design professional to review and integrate ODR into the project's technical specifications. This ODR document should not be viewed as a standalone technical specification.

PART 1 - GENERAL REQUIREMENTS

- SYSTEM PERFORMANCE REQUIREMENTS
  - Changes or alterations to the layout or configuration of the duct system must be specifically approved in writing. Accompany requests for layout modifications with calculations showing that the proposed layout will provide the original design results without increasing the system total pressure.

PART 2 - PRODUCTS AND MATERIALS

- SHEET METAL MATERIALS
  - Sheet Metal, General: Provide sheet metal in thickness of minimum 26 gauge.
  - Galvanized Sheet Steel: Lock-forming quality, ASTM A 653, Coating Designation G 90.
- DUCT LINER
  - Flexible Elastomeric Duct Liner: Insulation material shall be a flexible, closed cell, elastomeric insulation in sheet form.
- SEALING MATERIALS
  - Duct tape shall not be used as a sealant on any ducts.
- FIRE-STOPPING
  - Fire-Resistant Sealant: 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.
  - Products: Subject to compliance with requirements, provide one of the following:
    - "3M Fire Stop Foam"; 3M Corp.
    - OWNER approved equal
- RECTANGULAR DUCT FABRICATION
  - Exterior Ductwork: Ductwork installed exterior to the building shall be minimum #18 gauge with longitudinal and transverse joints welded or sealed airtight.
- RECTANGULAR DUCT FITTINGS
  - Provide prefabricated 45 degree, high efficiency, rectangular/round branch duct takeoff fittings with manual balancing damper and locking quadrant for branch duct connections and take-offs to individual diffusers, registers and grilles.
  - Provide radius elbows, turns, and offsets with a minimum centerline radius of 1-1/2 times the duct width. Where space does not permit full radius elbows, provide short radius elbows with a minimum of two continuous splitter vanes. Vanes shall be the entire length of the bend.
- ROUND SUPPLY AND EXHAUST FITTINGS FABRICATION
  - 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. Unless elbow construction type is indicated, provide elbows meeting the following requirements:
    - Mitered Elbows: Fabricate mitered elbows with welded construction in gauges specified below.
      - Round Mitered Elbows: Solid welded and with metal thickness listed below for pressure classes from minus 2 inches to plus 2 inches:
        - 3 to 26 inches: 24 gauge.

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- 27 to 36 inches: 22 gauge.
- 37 to 50 inches: 20 gauge.

- Round Mitered Elbows: Solid welded and with metal thickness listed below for pressure classes from 2 inches to 3 inches:
  - 3 to 14 inches: 24 gauge.
  - 15 to 26 inches: 22 gauge.
  - 27 to 50 inches: 20 gauge.
- Continuously Welded Elbows: Continuously welded and with metal thickness listed below for pressure classes greater than 3 inches:
  - 3 to 14 inches: 24 gauge.
  - 15 to 26 inches: 22 gauge.
  - 27 to 50 inches: 20 gauge.

- 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.
- 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.
- Die-Formed Elbows for sizes through 8 Inches and all pressures: 20 gauge with 2-piece welded construction.

PART 3 - EXECUTION

- Duct liner application
  - Application: Provide duct liner on interior, rectangular and round, supply air ducts only where necessary for acoustical reasons- eg. Connections to HVAC units with fans
- DUCT INSTALLATION, GENERAL
  - Duct System Pressure Class:
    - Constant Volume Supply Air Ducts: 3 inches water gauge.
    - Primary Supply Air Ducts (upstream of terminal boxes): 4 inches water gauge.
    - Secondary Supply Air Ducts (downstream of terminal boxes): 2 inches water gauge
    - Return and Outdoor Air Ducts: 2 inches water gauge, negative pressure.
    - Exhaust Air Ducts: 2 inches water gauge, negative pressure.
  - Cover ducts openings during construction with duct caps or three-mil plastic to protect inside of (installed and delivered) ductwork from exposure to dust, dirt, paint and moisture. Do not use duct tape on ducts that will be exposed or painted.
- SEAM AND JOINT SEALING
  - Seal externally insulated ducts prior to insulation installation.
  - All air ducts shall be sealed to meet SMACNA Seal Class A.
  - Ductwork shall have longitudinal and transverse joints welded or sealed airtight.
- HANGING AND SUPPORTING

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- Hanger spacing shall not exceed 8'-0"
- Support horizontal ducts within 2 feet of each elbow and within 4 feet of each branch intersection.
- Hangers and supports shall be fastened to building joists or beams. Do not attach hangers and supports to the above floor slab or roof with sheet metal screws.
- Install powder actuated concrete fasteners after concrete is placed and completely cured.

♦ CONNECTIONS

- Equipment Connections: Connect equipment with flexible connectors.
- Branch Connections: Use high efficiency branch connections
- Diffuser/Grille Connections: Flexible duct cannot exceed 5'-0" in total length and only in systems with less than 3"WG of pressure.
  - Where a 90-degree elbow is required at the connection to air devices provide:
    - A rigid duct elbow or
    - A flexible elbow supported by a product similar to Thermoflex flex elbow on systems.

♦ FIELD QUALITY CONTROL

- High Pressure (>3" w.c.) Ductwork: Ducts and plenums shall be leak tested in accordance with SMACNA HVAC Air Duct Leakage Test Manual to prove they meet leakage classification less than or equal to 6. Submit test reports to the Owner demonstrating that at least 25 percent of the installed duct area has been tested and pass this test.

♦ CLEANING

- Provide filtration at diffusers to keep debris removed from HVAC systems from contaminating other spaces. Locate exhaust down wind and away from air intakes and other points of entry into building.
- Use HEPA duct machine and HEPA rated vacuum to clean ducting.
- Block off diffusers not being cleaned to create a stronger vacuum.
- Vacuum duct systems prior to final acceptance to remove dust and debris.
- Clean all supply diffusers and return/exhaust grilles in system.
- On existing system, mark position of dampers and air-directional mechanical devices before cleaning, and restore to their marked position on completion.
- When a hole is placed within ductwork for access, a patch will not be allowed. An access door must be installed at location.

END OF SECTION