

SECTION XXXXX – FIBERGLASS REINFORCED PLASTIC DUCTWORK (FRP)

Part 1 General

1.1 Summary:

- A. Section includes:
 - a. Thermoset FRP ducts and fittings
- B. Related Sections:
 - a. Section XXXXX “Testing, Adjusting and Balancing for HVAC” for testing, adjusting and balancing requirements for nonmetal ducts.
 - b. Section XXXXX “Metal Ducts” for single and double wall, rectangular and round ducts.
 - c. Section XXXXX “Air Design Accessories” for dampers, duct-mounting access doors and panels, turning vanes and flexible ducts.

1.2 References:

- A. Comply with the latest revision of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
 - a. American Society for Testing Materials (ASTM):
 - i. C 582 Contact-Molded reinforced Thermosetting Plastic (RTP) Laminated for Corrosion-Resistance Equipment
 - ii. D 2412
 - iii. D 2996 Filament-Wound “Fiberglass” (Glass Fiber Reinforced Thermosetting Resin) Pipe and Fittings.
 - iv. D 3982 Contact-Molded “Fiberglass” (Glass Fiber Reinforced Thermosetting Resin) Duct and Hoods
 - v. E 84 Standard Test Method for Surface Burning Characteristic of Building Materials
 - b. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
 - i. Thermoset FRP Duct Construction Manual
 - c. United States Department of Commerce:
 - i. NPS 15-69
 - d. Underwriters Laboratories (UL181)
 - i. UL 181

1.3 Submittals

- A. Product Data:
 - a. Resin
 - b. Glass
 - c. Gel Coat
- B. Coordination Drawings: Plans drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - a. Duct installation in congested spaces, indicating coordination with general construction, building components and other building services. Indicated proposed changes to duct layout.
 - b. Suspended ceiling components.
 - c. Structural members to which duct will be attached.

- d. Penetrations of smoke barriers and fire-rated construction.
- C. Verification that the resin to be supplied has been tested by an ASTM E84 Nationally Recognized Testing Laboratory to comply with UL 181 Class 1 standards of low smoke and low flame. Certification shall be current within ten (10) years of project start date.

Part 2-Products

2.1 Thermoset FRP Ducts and Fittings

A. Resin:

- a. Thermoset FRP Resin: Manufacture duct with Monoxivent 824 modified acrylic resin that complies with UL 181, Class 1, maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested by an NRTL according to ASTM E 84.
- b. The use of liners to achieve the indicated smoke and flame spread development will not be accepted.

B. Insulation:

- a. Double-Wall Insulated Duct: Inner and outer duct complying with requirements for "Round Duct" description. Closed Cell Polyurethane Foam insulation with maximum thermal conductivity of 0.14 BTU x in. / h x sq. ft. x deg F at 75 deg. F mean temperature

R7	1" THK
R10	1.5" THK

C. Reinforcement:

- a. Surfacing Veil shall be "C" glass veil with a silane finish and a styrene soluble binder.
- b. Chopped Strand Mat shall be Type E Glass with a minimum 1-1/2 ounce per square foot with silane finish and styrene soluble binder.
- c. Woven Roving shall be Type E glass minimum 24 ounces per square yard.
- d. Continuous Roving for a filament binding shall be Type E glass with a silane finish.

D. Construction:

- a. Fabricate joints, seams, transitions, reinforcement, elbows, branch connections, and access doors and panels, according to SMACNA's "Thermoset FRP Duct Construction Manual" Chapter 7, "Requirements".
- b. FRP ductwork shall be design safety factor of 10 to 1 for pressure and 5 to 1 for vacuum
- c. Out of roundness of duct shall be limited to $\pm 1/4$ "
- d. Round Duct: Filament wound minimum Thickness:

2" to 20" diameter	0.125" THK
22" to 36" diameter	0.1875" THK
38" to 96" diameter	0.25" THK

E. Lamination:

- a. All ductwork shall have any interior and exterior "C" veil liner 10 mil thick.
- b. Structural layer shall be fabricated toward Winding or Hand lay-up Standard.
- c. Exterior:
 - i. Below ground to have a "C" veil layer.
 - ii. Above ground to have a "C" veil layer and White paraffinated gel coat with UV inhibitors

F. Fittings:

- a. All fittings shall be made out of the same resin and having the same strength as the FRP ductwork
- b. The internal diameter of all fittings shall be equal to the adjacent duct
- c. The tolerance on angles of all fittings shall be $\pm 1^\circ$ up to and including 24" diameter and $\pm 1/2^\circ$ for 30" diameter and above.

G. Elbows:

- a. Elbows Centerline radius shall be 1-1/2 times the diameter.

- b. Fabricate 45-degree elbows with a minimum of two (2) segments and 90-degree round elbows with a minimum of three (3) segments.
- H. Drains:
- a. When required, formed drain pockets with a minimum of NPS 1” threaded pipe connections
- I. Joints:
- a. Field Joints to be Butt & Wrap type for wet lay-up method.
 - b. Field joint kits sent out in bulk form with an extra 20% material for waste
 - c. Resin to be same as duct

Part 3-Execution

3.1 Duct Installation

A. General

- a. Store Resin, glass reinforcing and curing agent in a cool, dry area to maximize shelf life.
- b. Upon arrival at the installation site the customer shall examine the duct for any damage that may have occurred in transit.
- c. Follow ASTM D 3982 Table 1 for recommended hanger spacing.
- d. Use flexible connections to isolate ductwork from vibration caused by air-moving equipment (By Others).
- e. Unload the duct system with care and store in a location where it will be free of damage. Impact of a tool or other heavy object may result in a fracture of the inner lining and may affect the service life of the duct.
- f. Support large sub-assemblies during unloading and transportation to prevent excessive deflection and over stressing.
- g. Use full-face gaskets to eliminate any cantilever effect caused from bolting.
- h. Tighten bolts on flange connections following torque values given in Table1 per ASTM D 3982.
- i. Follow manufactures Field Jointing instructions for bonding ductwork together.

B. Burial

- a. Ductwork Trench shall be dug so that it will be 1.5 times wider than then diameter of the duct.
- b. Fill bottom of trench with a minimum of 6” of back fill (sand or pea gravel) compacted to 80%-90%.
- c. Grade Trench with a 1% pitch back to the largest diameter duct.
- d. Backfill in 6” lift increments compacting 80%90%.
- e. A minimum of 4” of backfill overtop the duct system is required.

3.2 Field Quality Control

A. Leakage Test:

- a. Comply with SMACNA’s “HVAC Air Duct Leakage Test Manual”. Submit a test report for each test.
- b. Test the following systems:
 - i. Supply Ducts with a Pressure Class of 2-inch w.g. or higher: Test representative duct sections totaling no less than 100 percent of total installed duct area for each designated pressure class.

- ii. Return Ducts with a Pressure Class of 2-inch w.g. or higher: Test representative duct sections totaling no less than 100 percent of total installed duct area for each designated pressure class.
- c. Disassemble, reassemble and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
- d. Test for leaks before burial of ducts.
- e. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.

END OF SECTION XXXXX