



Industrial Fiberglass Specialties, Inc.

521 Kiser Street

Dayton, Ohio 45404-1641

Telephone = (937) 222-9000 - Fax = (937) 222-9020

Series 9600 Filament Wound FRP Composite Duct and Fittings

**For corrosive, fire retardant, low smoke and
high temperature duct & fume service**

Uses and Applications:

Chemical process fume duct
Fire retardant applications
Buried ducting systems
Duct installed under concrete floors, parking areas, and roads
Elevated temperature chemical applications
Duct applications requiring solvent resistance
Low smoke generation for ducting and stacks
Low smoke toxicity (Meets New York Fire Marshall Tests)
Excellent physical properties to 400^o F.
An alternative to costly alloys and specialty metals.
Outstanding flame spread resistance
Industrial service for corrosive fumes

Description: Composition:

Filament-wound fiberglass reinforced phenolic composite duct.
ASTM D-2996 Classification Type I, Grade 2, Class E.
Nominal 10 mil glass veil reinforced corrosion barrier, followed by a nominal 90 mil corrosion liner reinforced with fiberglass chopped strands, followed by a fiberglass filament wound structural overwrap
A premium grade heat-cured fire-retardant phenolic resin is used throughout the inner corrosion barrier/liner (Borden Chemical's FIRE PRF₂ or Georgia Pacific's 5018 phenolic.) The same premium grade fire retardant phenolic resin is used in the filament wound structural portion on all laminates. The phenolic resin is used in the manufacture of this duct to provide low smoke, low toxicity and good inherent fire retardant properties. The FIRE PRF₂ and GP 5018 phenolic resin meets the test requirements of the New York Fire Marshall's Standards for low smoke toxicity. The exterior of all laminates is factory post coated with a UV resistant polymer coating.

Duct Sizes: Duct Lengths:

137+ different diameters, ranging from a tiny 3/8" diameter up to a mammoth 168" diameter Duct available built to iron pipe outside diameters (ASTM D-2996, Table 3), as well as duct built to chemical process piping inside diameter standards. A current list of duct sizes is available upon request. New sizes are being added regularly.

3/8" & 1/2" diameter duct is built in 5 ft. lengths.

3/4" & 7/8" diameter duct is built in 7 ft. lengths.

1" thru 1-1/2" diameter duct is built in 10 ft. lengths.

2" thru 24" diameter duct is available in 20 ft lengths.

8" thru 144" diameter duct is available in 40 ft lengths.

Burial Installations:

As a custom manufacturer of pipe, duct and fittings, we can design and build pipe and duct to handle burial conditions ranging from live loads due to highway and rail traffic - to earth loads of 100 ft. or greater. We even have experience with underwater installations. Our engineers will welcome the opportunity to work with you on a pipe and duct design, backfill selection and installation methods to meet your specific requirements. The result will be your lowest cost per year of service life (installed basis).

Supported Span Installations:

Again, we can design and build pipe and duct to provide you the lowest cost for supported span installed pipe and duct. Since we are not limited to just a few pipe and duct wall thicknesses and filament winding angles - we can select and choose the combination of pipe and duct design and support design and cost that will provide your "best buy". Consult with our engineers for help with your specific requirements.

Fittings:

Elbows, standard are 22-1/2°, 30°, 45°, and 90°. Any angle elbow available on special order. Elbows through 48" diameter are available as smooth radius. Mitered elbows are available in all sizes.

Reducing elbows

Tees

Reducing tees

Concentric taper body reducers

Eccentric taper body reducers

Saddles, with FRP and stainless steel threaded outlets, bell outlets, spigot outlets and flanged outlets.

Wear pads (blank saddles)

Crosses

Reducing Crosses

Laterals

Reducing Laterals

True wyes

P-Traps and 180° U-Bends.

Floor drains

Expansion joints

Pipe couplings

Threaded (NPT) couplings

Adapters, bell by NPT thread (male or female threads available).

Adapters, spigot by NPT thread (male or female threads available).

Pipe nipples

Threaded nipples

Reducing bushings and threaded adapter bushings.

Fitting and pipe plugs Pipe caps.

Blind flanges

Threaded flanges

Reducing flanges

Orifice flanges

All fittings are available as adhesive socket, plain end, flanged end, bell and spigot O-Ring; or any combination. See full Industrial Fiberglass' catalog for sizes, dimensions and tolerances. Fittings are available from 2" diameter through 84" diameter. We welcome the opportunity to work with our customers on special fittings.

Performance:

Good corrosion resistance over a wide temperature range. Temperatures from sub-zero to 400°F.

Advantages:

Working pressures from NBS-PS-15-69 duct to 150 psi+, depending upon diameter and wall thickness.

Vacuum to -14.7 psig for all sizes, by selection of wall thicknesses, ribs and filament wind angle.

Available for earth burial, all depths, with selection of wall thicknesses, ribs and filament wind angle.

Weighs 1/6 as much as steel. Thus, lower installed costs.

Smooth inner surface produces very low frictional loss for reduced pumping and fan blower costs. Hazen-Williams flow coefficient of 150.

Recommended for a wide range of corrosion applications. Consult with Industrial Fiberglass, or the resin manufacturer, for specific project recommendations.

Joining systems:

Bell (socket) and spigot structural adhesive weld bonded joints. Adhesive bonded joints are available as your choice of straight/straight, straight/taper and taper/taper.

Threaded joints (NPT) through 12" diameter. Other thread configurations available upon special order.

Flanges, all sizes through 84" diameter. ANSI 150 lb., 300 lb. and 600 lb. all available as standard. Any pressure rating and drilling pattern available on order.

Van Stone, loose ring style, flanges.

Flange Spacers - all diameters, bolt hole patterns and thicknesses, built to order.

Bell and spigot O-Ring joints, thru 120" diameter.

Bell and spigot O-Ring joints with locking key for restrained ends.

Mechanical Couplings, including Victaulic and Taylor-Kerr.

Repair (maintenance) couplings.

Physical Properties:

See Table 1 for typical physical properties of Series 9600 filament wound FRP composite pipe and duct. These are conservative properties that can be used for the design of FRP pipe and duct for pressure, vacuum, supported span and burial conditions.

Mechanical Properties:

Contact Industrial Fiberglass for recommendations on the appropriate design formulas to be used for FRP composite pipe and duct.

Table 1

Industrial Fiberglass Specialties, Inc.

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Properties of Series 9600 Phenolic Filament Wound FRP Composite Duct

Corrosion Barrier..... 10 mil C-veil reinforced
Corrosion Liner..... 90 mil fiberglass chopped strand mat
Resin (barrier/Liner)..... Premium grade heat cured phenolic
Structural Wall..... Filament wound overwrap
Resin (FW Overwrap)..... Premium grade heat cured phenolic

Elastic and Strength Properties of Glass Filament Reinforced Wall

Hoop Tensile: (Based on loading of pipe hydrostatically)

Ultimate (porosity)..... 14,000 psi
Yield..... 8,400 psi
Allowable..... 4,700 psi
Modulus of Elasticity..... 2,500,000 psi

Tensile: (Based on loading of pipe as a tension member)

Ultimate (rupture)..... 8,500 psi
Yield..... 3,500 psi
Allowable..... 2,400 psi
Modulus of Elasticity..... 1,260,000 psi

Flexural: (Based on loading of pipe as a beam)

Ultimate (rupture)..... 11,000 psi
Yield..... 4,300 psi
Allowable..... 2,800 psi
Modulus of Elasticity..... 1,190,000 psi

Torsion: (Based on loading of pipe as a shaft in torsion)

Ultimate (rupture)..... 11,300 psi
Allowable Shear..... 3,800 psi
Shear Modulus..... 520,000 psi

Compression: (Based on loading of pipe as a "short" column)

Ultimate (rupture)..... 7,800 psi
Yield..... 4,900 psi
Allowable..... 2,600 psi
Modulus of Elasticity..... 980,000 psi

Thermal Properties:

Coefficient of Thermal Expansion..... 0.0000085 in./in./deg. F
Thermal Conductivity..... 2.3 BTU/hr./sq. ft./deg. F/in. thick.