



Industrial Fiberglass Specialties, Inc.

521 Kiser Street

Dayton, Ohio 45404-1641

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

Series 9000 Filament Wound FRP Composite Pipe, Duct, and Fittings

For moderately corrosive industrial service

Uses and applications:

Chemical process piping
Roof and floor drains
Moderate service chemical applications
Floor collection drains
Municipal waste
Process plant piping
Water treatment
Sewer lines and sewer force mains
Excellent physical properties to 180° F
Corrosion resistant duct
Dual containment piping
Brine and brackish water
Cooling water and recycle water
Vent lines
General industrial service

Description:

Filament wound fiberglass reinforced premium grade isophthalic polyester composite pipe. ASTM D-2996 Classification Type I, Grade 2, Class E.

Composition:

Nominal 10 mil glass veil and/or Nexus reinforced corrosion barrier, followed by a nominal 90 mil corrosion liner reinforced with fiberglass chopped strands, followed by a fiberglass filament wound structural overwrap laminate.

A premium grade isophthalic polyester resin, pigmented dark grey for UV inhibition, is used for the corrosion liner. The same isophthalic polyester resin is used for the filament wound structural laminate.

Pipe Sizes:

113+ different diameters, ranging from a tiny 3/8" dia. up to a mammoth 84" dia. Pipe available built to iron pipe outside diameters (ASTM D-2996, Table 3), as well as pipe built to chemical process piping inside diameter standards. A current list of pipe sizes is available upon request. New sizes are being added regularly.

Pipe Lengths:

1/2" dia. pipe and smaller is built in 5 ft. lengths.
3/4" & 7/8" dia. pipe is built in 7 ft. lengths.
1" through 1-1/2" dia. pipe is built in 10 ft. lengths.
2" through 6" dia. pipe is available in 10 ft. or 20 ft. lengths.
8" dia through 84" dia. pipe is available in 40 ft. lengths.

Performance:	Good corrosion resistance over a wide temperature range. Temperatures from sub-zero to 200° F.
Advantages:	<p>Working pressures from NBS PS-15-69 duct to 450 psi+, depending upon size and wall thickness.</p> <p>Vacuum to -14.7 psig for all sizes, by selection of wall thicknesses, ribs and filament wind angle.</p> <p>Available for earth burial, all depths, with selection of wall thicknesses, ribs and filament wind angle.</p> <p>Weighs 1/6 as much as steel. Thus, lower installed costs.</p> <p>Series 9000 pipe can be provided using resins that meet the requirements of FDA regulations 21-CFR 175.105 and 21-CFR 177.242.</p> <p>Smooth inner surface produces very low frictional loss for reduced pumping and fan blower costs. Hazen-Williams flow coefficient under 150.</p> <p>Recommended for a wide range of corrosion applications. Consult with Industrial Fiberglass Specialties, or the resin manufacturer, for specific project recommendations.</p>

Joining systems:	<p>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.</p> <p>Threaded joints (NPT) through 12" dia. Other thread configurations available upon special order.</p> <p>Flanges, all sizes through 84" dia. ANSI 150 lb., 300 lb., and 600 lb. all available as standard. Any pressure rating and drilling pattern available on order.</p> <p>Van Stone, loose ring style, flanges.</p> <p>Flange Spacers - all diameters, bolt hole patterns and thicknesses, built to order.</p> <p>Bell and spigot O-Ring joints, through 84" dia.</p> <p>Bell and spigot O-Ring joints with locking key for restrained ends.</p> <p>Mechanical Couplings, including Victaulic and Taylor-Kerr.</p> <p>Repair (maintenance) couplings.</p>
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Physical Properties:	See Table 1 for typical physical properties of Series 9000 FW FRP Pipe. These are conservative properties that can be used for the design of FW pipe for pressure, vacuum, supported span, and burial conditions. Contact Industrial Fiberglass Specialties for recommendations on the appropriate design formulas to be used for FRP composite pipe.
Mechanical Properties:	

Burial installations:	As a custom manufacturer of pipe and fittings, we can design and build pipe 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 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).
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Supported span installations:

Again, we can design and build pipe to provide you the lowest cost for supported span installed pipe. Since we are not limited to just a few pipe wall thicknesses and filament winding angles - we can select and choose the combination of pipe 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" dia. 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 and 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 Specialties' catalog for sizes, dimensions, and tolerances. Fittings and flanges are available from 3/8" dia. through 84" dia. We welcome the opportunity to work with our customers on special fittings.

Table 1

Industrial Fiberglass Specialties, Inc.

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Properties of Series 9000 Filament Wound FRP Composite Pipe & Duct

Corrosion Barrier	10 mil C-Veil and/or Nexus Reinforced
Corrosion Liner	90 mil Fiberglass Chopped Strand
Resin (Barrier/Liner)	Premium Grade Isophthalic Polyester Resin
Structural Wall	Filament Wound FRP Overwrap
Resin (FW Overwrap)	Premium Grade Isophthalic Polyester Resin

Elastic and Strength Properties of Glass Filament Reinforced Wall

Hoop Tensile: (Based on loading of pipe hydrostatically)

Ultimate (porosity)	20,400 psi
Yield	9,300 psi
Allowable	6,800 psi
Modulus of Elasticity	3,300,000 psi

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

Ultimate (rupture)	12,400 psi
Yield	5,000 psi
Allowable	3,400 psi
Modulus of Elasticity	1,700,000 psi

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

Ultimate (rupture)	13,300 psi
Yield	4,000 psi
Allowable	2,700 psi
Modulus of Elasticity	1,200,000 psi

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

Ultimate (rupture)	16,500 psi
Allowable Shear	5,600 psi
Shear Modulus	680,000 psi

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

Ultimate (rupture)	9,500 psi
Yield	6,000 psi
Allowable	3,200 psi
Modulus of Elasticity	1,200,000 psi

Thermal Properties:

Coefficient of Thermal Expansion	0.0000088 in./in./deg. F
Thermal Conductivity	2.3 BTU/hr./sq. ft./deg. F/in. thick.