



Industrial Fiberglass Specialties, Inc.

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Series 4000-TC Filament Wound FRP Composite Pipe, Duct and Fittings For severe corrosive industrial service where high temperature thermal cycling may occur

**Uses and
applications:**

Chemical process piping with wide changes in operating temperature
Geothermal piping
Boiler blow-down lines
Acid drains
Duct systems exposed to changes in operating temperatures
Waste water and sewage systems
Circulating seawater applications
Process plant piping
Steam condensate return lines
Food processing plant piping
Plant piping
Water treatment piping
Brine and brackish water
Piping systems for alkalis and non-oxidizing acids
Industrial service for corrosive liquids

Description:

Filament-wound fiberglass reinforced epoxy composite pipe.

Composition:

ASTM D-2996 Classification Type I, Grade 1, Class F.

Nominal 40 mil glass veil and/or Nexus reinforced corrosion liner, followed by a fiberglass filament wound structural overwrap.

A premium grade amine-reacted heat-cured, toughened, high impact resistant, and high elongation epoxy resin, pigmented black for UV inhibition, is used throughout all laminates.

Operating temperatures up to 300 °F.

Pipe Sizes:**Pipe Lengths:**

137+ different diameters, ranging from a teeny 3/8" dia. up to a mammoth 168" 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.

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 24" dia. pipe is available in 20 ft. lengths.

8" through 84" dia. pipe is available in 40 ft. lengths.

Performance:

Good corrosion resistance over a wide temperature range. Temperatures from sub-zero to 300 °F.

Advantages:

Working pressures from NBS-PS-15-69 duct to 450 psi+, depending upon size 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.

The resins used in Series 4000-TC pipe meet the requirements of F.D.A. regulations 21-CFR-175.105 and 21CFR 177.2420`.

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 Specialties, 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" dia. Other thread configurations available upon special order.

Flanges, all sizes through 84" dia. Including the superior filament wound socket flanges for sizes through 1/2" dia. through 36" dia. 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 84" dia.

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

Mechanical Couplings, including Victaulic and Taylor-Kerr.

Expansion Joints, including triple O-Ring style for fly ash lines

Speed-Seal O-Ring true unions

Repair (maintenance) couplings.

Physical Properties:**Mechanical Properties:**

See Table 1 for typical physical properties of Series 4000-TC 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, Inc. for recommendations on the appropriate design formulas to be used for FRP composite pipe.

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).

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. 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 are available from 1/2" dia. through 168" 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 4000-TC Filament Wound Pipe and Duct

Corrosion Liner	40 mil C-Veil and/or Nexus Reinforced
Resin (Liner)	Tough Premium Grade High Elongation Epoxy
Structural Wall	Filament Wound Overwrap
Resin (FW Overwrap)	Tough Premium Grade High Elongation Epoxy

Elastic and Strength Properties of Glass Filament Reinforced Wall

Hoop Tensile: (Based on loading of pipe hydrostatically)

Ultimate (porosity)	20,000 psi
Yield	12,800 psi
Allowable	6,700 psi
Modulus of Elasticity	3,600,000 psi

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

Ultimate (rupture)	12,200 psi
Yield	5,000 psi
Allowable	3,300 psi
Modulus of Elasticity	1,800,000 psi

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

Ultimate (rupture)	15,700 psi
Yield	6,100 psi
Allowable	4,000 psi
Modulus of Elasticity	1,700,000 psi

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

Ultimate (rupture)	16,200 psi
Allowable Shear	5,500 psi
Shear Modulus	750,000 psi

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

Ultimate (rupture)	11,200 psi
Yield	7,000 psi
Allowable	3,700 psi
Modulus of Elasticity	1,400,000 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.