Industrial Fiberglass Specialties, Inc.

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Series 5000-NSF Filament Wound FRP Composite Pipe, Duct & Fittings

For utility & reverse osmosis potable water service where both corrosion resistance & NSF approval are important

Uses and applications:

Potable water service
Reverse osmosis equipment & systems
Food and beverage applications
FDA plant process piping
Cooling water piping where NSF approvals are required
Water treatment plants & systems
Air compressor intake lines
Sewer lines and sewer force mains
Excellent physical properties to 215^{o} F
Corrosion resistant fume duct
An alternative to costly alloys and specialty metals
General industrial service for corrosive liquids and fumes

Description:

Filament-wound fiberglass reinforced fire retardant methacrylate modified epoxy composite pipe, duct, and fittings. ASTM D-2996, Classification Type I, Grade 2, Class E.

Composition:

Nominal 20 mil C-Veil and/or Nexus synthetic veil reinforced inner corrosion barrier, followed by a nominal 30 mil corrosion liner reinforced with fiberglass chopped strand reinforcement, followed by a fiberglass filament wound structural pipe wall laminate. The exterior of the pipe will be post-coated after fabrication with a UV resistant polymer coating.

A premium grade National Sanitation Foundation (NSF) potable water service approved vinylester resin (Reichhold Chemical's Dion 9102), pigmented light grey, will be used in the inner corrosion barrier.

A premium grade vinylester resin (Reichhold Chemical's Dion 9100, or equal), pigmented light gray for UV inhibition, is used for the corrosion liner, the filament wound structural laminate, and all flanges.

Pipe Sizes:

137+ different diameters, ranging from a tiny 3/8" diameter up to a mammoth 168" diameter 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:

3/8" & 1/2" diameter pipe are built in 5 ft. lengths.

3/4" & 7/8" diameter pipe are built in 7 ft. lengths.

1" through 1-1/2" diameter pipe is built in 10 ft. lengths.

2" through 24" diameter pipe is available in 20 ft. lengths.

8" dia. through 168" diameter pipe is available in 40 ft. lengths

Performance:

Good corrosion resistance over a wide temperature range. Temperatures from sub-zero to 225° 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.

Series 5000-NSF pipe can be provided using resins that meet the requirements of FDA regulations 21-CFR-175.105 and 21-CFR-177.242.

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" diameter Other thread configurations available upon special order.

Flanges, all sizes through 200" diameter Including the superior filament wound socket flanges for sizes of 1/2" diameter through 42" 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, through 200" dia.

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

Mechanical Couplings, including Victaulic and Taylor-Kerr.

Repair (maintenance) couplings.

Physical Properties:

Mechanical Properties:

See Table 1 for typical physical properties of Series 5000-NSF 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. Contact Industrial Fiberglass for recommendations on the appropriate design formulas to be used for FRP composite pipe and duct.

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" 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 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 catalog for sizes, dimensions and tolerances. Fittings and flanges are available from 3/8" diameter through 168" dia. We welcome the opportunity to work with our customers on special fittings.

Table 1

INDUSTRIAL FIBERGLASS SPECIALTIES, INC

521 Kiser Street - Dayton, OH 45404-1641
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Properties of Series 5000-NSF Filament Wound FRP Composite Pipe

Corrosion Barrier . . . . . 20 mil C-veil and/or Nexus reinforced
Corrosion Liner . . . . . 30 mil fiberglass chopped strand reinforced
Structural Wall . . . . . Filament wound overwrap
Resin (Barrier) . . . . . Premium grade NSF approved vinylester
Resin (Liner & FW Overwrap) . . . . . Premium grade vinylester

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.