



Industrial Fiberglass Specialties, Inc.

521 Kiser Street

Dayton, Ohio 45404-1641

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

Series 5000-G Filament Wound FRP Composite Conductive Lined Pipe, Duct, and Fittings

For corrosive industrial service where both good corrosion resistance and "explosion resistant" conductive laminate properties are important.

Uses and applications:

Chemical plant process piping
Corrosion resistant fume duct
Plant duct for explosive and hazardous environments
Organic chemicals
Acid drains
Corrosive and abrasive slurries
Waste water and sewage systems
Chlorine and chlorinated water
Water treatment piping
Hazardous waste piping
Piping & duct systems for combinations of solvents, acids, & bases.
An alternative to costly alloys and specialty metals
Industrial service for severely corrosive liquids

Description:

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

Composition:

Nominal 10 to 20 mil carbon graphite veil reinforced corrosion barrier, followed by a nominal 40 mil corrosion liner reinforced with fiberglass chopped strand reinforcements, followed by a fiberglass filament wound structural pipe wall laminate.

A premium grade epoxy vinylester resin (Ashland Chemical's Derakane 411 or Hetrion 992, Reichhold Chemical's Dion 9100, or equal), pigmented gray, is used in the corrosion barrier/liner. To provide excellent impact strength and toughness, the same epoxy vinylester resin, pigmented gray for UV inhibition, is used for the filament wound structural laminate.

For controlling internal static charge buildup, the epoxy vinylester resin used for the corrosion barrier/liner will also include a special conductive carbon and graphite additive. The resulting internal laminate will provide a maximum surface resistance of 1,000 ohms, or less, when tested at two points 12" apart, or less.

Operating temperatures up to 225° F.

Pipe & Duct Lengths:

137+ different diameters, ranging from a teeny 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 (ASTM D-2996, Table 4). A current list of pipe sizes is available upon request. New sizes are being added regularly.

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

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

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

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

8" through 144" diameter pipe and duct is available in 40 ft. lengths.

Performance Advantages

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

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.

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 84" diameter. Including the superior filament wound socket flanges for sizes through 1/2" diameter through 36" 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 84" diameter.

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 5000-G filament wound FRP pipe and duct. These are conservative properties that can be used for the design of FRP composite 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^o, 30^o, 45^o, and 90^o. 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^o 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 1/2" diameter through 84" diameter 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 5000-G Filament Wound FRP Composite Pipe & Duct

Corrosion Barrier..... 10 mil Carbon graphite veil reinforced
Corrosion Liner..... 40 mil Fiberglass chopped strand mat
Resin (Barrier/Liner)..... Premium grade epoxy vinylester
Additive to Resin in Barrier/Liner.. Conductive carbon graphite
Structural Wall..... Fiberglass filament wound overwrap
Resin (FW Overwrap)..... Premium grade epoxy 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.