



Industrial Fiberglass Specialties, Inc.

521 Kiser Street

Dayton, Ohio 45404-1641

Tel: (937) 222-9000 - Fax: (937) 222-9020

Series 5700-HCl Filament Wound FRP Composite Pipe, Duct, & Fittings

For high temperature hydrochloric acid and corrosive industrial service where good impact and "toughness" are also important

Uses and applications:

Chemical process and plant piping
HCl corrosion resistant high temperature fume ducts and stacks
Acid drains and sewers
Severe service chemical applications
Organic and oxidizing chemicals and acids
Hydrochloric and phos-acid based process streams
Excellent physical properties at the higher temperatures
Piping for handling combinations of certain solvents, acids & bases
An alternative to costly alloys and specialty metals

Description:

Filament-wound fiberglass reinforced methacrylate modified epoxy (vinylester) composite pipe. ASTM D-2996, Classification Type 1, Grade 2, Class E.

Composition:

Nominal 20 to 30 mil double carbon and C-veil reinforced inner corrosion barrier, followed by a nominal 30 mil SPI corrosion liner reinforced with fiberglass chopped strands, 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 high-temperature high-performance novolac epoxy vinylester resin (Ashland Chemical's Derakane 470 or Derakane 441), is used for the inner corrosion barrier/liner. A tough premium grade high-impact resistant modified bis-A and novolac epoxy vinylester resin (Reichhold Chemical's Dion 9100/Derakane 441, or equal), pigmented gray for UV inhibition, is used for the filament wound structural laminate.

For increased corrosion and temperature performance, the Series 5700-HCl also includes the use of a special proprietary inorganic "HCL armoring" modifier in the corrosion barrier/liner.

Pipe & Duct 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 & Duct Lengths:

3/8" & 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" thru 1-1/2" diameter pipe and duct is built in 10 ft. lengths.
2" thru 24' diameter pipe and duct is available in 20 ft. lengths.
8" thru 84" diameter pipe and duct is available in 40 ft. lengths.

Performance:

Good corrosion resistance over a wide temperature range. Temperatures from sub-zero to 350°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 9750 pipe can be provided using resins that meet the requirements of F.D.A. 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, 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 84" 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:

Mechanical Properties:

See Table 1 for typical physical properties of Series 5700-HCI 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 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 5700-HCl Filament Wound FRP Composite Pipe & Duct

Corrosion barrier..... 20+ mil double carbon & glass veil reinforced
Corrosion liner..... 30 mil chopped strand fiberglass reinforced
Resin (barrier/liner).... High-performance epoxy novolac vinylester
Corrosion barrier/liner.....Special HCl armoring modifier/additive
Structural wall..... Filament wound overwrap
Resin (FW overwrap)..... Premium grade high-impact 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.