



# *Industrial Fiberglass Specialties, Inc.*

521 Kiser Street

Dayton, Ohio 45404-1641

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

## **Series 9820 Filament Wound Furan FRP Composite Pipe, Duct, and Fittings**

**For corrosion resistant, solvent resistant, and "tough" high temperature industrial service**

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### **Uses and applications:**

Chemical process piping  
Fire retardant applications  
Acid and solvent collection drains  
Elevated temperature chemical applications  
Plant and floor collection drains  
Process plant piping  
Applications requiring solvent resistance  
Low smoke generation for ducting and stacks  
Excellent physical properties to 300<sup>o</sup>+ F.  
Piping for handling combinations of solvents, acids & bases  
An alternative to costly alloys and specialty metals.  
Outstanding flame spread resistance  
Industrial service for corrosive liquids

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### **Description:**

Filament-wound fiberglass reinforced furan composite pipe and duct. ASTM D-2996, Classification Type I, Grade 1 & 2, Class E.

### **Composition:**

Nominal 10 to 20 mil fiberglass and/or Nexus synthetic veil reinforced inner corrosion barrier, followed by a nominal 90 mil corrosion liner reinforced with fiberglass chopped strands, followed by a fiberglass filament wound structural pipe and duct wall laminate.

A premium grade heat-cured furan resin (Ashland Chemical's Hetron 800, or equal) is used for the inner corrosion barrier/liner; and for the flange faces and stops.

A premium grade amine-reacted heat-cured, toughened, high impact resistant, and high elongation epoxy resin, pigmented black for UV inhibition, will be used for the filament wound FRP structural laminates of the pipe and fittings; and for the structural flange laminates. The exterior of all laminates is factory post coated with a UV resistant polyurethane polymer coating.

Operating upset temperatures up to 400<sup>o</sup> F.

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### **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.

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**Pipe & Duct Lengths:** 1/2" diameter pipe and smaller is built in 5 ft. lengths.  
3/4" & 7/8" diameter pipe and duct is 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" diameter through 96" diameter pipe and duct is available in 40 ft. lengths.

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**Performance:** Good corrosion resistance over a wide temperature range.  
Temperatures from sub-zero to 400°F.

**Advantages:** Working pressures from NBS-PS-15-69 duct to 150 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, or the resin manufacturer, for specific project recommendations.

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**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.

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**Physical Properties:** See Table 1 for typical physical properties of Series 9820 filament wound FRP composite pipe. These are conservative properties that can be used for the design of filament wound FRP pipe 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.

**Mechanical Properties:**

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**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.

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**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. 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 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 9820 Furan FRP Composite Pipe & Duct**

Corrosion Barrier..... 10 to 20 mil Veil Reinforced  
Corrosion Liner..... 86 to 90 mil Fiberglass Chopped Strand Mat  
Resin (Barrier/Liner)..... Premium Grade Heat Cured Furan  
Structural Wall..... Filament Wound Structural Laminate  
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)..... 14,000 psi  
Yield..... 8,400 psi  
Allowable..... 4,700 psi  
Modulus of Elasticity..... 2,500,000 psi

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

Ultimate (rupture)..... 8,500 psi  
Yield..... 3,500 psi  
Allowable..... 2,400 psi  
Modulus of Elasticity..... 1,260,000 psi

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

Ultimate (rupture)..... 11,000 psi  
Yield..... 4,300 psi  
Allowable..... 2,800 psi  
Modulus of Elasticity..... 1,190,000 psi

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

Ultimate (rupture)..... 11,300 psi  
Allowable Shear..... 3,800 psi  
Shear Modulus..... 520,000 psi

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

Ultimate (rupture)..... 7,800 psi  
Yield..... 4,900 psi  
Allowable..... 2,600 psi  
Modulus of Elasticity..... 980,000 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.