



## *Industrial Fiberglass Specialties, Inc.*

521 Kiser Street

Dayton, Ohio 45404-1641

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

## **Series 1600 Filament Wound FRP Composite Pipe, Conduit, Drains, and Fittings**

**For general utility and industrial service**

---

### **Uses and applications:**

The containment pipe for dual containment piping systems  
Electrical conduit  
Telephone conduit  
Bridge crossing conduit  
Waste water and sewage systems  
Water lines  
Ventilation ducting and lines  
Cooling water piping  
Highway bridge drains  
Process plant piping  
Air ducting  
Roof and floor drains  
Water treatment piping  
Sewer lines and sewer force mains  
Brine and brackish water  
General industrial service for mildly corrosive liquids

---

### **Description:**

Filament-wound fiberglass reinforced epoxy composite pipe.

### **Composition:**

ASTM D-2996-71 Classification Type I, Grade 1, Class A.

Pipe is provided with an unlined, resin rich pipe interior, followed by a fiberglass filament wound structural overwrap.

A premium grade anhydride-reacted heat-cured epoxy resin, pigmented dark black for UV inhibition, is used throughout the laminate.

Operating temperatures up to 160° F.

---

### **Pipe Sizes:**

1" thru 8" diameter pipe and conduit. Pipe and conduit available built to iron pipe outside diameters (ASTM D-2996, Table 3), as well as pipe and conduit built to chemical process piping inside diameter standards. Special sizes of pipe (smaller and larger) are available upon request.

### **Pipe Lengths:**

1" through 1-1/2" dia. pipe is built in 10 or 15 ft. lengths.

2" through 8" dia. pipe is available in 20 ft. lengths.

---

**Performance:**

Suitable corrosion resistance over a wide temperature range. Temperatures from sub-zero to 160°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.

Smooth inner surface produces very low frictional loss for reduced pumping and fan blower costs. Hazen-Williams flow coefficient under 150.

Recommended for a wide range of corrosion applications. Consult with Industrial Fiberglass Specialties, or the resin manufacturer, for specific 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 120" dia. Including the superior filament wound socket flanges for sizes through 1/2" dia. through 42" 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 120" dia.

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

Mechanical Couplings, including Victaulic and Taylor-Kerr.

Speed-Seal O-Ring true unions

Repair (maintenance) couplings.

---

**Physical Properties:**

See Table 1 for typical physical properties of Series 1600 FW FRP Pipe. These are conservative properties that can be used

**Mechanical Properties:**

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

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 "Reinforced Fiberglass Pipe Fittings & Accessories" for sizes, dimensions and tolerances. Fittings are available from 1/2" dia. through 120" 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  
Telephone (937) 222-9000 - Fax (937) 222-9020

**Properties of Series 1600 FW FRP Composite Pipe, Drains, and Conduit**

Corrosion Liner..... Unlined, resin rich pipe interior  
Resin (Liner)..... Premium grade heat cured epoxy  
Structural Wall..... Filament wound overwrap  
Resin (FW Overwrap)..... Premium grade heat cured 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.