



# *Industrial Fiberglass Specialties, Inc.*

521 Kiser Street

Dayton, Ohio 45404-1641

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

## **Series 5000-AA Filament Wound FRP Composite, Pipe, Duct, and Fittings**

**For corrosive and abrasion resistant industrial and utility service**

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### **Uses and Applications:**

Fly ash slurry handling lines  
Waste water and sewage systems  
Lime and acid slurry handling lines  
Flue Gas Scrubber Piping and Headers  
Water lines where abrasive service exists  
Ventilation ducting and lines where abrasive dust is present  
Air ducting for abrasive environments  
Floor, collection sump and roof drains  
Sewer lines and sewer force mains  
An alternative to costly alloys and specialty metals.

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### **Description:**

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

### **Composition:**

Nominal 50 mil synthetic and fiberglass reinforced combination abrasion resistant and corrosion liner/barrier, followed by a fiberglass filament wound structural overwrap, followed by a nominal 10 to 20 mil synthetic veil reinforced external corrosion and abrasion resistant barrier.

A rubber modified, "toughened" premium grade methacrylate epoxy (vinylester) resin, pigmented dark grey for UV inhibition, is used in both the internal and external abrasion and corrosion liner/barriers. Both the internal and external corrosion liner/barriers are also further modified with a special abrasion resistant armoring modifier that provides a service life of up to ten times that available from pipe made with a standard resin matrix.

A premium grade methacrylate epoxy (vinylester) resin, pigmented black for UV inhibition, is used in the filament wound structural overwrap.

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### **Pipe & Duct Sizes:**

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. 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 is available in 20 ft. lengths.  
8" thru 144" diameter pipe is available in 40 ft. lengths.

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**Performance:** Good corrosion resistance over a wide temperature range  
Temperatures from sub-zero to 240°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.

Weights 1/6 as much as steel. Thus, lower installed costs.

Fire-retardant pipe and duct systems available. ASTM E-84 flame  
spreads under 25.

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  
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.

Plain ends for butt and strap welding

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  
(Kwik-Key).

Mechanical Couplings, including Victaulic and Taylor-Kerr.

Speed-Seal O-Ring true unions

Repair (maintenance) couplings.

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**Physical  
Properties:** See Table 1 for typical physical properties of Series 5000-AA  
filament wound FRP composite 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.

**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<sup>o</sup>, 30<sup>o</sup>, 45<sup>o</sup>, and 90<sup>o</sup>. 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<sup>o</sup> 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' catalog "Reinforced Fiberglass Pipe Fittings & Accessories" 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-AA Abrasion Resistant FW FRP Composite Pipe**

Internal Corrosion Barrier..... 10+ mil Nexus veil reinforced  
Corrosion Liner..... 43 mil Fiberglass chopped strand mat  
External Corrosion Barrier..... 10+ mil Nexus veil reinforced  
Resin (Barriers/Liner)..... Premium grade armored vinylester  
Structural Wall..... FRP filament wound overwrap  
Resin (FW Overwrap)..... Premium grade vinylester

**Elastic and Strength Properties of Glass Filament Reinforced Wall**

**Hoop Tensile: (Based on loading of pipe hydrostatically)**

Ultimate (porosity)..... 20,400 psi  
Yield..... 9,300 psi  
Allowable..... 6,800 psi  
Modulus of Elasticity..... 3,300,000 psi

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

Ultimate (rupture)..... 12,400 psi  
Yield..... 5,000 psi  
Allowable..... 3,400 psi  
Modulus of Elasticity..... 1,700,000 psi

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

Ultimate (rupture)..... 13,300 psi  
Yield..... 4,000 psi  
Allowable..... 2,700 psi  
Modulus of Elasticity..... 1,200,000 psi

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

Ultimate (rupture)..... 16,500 psi  
Allowable Shear..... 5,600 psi  
Shear Modulus..... 680,000 psi

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

Ultimate (rupture)..... 9,500 psi  
Yield..... 6,000 psi  
Allowable..... 3,200 psi  
Modulus of Elasticity..... 1,200,000 psi

**Thermal Properties:**

Coefficient of Thermal Expansion..... 0.0000088 in./in./deg. F  
Thermal Conductivity..... 2.3 BTU/hr./sq. ft./deg. F/in. thick.