



FiberSystems, Inc.

521 Kiser Street

Dayton, Ohio 45404-1641

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

Series 9500-AA Filament Wound FRP Composite, Pipe, Duct, and Fittings

For severely corrosive and abrasion resistant industrial and utility service

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.

Description: Composition:

Filament-wound fiberglass reinforced composite pipe.
ASTM D-2996 Classification Type I, Grade 2, Class E
Nominal 100 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 mil synthetic veil reinforced external corrosion and abrasion resistant barrier.
A rubber modified, "toughened" premium grade methacrylate modified 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 modified epoxy (vinylester) resin, pigmented gray for UV inhibition, is used in the filament wound structural overwrap

Pipe & Duct Sizes: 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. A current list of pipe sizes is available upon request. New sizes are being added regularly.

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.

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

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 FiberSystems' 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.

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.

Weighs 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 FiberSystems, 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

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

**Physical
Properties:****Mechanical
Properties:**

See Table 1 for typical physical properties of Series 9500-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 FiberSystems for recommendations
on the appropriate design formulas to be used for FRP composite
pipe and duct.

Table 1

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Properties of Series 9500-AA Abrasion Resistant FW FRP Composite Pipe

Internal Corrosion Barrier..... 20+ mil Nexus veil reinforced
Corrosion Liner..... 90 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.