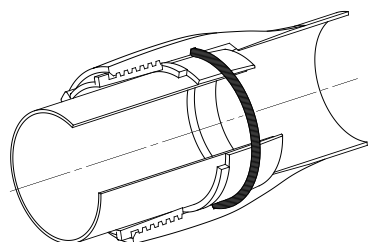


FIBERGLASS PIPE GROUP



Series 3000A Fiberglass Pipe and Fittings

for general industrial service

Uses and applications

- | | |
|-------------------------------|---|
| Alcohol solutions | Mild chemicals |
| Boiler feed water | Municipal waste |
| Bridge, roof and floor drains | Potable water |
| Brine and brackish water | Power plant, steel mill and industrial plant piping |
| Chemical process piping | Sewer lines and sewer force mains |
| Cooling water | Source and recycle water |
| Demineralized water | Sump discharge |
| Electroplating | Vent lines |
| Fuel oil piping | Water mains |
| General service piping | Water treatment |
| Jet fuel piping | |

Listings

MIL-P-29206A for jet fuels and petroleum liquids.

Performance

Working pressure to 450 psig depending on pipe size.

No thrust blocks are required at rated system pressure for most buried piping configurations and most soil conditions. Thrust blocks may be required for 14 and 16-inch Bondstrand 3000A. For above-ground use, consult Ameron Fiberglass Pipe Division.

Temperatures to 210°F (99°C) maximum.

Full vacuum capabilities when buried and properly backfilled. For above-ground use, refer to collapse pressures listed below under pipe pressure performance.

Recommended burial depth: 3 to 25 feet.

Recommended for water, waste water (pH 1 to 12), moderately corrosive liquids and mild chemicals. Consult Ameron corrosion guide FP132 or Ameron Applications Engineering for recommendations for your particular application.

Bondstrand Series 3000A is available with the patented Pronto-Lock® and Pronto-Lock II mechanical joining systems and may be used to temperatures as high as 210°F (99°C).

Individual system components may not have the same ratings as the pipe. Refer to the detailed product information for the specific components to determine the pressure rating for the system as a whole.

Composition

Pipe

Filament-wound fiberglass reinforced epoxy pipe with integral epoxy liner and exterior coating.

Nominal Pipe Size		ASTM Designation	
(in)	(mm)	(D2310)	(D2996)
2 - 6	50 - 150	RTRP 11FX	RTRP 11FX-5430
8 - 16	200 - 400	RTRP 11FX	RTRP 11FX-3210

Fittings

2 to 6-inch

Compression-molded fiberglass reinforced epoxy elbows and tees
Filament-wound and/or mitered crosses, wyes, laterals and reducers

8 to 16-inch

Filament-wound fiberglass reinforced epoxy elbows
Filament-wound and/or mitered crosses, wyes, and laterals
Contact-molded reducers

Flanges

Flange rings:

Molded or filament-wound fiberglass

Stub ends:

Molded or centrifugally cast fiberglass

Blind flanges

Compression-molded fiberglass or epoxy-coated cast iron or steel.

O-rings

Buna-N standard.

Other materials available on request.

Adhesive

Ameron two-part epoxy adhesive for field fabrication.
(consult Ameron for specifications)

Joining systems

2 to 6-inch

Pronto-Lock mechanical coupling.

U.S. Patent No. 3,784,239.

8 to 16-inch

Pronto-Lock II mechanical coupling.

U.S. Patent No. 4,014,568.

2 to 16-inch

Bell and spigot taper/taper adhesive-bonded joint.

Pipe lengths

Standard 20 and 39-ft random lengths.

Other lengths available on request.

Typical pipe dimensions and weights

Nominal Pipe Size		Pipe Outside Diameter ¹		Pipe Inside Diameter		Wall Thickness			
						Total		Structural	
(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)
2	50	2.38	60	2.21	56	0.072	1.8	0.064	1.6
3	80	3.50	90	3.32	84	0.081	2.1	0.071	1.8
4	100	4.50	114	4.33	110	0.086	2.2	0.074	1.9
6	150	6.63	168	6.39	162	0.119	3.0	0.105	2.7
8	200	8.63	219	8.30	211	0.150	3.8	0.125	3.2
10	250	10.75	273	10.41	264	0.175	4.4	0.150	3.8
12	300	12.75	324	12.30	312	0.200	5.1	0.175	4.4
14	350	14.44	367	14.01	356	0.215	5.4	0.190	4.8
16	400	16.50	419	16.02	407	0.235	6.0	0.210	5.3

1) Typical outside diameters of 2 through 12-inch pipe are within API, ASTM and ANSI fiberglass and steel pipe dimensions.

Nominal Pipe Size		Taper Angle	Taper Length		Pipe Weight	
(in)	(mm)	(deg)	(in)	(mm)	(lb/ft)	(kg/m)
2	50	1.75	1.5	38	0.5	.75
3	80	1.75	1.7	43	0.7	1.05
4	100	1.75	1.9	48	1.0	1.50
6	150	1.75	2.8	71	1.9	2.85
8	200	2.00	2.6	66	3.1	4.60
10	250	2.00	3.1	79	4.5	6.70
12	300	2.00	3.6	91	6.1	9.10
14	350	2.00	4.2	107	7.5	11.15
16	400	2.00	4.7	119	9.4	14.00

Typical pipe performance

Nominal Pipe Size		Static Pressure Rating		Ultimate Internal Pressure ¹		Ultimate Collapse Pressure ²			
						80°F	27°C	210°F	99°C
(in)	(mm)	(psig)	(bar)	(psig)	(bar)	(psig)	(bar)	(psig)	(bar)
2	50	450	30	3200	215	145	10.0	125	8.6
3	80	450	30	2400	160	50	3.4	45	3.1
4	100	375	25	2000	135	40	2.8	35	2.4
6	150	300	20	2000	135	35	2.4	30	2.1
8	200	150	10	900	60	25	1.7	21	1.4
10	250	150	10	900	60	18	1.2	12	0.8
12	300	150	10	900	60	12	0.8	9	0.6
14	350	150	10	900	60	10	0.7	7.5	0.5
16	400	150	10	900	60	10	0.7	7.5	0.5

1) Quality control minimum

2) For vacuum service above ground in sizes 8 inches and above consult Ameron.

Fittings pressure ratings

Nominal Pipe Size		Elbows and Tees		Flanges		Blind Flanges	
(in)	(mm)	(psig)	(bar)	(psig)	(bar)	(psig)	(bar)
2	50	450	30	450	30	450	30
3	80	450	30	400	30	450	30
4	100	375	25	375	25	375	25
6	150	300	20	300	20	300	20
8	200	150	10	150	10	150	10
10	250	150	10	150	10	150	10
12	300	150	10	150	10	125	8
14	350	150	10	150	10	75	5
16	400	150	10	150	10	75	5

1) Ratings shown are for 90° and 45° elbows. Ratings in 8 to 16-inch sizes are also applicable to elbows of other angles.

Nominal Pipe Size		Adapters		Laterals, Wyes and Crosses		Saddles	
(in)	(mm)	(psig)	(bar)	(psig)	(bar)	(psig)	(bar)
2	50	450	30	200	13	300	20
3	80	375	25	200	13	300	20
4	100	300	20	200	13	200	13
6	150	300	20	200	13	150	10
8	200	150	10	150	10	150	10
10	250	-	-	150	10	100	8
12	300	-	-	150	10	75	5
14	350	-	-	150	10	50	3
16	400	-	-	150	10	50	3

Typical physical properties

Pipe Property	Units	Value	Method	
			ASTM	ATM ¹
Thermal conductivity	Btu•in/(hr•ft ² •°F)	1.7	C177	23
	W/m•°C	0.25		
Coefficient of thermal expansion (linear)	(2 - 6 inch)	10 ⁻⁶ in/in/°F	D696	21
		10 ⁻⁶ m/m/°C		
	(8 - 16 inch)	10 ⁻⁶ in/in/°F		
		10 ⁻⁶ m/m/°C		
Flow coefficient	Hazen-Williams	150	—	156
Absolute roughness	10 ⁻⁶ ft	50	—	—
	10 ⁻⁶ m	15		
Specific gravity	—	1.81	D792	—
Barcol Hardness	Impressor 934-1	65	D2583	—

1) Ameron test method.

Typical mechanical properties

Pipe Property ¹	Units	Value		Method	
		(2 - 6 in)	(8 - 16 in)	ASTM	ATM ²
Tensile strength					
Longitudinal	10 ³ psi MPa	35.0 240	20.0 138	D2105	161
Circumferential	10 ³ psi MPa	70.0 480	40.0 275	D1599	151
Tensile modulus					
Longitudinal	10 ⁶ psi GPa	3.0 20.6	1.5 10.3	D2105	161
Circumferential	10 ⁶ psi GPa	4.2 29.0	2.3 15.9	—	—
Compressive strength					
Longitudinal	10 ³ psi MPa	35.0 240	20.0 138	—	142
Compressive modulus					
Longitudinal	10 ⁶ psi GPa	3.0 20.6	1.5 10.3	—	142
Long-term hydrostatic design basis					
Static	10 ³ psi MPa	21 145	21 145	D2992(B)	—
Cyclic	10 ³ psi MPa	8 55	— —	D2992(A)	—
Poisson's ratio ³					
v_{yx}	—	0.16	0.11	—	—
v_{xy}	—	0.26	0.19	—	—

1) Based on structural wall thickness.

2) Ameron test method.

3) The first subscript denotes the direction of contraction and the second that of the applied stress.
x denotes longitudinal direction.
y denotes circumferential direction.

Nominal Pipe Size		Change in Length Due to Pressure ¹		Stiffness Factor ²	
(in)	(mm)	(in/100 ft/100 psi)	(mm/m/bar)	(lb•in ³ /in ²)	(N•m)
2	50	.284	343	42	4.7
3	80	.394	476	75	8.5
4	100	.477	576	60	6.8
6	150	.493	596	275	31.1
8	200	1.14	1376	500	56.5
10	250	1.19	1437	750	85
12	300	1.20	1450	1250	140
14	350	1.26	1523	1600	180
16	400	1.31	1583	2000	225

1) In an unrestrained system due to pressure effects alone.

2) At 5% deflection.

Support spacing

Values are based on a 1/2-inch (12 mm) deflection at midspan.

Nominal Pipe Size		Single Span ¹						Continuous Span ²					
		Gases		1.00 ³		1.25		Gases		1.00		1.25	
(in)	(mm)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)
2	50	14.4	4.4	9.7	3.0	9.3	2.8	21.5	6.6	14.5	4.4	13.9	4.2
3	80	17.7	5.4	11.1	3.4	10.6	3.2	26.4	8.0	16.6	5.1	15.8	4.8
4	100	20.0	6.1	12.1	3.7	11.5	3.5	29.9	9.1	18.1	5.5	17.2	5.2
6	150	24.9	7.6	14.6	4.5	13.9	4.2	37.2	11.3	21.9	6.7	20.8	6.3
8	200	23.8	7.3	13.9	4.2	13.2	4.0	35.6	10.9	20.8	6.3	19.7	6.0
10	250	26.9	8.2	15.4	4.7	14.6	4.5	40.2	12.3	23.0	7.0	21.9	6.7
12	300	29.3	8.9	16.7	5.1	15.9	4.8	43.8	13.4	25.0	7.6	23.7	7.2
14	350	31.3	9.5	17.6	5.4	16.7	5.1	46.8	14.3	26.3	8.0	25.0	7.6
16	400	33.5	10.2	18.7	5.7	17.8	5.4	50.1	15.3	27.9	8.5	26.6	8.1

1) For fluid temperatures above 78°F (25°C), the span lengths decrease by 0.2 in/°F (9 mm/°C).

2) For intermediate spans. End spans may be calculated by multiplying the single span length by 1.8.

3) Fluid specific gravity.

Bending radius

Nominal Pipe Size		Minimum Bending Radius ¹		Maximum Deflection per 39-ft Joint (deg)	Minimum Length Required for 10° Change	
		(ft)	(m)		(ft)	(m)
2	50	75	23	30 ²	13 ²	4
3	80	100	30	20	20	6
4	100	150	46	15	27	8
6	150	200	61	10	40	12
8	200	300	91	7 + 2 = 9 ³	57 - 13 = 44 ⁴	12
10	250	350	107	6 + 2 = 8	67 - 13 = 54	16
12	300	400	123	5 + 2 = 7	80 - 13 = 67	20
14	350	450	137	4 + 2 = 6	100 - 13 = 87	27
16	400	500	152	3 + 2 = 5	133 - 13 = 120	37

1) At rated pressure. Sharper bends may create excessive stress concentrations. **Do not** bend pipe until adhesive has cured.

2) 2 - 6 inch: pipe only.

3) 8 - 16 inch: pipe deflection plus 2° Pronto-Lock II coupling deflection.

4) 8 - 16 inch: pipe minimum minus 13-ft (4 m) effect of Pronto-Lock II coupling deflection.

Bondstrand® Guide Specification

Pipe construction

Pipe—The structural wall of fiberglass pipe in 2 through 16-inch nominal pipe sizes shall be constructed of continuous glass fibers wound in a matrix of aromatic amine cured epoxy resin in a dual angle pattern that takes optimum advantage of the tensile strength of the filaments. Pipe produced by filament-winding shall have a smooth outer surface with an outside diametral tolerance not exceeding $\pm 1.0\%$. The pipe shall incorporate an integral liner with a nominal thickness of 0.010 ± 0.005 inches for 2 through 6-inch nominal sizes and 0.020 ± 0.005 inches for 8 through 16-inch nominal sizes. The pipe shall be manufactured in accordance with ASTM Standard D2996 for filament-wound reinforced thermosetting resin pipe (RTRP). When classified under ASTM Standard D2310, the pipe shall be Type 1, Grade 1, and Class F for 2 through 16-inch nominal pipe sizes.

Pipe shall be provided in standard lengths up to 40 feet, and shall be available in 60-ft lengths on special request to minimize the number of field joints for rapid installation.

Pressure rating—Pipe in 2 through 16-inch sizes shall be rated for a minimum internal pressure of 150 psig at 210°F. In 2 through 10-inch sizes the pipe shall have a full vacuum capability at 80°F when installed above ground.

Fittings construction

Fittings in 8 through 16-inch nominal sizes shall be filament wound and incorporate a resin-rich liner of equal or greater thickness than the pipe liner and shall be constructed of the same glass and resin type for corrosion and abrasion resistance equal to that of the pipe. Fittings in 2 through 6-inch nominal sizes may be compression molded from glass and resins similar to those used in the pipe. Contact-molded, sprayed-up or hand laid-up fittings shall not be permitted.

Pipe and fittings shall be joined using bell and spigot taper/taper adhesive-bonded joints or mechanical screw-on type joints with O-ring seals inside the bell for rapid installation.

Physical and mechanical requirements

Values for physical and mechanical properties shall be no less than 95% of those shown tabulated above under TYPICAL PHYSICAL PROPERTIES and TYPICAL MECHANICAL PROPERTIES.

Workmanship

The pipe and fittings shall be free from all defects, including delaminations, indentations, pinholes, foreign inclusions, bubbles and resin-starved areas which, due to their nature, degree or extent, detrimentally affect the strength and serviceability of the pipe or fittings. Pigments or dyes may be used in the resin as long as the product is sufficiently translucent to verify the structural integrity of the structural wall. The pipe and fittings shall be as uniform as commercially practicable in color, density and other physical properties.

Testing

Quality control testing—Samples of pipe and fittings shall be tested at random based on standard quality control practices to determine conformance of the materials to the following ASTM guidelines for testing fiberglass pipe products: ASTM D1599, D2105, D2925, D2992A or D2992B. Test samples may be hydrostatically tested by the manufacturer to 1.5 times the pressure rating for signs of leakage.

Marking

Each component shall be marked to show the following

- Manufacturer's name and address
- Nominal pipe size
- Hydrostatic test pressure (if so ordered)
- Date and shift of manufacture (pipe only)

Conversions

1 psi = 6895 Pa = 0.07031 kg/cm²
1 bar = 10⁵ Pa = 14.5 psi = 1.02 kg/cm²
1 MPa = 10⁶ Pa = 145 psi = 10.2 kg/cm²
1 GPa = 10⁹ Pa = 145,000 psi = 10,200 kg/cm²
1 in = 25.4 mm
1 ft = 0.3048 m
1 lb·in = 0.113 N·m
1 in⁴ = 4.162 x 10⁻⁷m⁴
°C = $\frac{5}{9}$ (°F - 32)

Important Notice

This literature and the information and recommendations it contains are based on data reasonably believed to be reliable. However, such factors as variations in environment, application or installation, changes in operating procedures, or extrapolation of data may cause different results. Ameron makes no representation or warranty, express or implied, including warranties of merchantability or fitness for purpose, as to the accuracy, adequacy or completeness of the recommendations or information contained herein. Ameron assumes no liability whatsoever in connection with this literature or the information or recommendations it contains. Product specifications are subject to change.



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