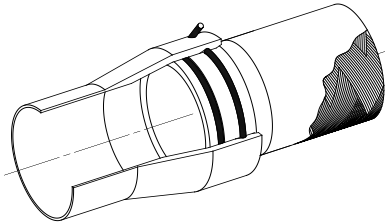


FIBERGLASS PIPE GROUP



Series 3400 Fiberglass Pipe and Fittings

using Key-Lock® mechanical or taper/taper adhesive bonded joint

Uses and applications

Brackish water lines	Saltwater and seawater lines
Crude oil transmission pipelines	Seawater intake and discharge lines
Drainage systems	Sewage systems
Electrical conduit	Submerged pipelines
Fire protection systems	Temporary pipelines
Highly corrosive crude oil pipelines	Waste water lines
Potable water lines	General industrial service for mildly corrosive liquids
Oil field reinjection systems	

Description

Filament-wound fiberglass reinforced epoxy pipe with Key-Lock male and female mechanical joining system or matching taper adhesive-bonded joint.

Pipe designs from 150 to 725 psig using a 7200 psi hydrostatic design basis (cyclic) with a 1.0 service factor, or 21,500 psi HDB Static and SF=0.5.

Cycloaliphatic amine cured resin construction for operating temperatures to 200°F.

Manufactured per ASTM D2996. ASTM D2310 classification: RTRP-11AX, RTRP-11 FX (including 20-mil liner on request).

System designed to provide 4:1 safety factor for static applications in accordance with ASTM D1599.

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.

The information in this document is available in metric format: request Product Data Sheet FP452, revision C or later.

Joining systems

Key-Lock male and female mechanical joint assembled with locking keys in integrally wound male and female ends. Systems in larger diameters and higher pressure ratings are provided with dual locking keys. Key-Lock joined systems employ elastomeric O-rings for hydrostatic seal.

Taper/taper for adhesive-bonded joint using integrally wound bells and spigots.

Pipe lengths

Nominal Pipe Size		Random Length	
(in)	(mm)	(ft)	(m)
2-6	50-150	20	6.1
8-24	200-600	20, 40	6.1, 12.2
28-40	700-1000	40	11.8

Typical pipe pressure performance

Nominal Pipe Size	Internal Pressure Rating	Ultimate Collapse Pressure (psig) ³							
		3410 ¹	3412	3414	3416	3420	3425		
		150 ²	180	200	230	290	360		
2 50	180 to 725	368	368	368	368	368	368	368	368
3 80	180 to 725	98	98	98	98	98	98	98	115
4 100	180 to 725	46	46	46	35	35	109		
6 150	180 to 725	18	24	28	36	56	90		
8 200	150 to 725	18	18	22	27	43	92		
10 250	150 to 725	14	14	17	28	40	83		
12 300	150 to 725	12	14	16	27	42	85		
14 350	150 to 580	10	14	19	26	39	91		
16 400	150 to 580	9	12	17	26	41	89		
18 450	150 to 580	8	14	17	27	40	87		
20 500	150 to 580	10	14	18	27	39	87		
24 600	150 to 460	8	13	16	26	41	88		
28 700	150 to 230	7	10	16	27	—	—		
30 750	150 to 230	7	10	17	27	—	—		
32 800	150 to 230	6	10	17	27	—	—		
36 900	150 to 230	5	9	16	26	—	—		
40 1000	150 to 230	5	9	17	26	—	—		

- 1) Pipe series designation: final two digits indicate metric pressure class: e.g. 3425 is rated at 25 bar.
- 2) Pressure class (psig)
- 3) Ultimate collapse pressures for higher pressure classes exceed tabulated values.
- 4) **Italicized bold-face entries indicate dual locking key design.**

Typical pipe dimensions

Nominal Pipe Size	Pipe ID	Minimum Total Wall Thickness ¹ (in)									
		3410	3412	3414	3416	3420	3425	3432	3440	3450	
(in) (mm)	(in)	150	180	200	230	290	360	460	580	725	
2 50	2.10	.091	.091	.091	.091	.091	.091	.091	.091	.098	.110
3 80	3.22	.091	.091	.091	.091	.091	.094	.102	.126	.153	
4 100	4.14	.091	.091	.091	.098	.098	.114	.126	.157	.197	
6 150	6.26	.098	.106	.110	.118	.134	.154	.181	.228	.283	
8 200	8.22	.122	.122	.130	.138	.157	.197	.232	.095	.366	
10 250	10.35	.138	.138	.146	.169	.189	.236	.287	.366	.453	
12 300	12.35	.154	.161	.169	.197	.224	.280	.339	.429	.535	
14 350	13.56	.161	.177	.193	.213	.240	.311	.370	.472	—	
16 400	15.50	.173	.189	.209	.240	.276	.350	.421	.535	—	
18 450	17.08	.181	.217	.228	.264	.299	.382	.461	.551	—	
20 500	18.98	.213	.236	.256	.291	.327	.421	.512	.650	—	
24 600	22.78	.236	.276	.296	.343	.398	.504	.610	—	—	
28 700	27.56	.276	.299	.354	.413	—	—	—	—	—	
30 750	29.52	.283	.319	.382	.441	—	—	—	—	—	
32 800	31.50	.291	.339	.406	.469	—	—	—	—	—	
36 900	35.43	.311	.378	.449	.524	—	—	—	—	—	
40 1000	39.37	.338	.417	.500	.579	—	—	—	—	—	

- 1) Total wall thickness includes 20-mil liner thickness.

Pipe weight

Nominal Pipe Size	Minimum Weight of Empty Pipe (lb/ft)									
		3410	3412	3414	3416	3420	3425	3432	3440	3450
(in) (mm)	150	180	200	230	290	360	460	580	725	
2 50	.47	.47	.47	.47	.47	.47	.47	.47	.47	.54
3 80	.67	.67	.67	.67	.67	.74	.81	1.01	1.21	
4 100	.87	.87	.87	.94	.94	1.15	1.28	1.62	2.02	
6 150	1.42	1.55	1.62	1.75	2.02	2.29	2.76	3.57	4.45	
8 200	2.36	2.36	2.56	2.70	3.10	3.98	4.72	6.07	7.62	
10 250	3.37	3.37	3.57	4.25	4.72	6.00	7.35	9.5	11.9	
12 300	4.52	4.79	5.00	5.86	6.74	8.49	10.4	13.3	16.8	
14 350	5.26	5.80	6.34	7.01	7.95	10.4	12.5	16.1	—	
16 400	6.40	7.08	7.82	9.03	10.4	13.4	16.2	20.9	—	
18 450	7.41	8.96	9.44	11.0	12.5	16.1	19.6	25.2	—	
20 500	14.4	10.9	11.8	13.5	15.2	19.8	24.2	31.1	—	
24 600	13.0	15.2	16.4	19.1	22.3	28.5	34.7	—	—	
28 700	18.4	20.1	24.1	28.0	—	—	—	—	—	
30 750	20.3	22.9	27.6	32.0	—	—	—	—	—	
32 800	22.2	26.0	31.3	36.3	—	—	—	—	—	
36 900	26.8	32.7	39.0	45.7	—	—	—	—	—	
40 1000	32.4	40.2	48.4	56.2	—	—	—	—	—	

Typical physical properties

Pipe Property	Units	Value	ASTM Method	
Thermal conductivity Pipe wall	Btu·in/(hr·ft ² ·°F)	2.3	C177	
	W/m·°C	0.33		
Thermal expansion linear	Axial	10 ⁻⁶ in/in/°F	10	D696
		10 ⁻⁶ mm/mm°C	18	
	Circumferential	10 ⁻⁶ in/in/°F	6	D696
		10 ⁻⁶ mm/mm°C	10.8	
Flow coefficient	Hazen-Williams	150	—	
Absolute roughness	10 ⁻⁶ ft	17.4	—	
	10 ⁻⁶ m	5.3		
Density	lb/in ³	0.065	D792	
	g/cm ³	1.8		

Typical mechanical properties

Pipe Property	Units	70°F (21°C)	200°F (93°C)	ASTM Method	
Circumferential	Tensile stress at weeping	10 ³ psi	18.6	-	D1599
		MPa	128	-	
	Tensile modulus	10 ⁶ psi	3.67	3.19	D2105
	GPa	25.3	22.0		
	Poisson's ratio		0.50	0.65	D2105
Longitudinal	Tensile strength	10 ³ psi	9.43	7.25	D2105
		MPa	65	50	
	Tensile modulus	10 ⁶ psi	1.45	1.13	D2105
		GPa	10.0	7.80	
	Poisson's ratio		0.40	0.45	D2105
Beam apparent	Elastic modulus	10 ⁶ psi	1.33	1.02	D2925
		GPa	9.2	7.0	
Hydrostatic design basis	Static	10 ³ psi	21.4 ¹	-	D2992B
		MPa	148	-	
	Cyclic	10 ³ psi	7.3 ¹	-	D2992A
		MPa	50	-	

1) At 150°F.

Recommended span lengths

Nominal Pipe Size (in) (mm)	Recommended Span Lengths for Horizontal Support @ 70°F ¹ (ft)									
	3410	3412	3414	3416	3420	3425	3432	3440	3450	
2 50	10	10	10	10	10	10	10	10	10	10
3 80	11	11	11	11	11	11	11	12	12	13
4 100	12	12	12	12	12	13	13	14	14	15
6 150	14	14	14	15	15	16	16	17	17	18
8 200	16	16	16	16	17	18	19	20	20	21
10 250	17	17	18	18	19	20	21	22	22	23
12 300	19	19	19	20	21	22	23	24	24	25
14 350	20	20	20	21	21	23	24	25	25	—
16 400	20	21	21	22	23	25	26	27	27	—
18 450	21	22	23	23	24	26	27	29	29	—
20 500	23	23	24	25	25	27	29	30	30	—
24 600	25	26	26	27	28	30	31	—	—	—
28 700	27	28	29	30	—	—	—	—	—	—
30 750	28	29	30	31	—	—	—	—	—	—
32 800	28	30	31	32	—	—	—	—	—	—
36 900	30	31	33	34	—	—	—	—	—	—
40 1000	31	33	35	36	—	—	—	—	—	—

1) Span recommendations are based on pipe filled with fresh water (S.G. = 1.0) and include no provision for weight from valves, flanges, or other heavy objects. Span recommendations are calculated for a maximum long-term deflection of 1/8 inch to ensure good appearance and adequate drainage. Fully continuous spans may be used with support spacing up to 20% greater for this deflection: in simple spans, support spacing should be 20% less.

Minimum bending radius

Nominal Pipe Size	(in) (mm)	Minimum Allowable Bending Radius @ 70°F (ft)								
		3410	3412	3414	3416	3420	3425	3432	3440	3450
2	50	30	30	30	30	40	40	60	70	90
3	80	50	50	55	60	75	105	165	150	150
4	100	70	75	85	90	125	140	210	185	175
6	150	125	135	160	175	205	245	305	280	275
8	200	165	205	240	275	335	310	390	355	355
10	250	230	300	375	340	455	425	490	445	460
12	300	285	355	450	410	515	495	584	545	545
14	350	335	380	430	460	600	515	640	585	—
16	400	415	490	550	525	644	595	640	675	—
18	450	495	490	600	570	740	670	810	475	—
20	500	485	550	640	630	855	745	880	830	—
24	600	655	670	820	775	940	885	1060	—	—
28	700	925	1050	985	915	—	—	—	—	—
30	750	1050	1130	1130	990	—	—	—	—	—
32	800	1180	1210	1100	1060	—	—	—	—	—
36	900	1460	1370	1270	1190	—	—	—	—	—
40	1000	1710	1520	1390	1339	—	—	—	—	—

Field testing

Bondstrand 3400 piping systems are designed for hydrostatic testing at 150% of rated operating pressure. Pneumatic testing is not recommended.

Conversions

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

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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