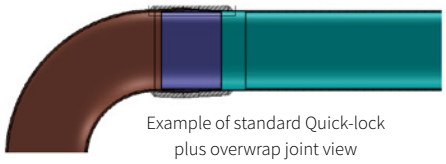
Bondstrand 5000/5000C Product Data

(Severely Corrosive Industrial Service and Oxidizing Acids)

Uses and applications

- Acid drains
- Bleach processing
- Chemical process piping
- Chlorinated water
- Chlorine
- Corrosive slurries
- Food processing plant
- Organic chemicals
- Oxidizing chemicals and acids
- Phosphoric acid
- Water Treatment/Purification
- General industrial service for severely corrosive liquids



Example of standard Quick-lock plus overwrap joint view

The service temperature and concentration limitation for each chemical mixture shall be cross referenced to NOV FGS Chemical Resistance Guide.

Listings

Classification approval from LRS, DNV, ABS, BV and NK.

Performance

Working pressure from 150 to 232 psig (10 to 16 bar) depending on pipe size.

Operating temperatures up to 180°F (82°C). Subzero temperatures will not adversely affect mechanical properties.

Excellent corrosion resistance over a wide temperature range. See most recent release of Bondstrand Corrosion Guide for specific applications.

Does not require thrust blocks at ambient temperatures when properly installed in most soils.

Smooth inner liner (Hazen-Williams C = 150) produces extremely low frictional loss for greater discharge and reduced pumping costs.

Low thermal conductivity minimizes heat losses.

Optional: The product can be supplied in conductive type - Bondstrand 5000C for Conductive

Pipe Data Sheet

Composition

Pipe

Filament-wound fiberglass-reinforced vinylester pipe with integral 0.050-inch (1.3 mm) resin-rich reinforced liner.

Nominal pipe size		ASTM Designation
In	mm	D2996
1-6	25-150	RTRP 11FW-1012/11FE-1012
8-16	200-400	RTRP 11FW-1013/11FE-1013

Fittings

Filament wound fiberglass reinforced vinyl ester fittings with integral 0.050 inch (1.3 mm) resin rich reinforced liner. Following types of fittings available as a standard.

Tees

90° and 45° elbows

Crosses

Nipples and couplings

45° laterals

Reducers

Flanges and Blind

Laminated or molded flanges with ASME/ ANSI / JIS/ DIN standard drilling. Other flange bolt drilling standard available upon request.

Thermosetting adhesives

RP106 two-parts Vinylester resin and cure for 5000/5000C

Joining systems

Quick-Lock® straight/taper adhesive-bonded joint featuring integral pipe stop in bell for predictable, precise laying lengths plus overwrap on joint for enhanced joint performance.

Pipe lengths end-to-end

Standard pipe length (end-to-end) will have one shaved male ends and one integral female end. Pipe end with both plain ends supply is upon specific order requested.

Nominal pipe size		Random lengths	
in	mm	ft	m
1 - 1½	25 - 40	9.8	3.0
2- 6	50 - 150	29.5	9.0
8 - 16	200 - 400	39.0	11.89

Fittings

Reducers, couplings, tees and 90° & 45° elbows are available with integral Quick-Lock female end. Plain end fittings are available upon specific order requested.

Laying lengths of filament-wound fittings with Quick-Lock ends to be refer to product dimensions table (PDT).

Pipe Data Sheet

Typical pipe dimensions and weights

Nominal pipe size		Pipe I.D.		Total wall thickness[1]		Average sectional area[2]		Pipe weight (ref.)	
in	mm	in	mm	in	mm	in²	mm²	lb/ft	Kg/m
1	25	1.07	27.3	0.138	3.5	0.53	340	0.4	0.6
1½	40	1.67	42.3	0.138	3.5	0.79	510	0.61	0.9
2	50	2.10	53.0	0.134	3.4	1.13	730	1.0	1.2
3	80	3.22	82.0	0.138	3.5	1.70	1100	1.5	1.7
4	100	4.14	105.0	0.178	4.5	2.73	1760	2.4	2.8
5	125	5.19	131.9	0.178	4.5	3.00	1928	3.1	3.8
6	150	6.20	159.0	0.178	4.5	4.06	2620	3.5	4.2
8	200	8.22	209.0	0.197	5.0	5.83	3760	5.0	6.1
10	250	10.35	263.0	0.197	5.0	7.31	4710	6.2	7.7
12	300	12.35	314.0	0.224	5.7	8.86	5719	7.4	9.1
14	350	13.56	344.0	0.221	5.6	10.85	7000	8.7	11.0
16	400	15.50	394.0	0.252	6.4	14.18	9150	11.2	14.0

1) Total wall thickness is combined of minimum structural wall thickness plus 1.3mm liner.
1) Use these values for calculating longitudinal thrust.

Typical pipe performance

Nominal pipe size		Internal pressure rating [2]		Ultimate collapse pressure rating [1]	
in	mm	psig	Bar	psig	Mpa
1	25	232	16	2191.2	15.11
1½	40	232	16	689.5	4.76
2	50	232	16	318.7	2.20
3	80	232	16	109.5	0.76
4	100	232	16	160.1	1.10
5	125	232	16	83.8	0.58
6	150	232	16	48.9	0.34
8	200	175	12	34.0	0.23
10	250	175	12	17.3	0.12
12	300	145	12	17.3	0.12
14	350	145	10	12.3	0.08
16	400	145	10	13.7	0.09

1) External pressure at 70°F (21°C)
2) Internal pressure at 150°F (65°C)

Fittings pressure rating

Fittings and flanges will have same product pressure rating as pipe.

Bushed saddles used Bondstrand Series 2000M epoxy saddles with 316 stainless steel outlet. Other outlet material available on special order.

Reducer bushings bonded into flanges/ saddles will have the same product rating as the flanges/ fittings unless otherwise shown in the products table.

Field testing

Bondstrand 5000/5000C piping systems are designed for hydrostatic field testing at 150% of rated design pressure. Pneumatic testing is not recommended

Typical mechanical properties

Pipe Property(1)	Units	Value	ASTM
Tensile strength Longitudinal	10^3 psi MPa	10.8 74.5	D2105
Tensile strength Circumferential	10^3 psi MPa	77.2 53.2	D1599
Tensile modulus Longitudinal	10^3 psi MPa	2.79 19.24	D2105
Tensile modulus Circumferential	10^3 psi MPa	3.94 27.17	-
Long-term hydrostatic(2) Design basis Static, Hoop Stress LCL 20 Year Life @150°F (65°C)	10^3 psi MPa	12.8 88.3	D2992(B)
Poisson's Ratio(3) **V**ah	-	0.32	-
Poisson's Ratio(3) **V**ha	-	0.61	-

(1) Based on structural wall thickness, at ambient temperature unless noted.

(2) Test fixtures were "free end" type. Specimens were stressed by internal pressure in both hoop and longitudinal directions.

(3) **V**ha = The ratio of axial strain to hoop strain resulting from stress in the hoop direction.

Vah = The ratio of hoop strain to axial strain resulting from stress in the axial direction.

Pipe Data Sheet

Typical physical properties

Pipe Property(1)	Units	Value	ASTM
Thermal conductivity	Btu-in/(h•ft2 • ° F) W/m•°C	2.0 0.28	C177
Coefficient of thermal expansion (linear) (2 -16 inch) 77°F to 150°F (25°C to 65°C)	10-6 in/in/°F 10-6 cm/cm/°C	10 18	D696
Flow coefficient	Hazen-Williams	150.00	-
Absolute roughness	10-6 ft 10-6 m	17.40 5.30	-
Specific gravity	-	1.80	D792
Density	lb/in^3 Kg/m^3	0.065 1840	-

Pipe stiffness

Nominal pipe size		Stiffness factor(1)		Pipe Stiffness(1)		STIS(2)	
in	mm	lb•in	N•m	psi	MPa	psi	N/m^2
1	25	340	38.4	1540	10.60	91.3	629655
1½	40	340	38.4	1540	10.60	28.7	198132
2	50	340	38.4	1540	10.60	13.3	91586
3	80	340	38.4	460	3.20	4.6	31471
4	100	820	92.6	530	3.70	6.7	45992
5	125	556	62.9	187	1.29	3.5	24091
6	150	820	92.6	160	1.10	2.1	14053
8	200	1180	133.3	105	0.72	1.4	9770
10	250	1180	133.3	53	0.37	0.72	4984
12	300	1447	163.5	38	0.27	0.72	4957
14	350	1330	150.2	36	0.25	0.51	3520
16	400	2190	247.4	38	0.26	0.57	3937

1) Per ASTM D2412

2) STIS is referring to Specific Tangential initial Stiffness (Stiffness Class).

Span lengths

Recommended maximum support spacings for Bondstrand 5000/5000C vinyl ester pipe at various operating temperatures. Values based on 0.5-inch (12.5 mm) deflection at midspan for fluid specific gravity = 1.0. For fully continuous spans, values may be increased up to 20%. Decrease values by 20% for single spans.

Nominal pipe size		Pipe spans (ft)		
in	mm	100°F	140°F	170°F
1	25	9.3	8.9	8.7
1½	40	10.7	10.2	9.2
2	50	12.1	10.8	9.4
3	80	13.7	12.3	10.7
4	100	16.1	14.5	12.6
5	125	17.0	15.2	13.3
6	150	18.1	16.1	14.2
8	200	20.1	18.1	15.5
10	250	21.4	19.2	16.6
12	300	22.3	20.2	17.5
14	350	23.1	20.7	18.1
16	400	24.3	21.6	18.9

1) Span recommendations are intended for normal horizontal piping support arrangements, but include no provision for weights (fittings, valves, flanges, etc) or thrusts (branches, turns, etc.).
2) Span recommendations are calculated for a maximum long-term deflection of ½ inch to ensure good appearance and adequate drainage.

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