

# STAR® Aliphatic Amine Line Pipe (High Pressure - STANDARD DESIGN - Product Data)

## Product Description

- Pressure - Up to 4000 psi (27,6 MPa)
- Resin System - Aliphatic Amine Cured Epoxy
- Reinforcement - Premium Fiberglass
- Joining Systems - API 8rd Threaded
- Joint Length - 30 Feet (9,1 mts) Nominal  
Random Lengths of 20 to 32 Feet (6,1 to 9,8 mts)
- Temperature - Up to 200° F (93.3° C) Maximum
- Sizes - 1½ through 8 inches - API 8rd Thread
- Fittings - A variety of filament wound API 5B threaded fittings are available. Purchase all fittings by thread size and design pressure rating only.

## High Pressure Design ≥ 500 psi

- Design Life - 20 years at full rating
- Design Temperature - 150° F (65.6° C)
- Wall Thickness - Nominal
- Hoop Stress - Average Long-Term Hydrostatic Strength (LTHS), ASTM D2992-B
- 100% Factory Hydro Test - All sizes 1.25 times the Series pressure rating
- Non API Design

## Flow Factors

- Hazen Williams C=150
- Absolute Roughness = 0.00021 in. (0.00533 mm)

## Nominal Moduli

- Modulus of Elasticity  
Hoop -  $3.3 \times 10^6$  psi (22,8 GPa)  
Axial -  $2.0 \times 10^6$  psi (13,8 GPa)
- Poisson's Ratio (Minor) = 0.39

## Physical Properties

- Density = 124 lbs/cu ft (1986 kgs/cu m)
- Specific Gravity = 1.99

## Thermal Properties

- Coefficient of Thermal Conductivity  
0.23 BTU/(ft•hr•°F) (0.4 W/(m•C°))
- Axial Coefficient of Thermal Expansion  
 $10.4 \times 10^{-6}$  in/in/°F ( $18,8 \times 10^{-6}$  mm/mm/°C)
- Hoop Coefficient of Thermal Expansion  
 $6.2 \times 10^{-6}$  in/in/°F ( $11,2 \times 10^{-6}$  mm/mm/°C)

## Benefits

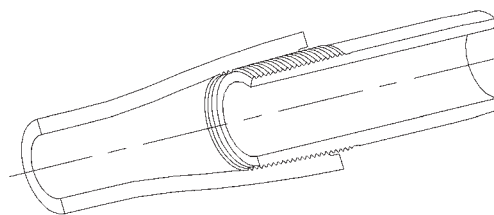
- Corrosion Control
- Reduced Installation Costs
- Improved Flow Efficiency
- Reduced Paraffin & Scale Build-Up
- Reduced Maintenance Cost

## Applications

- Production Lines or Injection Lines
- Transfer Lines or Disposal Lines
- Oil, Gas, Saltwater, CO<sub>2</sub> and H<sub>2</sub>S

## Joining System

### Advanced Composite Thread (ACT) or Precision Ground Thread (PGT)



- ACT - Molded threads using a graphite, ceramic and epoxy composite for high performance applications.
- PGT - Typical ground threads produced with numerical controlled grinding equipment.
- All 1½" EUE 10rd and 2 ¾" - 4 ½" EUE 8rd API threads conform to API 5B Table 14, 14th Edition (L4 is minimum) and all 5 ½" - 9 5/8" OD 8rd casing threads conform to API 5B Table 7, 14th Edition (L4 is minimum).

SIZE		NOMINAL PIPE DIMENSIONS						Minimum Bending Radius Ft (m)	Short Term Tensile Rating Lbs (kgs)
Pipe	Thread	Inside Diameter In (mm)	Outside Diameter In (mm)	Wall Thickness In (mm)	Pipe Weight lbs/ft (kg/m)	Connection Diameter In (mm)			

Series 500 (3,4 MPa) <sup>(1)</sup> - PGT (All Sizes)										500@150°F (65,6°C)		450@180°F (82,2°C)		400@200°F (93,3°C)	
3	3 1/2	2.94 (74,7)	3.07 (78,0)	0.07 (1,8)	0.70 (1,0)	4.20 (106,7)	154 (46,9)	1700 (771)							
4	4 1/2	3.85 (97,8)	4.01 (101,9)	0.08 (2,0)	1.20 (1,8)	5.45 (138,4)	201 (61,3)	2900 (1315)							
5	<sup>TC</sup> 5 1/2	4.74 (120,4)	4.91 (124,7)	0.09 (2,3)	1.80 (2,7)	6.25 (158,8)	246 (75,0)	3600 (1633)							
6	6 5/8	5.93 (150,6)	6.15 (156,2)	0.11 (2,8)	2.10 (3,1)	7.10 (180,3)	308 (93,9)	5800 (2631)							
8	8 5/8	7.74 (196,6)	8.03 (204,0)	0.15 (3,8)	3.90 (5,8)	9.25 (235,0)	401 (122,2)	10300 (4672)							

Series 800 (5,5 MPa) <sup>(1)</sup> - ACT, PGT (All Sizes)										800@150°F (65,6°C)		700@180°F (82,2°C)		650@200°F (93,3°C)	
2	2 3/8	1.94 (49,3)	2.11 (53,6)	0.08 (2,0)	0.50 (0,7)	3.05 (77,5)	105 (32,0)	1400 (635)							
2 1/2	2 7/8	2.37 (60,2)	2.53 (64,3)	0.08 (2,0)	0.60 (0,9)	3.55 (90,2)	127 (38,7)	1800 (816)							
3	3 1/2	2.94 (74,7)	3.11 (79,0)	0.09 (2,3)	0.90 (1,3)	4.25 (108,0)	156 (47,5)	2300 (1043)							
4	4 1/2	3.85 (97,8)	4.08 (103,6)	0.12 (3,0)	1.60 (2,4)	5.55 (141,0)	204 (62,2)	4200 (1905)							
5	<sup>TC</sup> 5 1/2	4.74 (120,4)	5.02 (127,5)	0.14 (3,6)	2.50 (3,7)	6.25 (158,8)	251 (76,5)	6100 (2767)							
6	6 5/8	5.50 (139,7)	5.83 (148,1)	0.17 (4,3)	3.10 (4,6)	7.35 (186,7)	292 (89,0)	8300 (3765)							
6	6 5/8	5.93 (150,6)	6.27 (159,3)	0.17 (4,3)	3.10 (4,6)	7.30 (185,4)	314 (95,7)	9200 (4173)							
8	8 5/8	7.74 (196,6)	8.18 (207,8)	0.22 (5,6)	5.80 (8,6)	9.55 (242,6)	409 (124,7)	15800 (7167)							

Series 1000 (6,9 MPa) <sup>(1)</sup> - ACT, PGT (All Sizes)										1000@150°F (65,6°C)		900@180°F (82,2°C)		850@200°F (93,3°C)	
2	2 3/8	1.94 (49,3)	2.11 (53,6)	0.08 (2,0)	0.50 (0,7)	3.10 (78,7)	105 (32,0)	1400 (635)							
2 1/2	2 7/8	2.37 (60,2)	2.54 (64,5)	0.09 (2,3)	0.70 (1,0)	3.55 (90,2)	127 (38,7)	1900 (862)							
3	3 1/2	2.94 (74,7)	3.15 (80,0)	0.11 (2,8)	1.00 (1,5)	4.30 (109,2)	158 (48,2)	2800 (1270)							
4	4 1/2	3.85 (97,8)	4.13 (104,9)	0.14 (3,6)	1.90 (2,8)	5.60 (142,2)	206 (62,8)	5000 (2268)							
5	<sup>TC</sup> 5 1/2	4.74 (120,4)	5.09 (129,3)	0.17 (4,3)	2.90 (4,3)	6.25 (158,8)	254 (77,4)	7500 (3402)							
6	6 5/8	5.50 (139,7)	5.91 (150,1)	0.21 (5,3)	3.70 (5,5)	7.45 (189,2)	296 (90,2)	10400 (4717)							
6	6 5/8	5.93 (150,6)	6.38 (162,1)	0.22 (5,6)	4.10 (6,1)	7.50 (190,5)	319 (97,2)	12000 (5443)							
8	8 5/8	7.74 (196,6)	8.29 (210,6)	0.28 (7,1)	7.10 (10,6)	9.75 (247,7)	415 (126,5)	19800 (8981)							

\*PGT 8" is excluded

Series 1250 (8,6 MPa) <sup>(1)</sup> - ACT (All Sizes), PGT 2"-4"										1250@150°F (65,6°C)		1100@180°F (82,2°C)		1050@200°F (93,3°C)	
2	2 3/8	1.94 (49,3)	2.13 (54,1)	0.10 (2,5)	0.60 (0,9)	3.15 (80,0)	107 (32,6)	1700 (771)							
2 1/2	2 7/8	2.37 (60,2)	2.58 (65,5)	0.11 (2,8)	0.80 (1,2)	3.60 (91,4)	129 (39,3)	2300 (1043)							
3	3 1/2	2.94 (74,7)	3.22 (81,8)	0.14 (3,6)	1.30 (1,9)	4.35 (110,5)	161 (49,1)	3700 (1678)							
4	4 1/2	3.85 (97,8)	4.19 (106,4)	0.17 (4,3)	2.30 (3,4)	5.70 (144,8)	210 (64,0)	6100 (2767)							
5	<sup>TC</sup> 5 1/2	4.74 (120,4)	5.18 (131,6)	0.22 (5,6)	3.50 (5,2)	6.45 (163,8)	259 (78,9)	9600 (4355)							
6	6 5/8	5.50 (139,7)	6.00 (152,4)	0.25 (6,4)	4.50 (6,7)	7.57 (192,3)	300 (91,4)	12700 (5761)							
6	7	5.93 (150,6)	6.48 (164,6)	0.27 (6,9)	5.20 (7,7)	8.00 (203,2)	324 (98,8)	14900 (6759)							
8	8 5/8	7.74 (196,6)	8.44 (214,4)	0.35 (8,9)	8.80 (13,1)	10.00 (254,0)	422 (128,6)	25300 (11476)							

Series 1500 (10,3 MPa) <sup>(1)</sup> - ACT (All Sizes), PGT (2"-4")										1500@150°F (65,6°C)		1350@180°F (82,2°C)		1250@200°F (93,3°C)	
1 1/2	1.90	1.44 (36,6)	1.60 (40,6)	0.08 (2,0)	0.40 (0,6)	2.70 (68,6)	80 (24,4)	1100 (499)							
2	2 3/8	1.94 (49,3)	2.17 (55,1)	0.12 (3,0)	0.70 (1,0)	3.20 (81,3)	109 (33,2)	2100 (953)							
2 1/2	2 7/8	2.37 (60,2)	2.62 (66,5)	0.13 (3,3)	1.00 (1,5)	3.67 (93,2)	131 (39,9)	2800 (1270)							
3	3 1/2	2.94 (74,7)	3.26 (82,8)	0.16 (4,1)	1.50 (2,2)	4.42 (112,3)	163 (49,7)	4400 (1996)							
4	4 1/2	3.85 (97,8)	4.28 (108,7)	0.22 (5,6)	2.70 (4,0)	5.80 (147,3)	214 (65,2)	7700 (3493)							
5	<sup>TC</sup> 5 1/2	4.74 (120,4)	5.27 (133,9)	0.26 (6,6)	4.20 (6,2)	6.60 (167,6)	263 (80,2)	11700 (5307)							
6	6 5/8	5.50 (139,7)	6.11 (155,2)	0.31 (7,9)	5.50 (8,2)	7.74 (196,6)	306 (93,3)	15700 (7122)							
6	7	5.93 (150,6)	6.59 (167,4)	0.33 (8,4)	6.30 (9,4)	8.20 (208,3)	330 (100,6)	18200 (8256)							
8	8 5/8	7.43 (188,7)	8.27 (210,1)	0.42 (10,7)	10.50 (15,6)	10.25 (260,4)	414 (126,2)	29200 (13245)							
8	9 5/8	7.74 (196,6)	8.59 (218,2)	0.43 (10,9)	12.10 (18,0)	11.40 (289,6)	430 (131,1)	31100 (14107)							

All products are produced integral joint unless indicated (TC) Threaded and Coupled

SIZE		NOMINAL PIPE DIMENSIONS						Minimum Bending Radius		Short Term Tensile Rating	
Pipe	Thread	Inside Diameter In (mm)	Outside Diameter In (mm)	Wall Thickness In (mm)	Pipe Weight lbs/ft (kg/m)	Connection Diameter In (mm)	Ft	(m)	Lbs	(kgs)	

Series 1750 (12,1 MPa) <sup>(1)</sup> - ACT (All Sizes), PGT (2"-4")							1750@150°F (65,6°C)		1550@180°F (82,2°C)		1450@200°F (93,3°C)	
1½	1.90	1.44 (36,6)	1.63 (41,4)	0.10 (2,5)	0.50 (0,7)	2.75 (69,9)	82	(25,0)	1300	(590)		
2	2 ³⁄₈	1.94 (49,3)	2.20 (55,9)	0.13 (3,3)	0.80 (1,2)	3.25 (82,6)	110	(33,5)	2400	(1089)		
2½	2 7⁄₈	2.37 (60,2)	2.67 (67,8)	0.15 (3,8)	1.20 (1,8)	3.76 (95,5)	134	(40,8)	3400	(1542)		
3	3 1⁄₂	2.94 (74,7)	3.32 (84,3)	0.19 (4,8)	1.80 (2,7)	4.52 (114,8)	166	(50,6)	5300	(2404)		
4	4 1⁄₂	3.85 (97,8)	4.36 (110,7)	0.26 (6,6)	3.30 (4,9)	5.90 (149,9)	218	(66,4)	9300	(4218)		
5	TC5 1⁄₂	4.74 (120,4)	5.35 (135,9)	0.30 (7,6)	4.80 (7,1)	7.00 (177,8)	267	(81,4)	13600	(6169)		
6	6 5⁄₈	5.50 (139,7)	6.21 (157,7)	0.36 (9,1)	6.30 (9,4)	7.92 (201,2)	311	(94,8)	18500	(8392)		
6	7	5.93 (150,6)	6.70 (170,2)	0.38 (9,7)	7.30 (10,9)	8.39 (213,1)	335	(102,1)	21600	(9798)		
8	8 5⁄₈	7.43 (188,7)	8.42 (213,9)	0.49 (12,4)	12.20 (18,2)	10.50 (266,7)	421	(128,3)	34700	(15740)		
8	9 5⁄₈	7.74 (196,6)	8.73 (221,7)	0.50 (12,7)	13.80 (20,5)	11.60 (294,6)	437	(133,2)	36500	(16556)		

Series 2000 (13,8 MPa) <sup>(1)</sup> - ACT (All Sizes), PGT (2"-4")							2000@150°F (65,6°C)		1800@180°F (82,2°C)		1700@200°F (93,3°C)	
1½	1.90	1.44 (36,6)	1.67 (42,4)	0.11 (2,8)	0.60 (0,9)	2.75 (69,9)	83	(25,3)	1500	(680)		
2	2 ³⁄₈	1.94 (49,3)	2.24 (56,9)	0.15 (3,8)	0.90 (1,3)	3.30 (83,8)	112	(34,1)	2700	(1225)		
2½	2 7⁄₈	2.37 (60,2)	2.72 (69,1)	0.18 (4,6)	1.40 (2,1)	3.85 (97,8)	136	(41,5)	4000	(1814)		
3	3 1⁄₂	2.94 (74,7)	3.38 (85,9)	0.22 (5,6)	2.10 (3,1)	4.63 (117,6)	169	(51,5)	6100	(2767)		
4	4 1⁄₂	3.85 (97,8)	4.43 (112,5)	0.29 (7,4)	3.70 (5,5)	6.00 (152,4)	221	(67,4)	10700	(4854)		
5	TC5 1⁄₂	4.74 (120,4)	5.45 (138,4)	0.36 (9,1)	5.50 (8,2)	7.00 (177,8)	273	(83,2)	16200	(7348)		
6	6 5⁄₈	5.50 (139,7)	6.33 (160,8)	0.41 (10,4)	7.40 (11,0)	8.22 (208,8)	316	(96,3)	21700	(9843)		
6	7	5.93 (150,6)	6.82 (173,2)	0.44 (11,2)	8.40 (12,5)	8.59 (218,2)	341	(103,9)	25000	(11340)		
8	8 5⁄₈	7.43 (188,7)	8.57 (217,7)	0.57 (14,5)	14.00 (20,8)	10.75 (273,1)	428	(130,5)	40300	(18280)		
8	9 5⁄₈	7.74 (196,6)	8.90 (226,1)	0.58 (14,7)	16.00 (23,8)	12.00 (304,8)	445	(135,6)	43000	(19505)		

Series 2500 (17,2 MPa) <sup>(1)</sup> - ACT (All Sizes), PGT (2"-3")							2500@150°F (65,6°C)		2250@180°F (82,2°C)		2100@200°F (93,3°C)	
1½	1.90	1.44 (36,6)	1.71 (43,4)	0.14 (3,6)	0.70 (1,0)	2.84 (72,1)	86	(26,2)	1900	(862)		
2	2 ³⁄₈	1.94 (49,3)	2.32 (58,9)	0.19 (4,8)	1.20 (1,8)	3.40 (86,4)	116	(35,4)	3600	(1633)		
2½	2 7⁄₈	2.37 (60,2)	2.82 (71,6)	0.23 (5,8)	1.80 (2,7)	4.03 (102,4)	141	(43,0)	5200	(2359)		
3	3 1⁄₂	2.94 (74,7)	3.51 (89,2)	0.29 (7,4)	2.80 (4,2)	4.85 (123,2)	176	(53,6)	8200	(3720)		
4	4 1⁄₂	3.85 (97,8)	4.58 (116,3)	0.37 (9,4)	4.60 (6,8)	6.11 (155,2)	229	(69,8)	13800	(6260)		
6	7	5.50 (139,7)	6.56 (166,6)	0.53 (13,5)	9.70 (14,4)	9.01 (228,9)	328	(100,0)	28300	(12837)		

Series 3000 (19,0 MPa) <sup>(1)</sup> - ACT (All Sizes), PGT (2"-2½")							3000@150°F (65,6°C)		2700@180°F (82,2°C)		2550@200°F (93,3°C)	
1½	1.90	1.44 (36,6)	1.78 (45,2)	0.17 (4,3)	0.80 (1,2)	2.98 (75,7)	89	(27,1)	2400	(1089)		
2	2 ³⁄₈	1.94 (49,3)	2.40 (61,0)	0.23 (5,8)	1.50 (2,2)	3.57 (90,7)	120	(36,6)	4400	(1996)		
2½	2 7⁄₈	2.37 (60,2)	2.92 (74,2)	0.28 (7,1)	2.20 (3,3)	4.23 (107,4)	146	(44,5)	6500	(2948)		
3	3 1⁄₂	2.94 (74,7)	3.63 (92,2)	0.34 (8,6)	3.40 (5,1)	5.10 (129,5)	181	(55,2)	10000	(4536)		
3½	4 1⁄₂	3.33 (84,6)	4.12 (104,6)	0.40 (10,2)	4.70 (7,0)	6.65 (168,9)	206	(62,8)	13100	(5942)		
4	5 1⁄₂	3.85 (97,8)	4.75 (120,7)	0.45 (11,4)	6.40 (9,5)	7.47 (189,7)	237	(72,2)	17200	(7802)		

Series 3500 (24,1 MPa) <sup>(1)</sup> - ACT Only							3500@150°F (65,6°C)		3150@180°F (82,2°C)		2950@200°F (93,3°C)	
1½	1.90	1.44 (36,6)	1.85 (47,0)	0.20 (5,1)	1.00 (1,5)	3.13 (79,5)	92	(28,0)	2900	(1315)		
2	2 ³⁄₈	1.94 (49,3)	2.48 (63,0)	0.27 (6,9)	1.80 (2,7)	3.75 (95,3)	124	(37,8)	5300	(2404)		
2½	2 7⁄₈	2.37 (60,2)	3.04 (77,2)	0.34 (8,6)	2.70 (4,0)	4.45 (113,0)	152	(46,3)	8100	(3674)		
3	TC4 1⁄₂	2.94 (74,7)	3.76 (95,5)	0.41 (10,4)	4.90 (7,3)	7.00 (177,8)	188	(57,3)	12200	(5534)		
3½	4 1⁄₂	3.33 (84,6)	4.26 (108,2)	0.46 (11,7)	5.40 (8,0)	6.74 (171,2)	213	(64,9)	15700	(7122)		
4	5 1⁄₂	3.85 (97,8)	4.92 (125,0)	0.54 (13,7)	7.60 (11,3)	7.86 (199,6)	246	(75,0)	21000	(9526)		

All products are produced integral joint unless indicated (TC) Threaded and Coupled

**NOTE:** Additional pressure classes are available on request.

<sup>(1)</sup> **Series Rating** - All ratings are maximum operating limits. Exceeding these limits will void the warranty on all NOV Fiber Glass Systems pipe.

## Joining System Information (API 8rd Thread)

Joining System Pipe Size - Inches	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	6"	8"	8"	
Thread Size	1.90" EUE 10rd	2 3/8" EUE 8rd	2 7/8" EUE 8rd	3 1/2" EUE 8rd	4 1/2" EUE 8rd	5 1/2" OD 8rd	6 5/8" OD 8rd	7" OD 8rd	8 5/8" OD 8rd	9 5/8" OD 8rd	
• Pin Upset O.D.	In (mm)	2.15 (54,6)	2.60 (66,0)	3.10 (78,7)	3.75 (95,3)	4.75 (120,7)	5.55 (141,0)	6.65 (168,9)	7.05 (179,1)	8.65 (219,7)	9.65 (245,1)
• Thread Length	In (mm)	2.36 (59,9)	2.94 (74,7)	3.25 (82,6)	3.50 (88,9)	3.88 (98,6)	4.75 (120,7)	4.25 (108,0)	4.88 (124,0)	4.85 (123,2)	5.13 (130,3)
• Make Up Length Loss	In (mm)	2.06 (52,4)	2.56 (65,1)	2.86 (73,0)	3.13 (79,4)	3.50 (88,9)	4.38 (111,1)	3.88 (98,4)	4.50 (114,3)	4.50 (114,3)	4.75 (120,7)

Pipe Capacity			
Size	Inside Diameter		Capacity
Pipe	In	(mm)	Bbls/1,000 ft. (m <sup>3</sup> /km)
1 1/2	1.44	(36,6)	2.00 (1,0)
2	1.94	(49,3)	3.70 (1,9)
2 1/2	2.37	(60,2)	5.40 (2,8)
3	2.94	(74,7)	8.40 (4,4)
4	3.85	(97,8)	14.40 (7,5)
5	4.74	(120,4)	21.80 (11,4)
6	5.50	(139,7)	29.40 (15,3)
6	5.93	(150,6)	34.20 (17,8)
8	7.43	(188,7)	53.70 (28,0)
8	7.74	(196,6)	58.10 (30,3)

Performance Ratings vs. Temperature					
ASTM D 2992-B	73.4° F (23°) C	150° F (65.6°) C	180° F (82.2°) C	200° F (93.3°) C	
11.4 Year Life, LTHS	psi	26,353	22,203	20,578	19,494
	MPa	(181,7)	(153,1)	(141,9)	(134,4)
20 Year Life, LTHS (long term hydrostatic stress)	psi	26,004	21,404	19,602	18,401
	MPa	(179,3)	(147,6)	(135,2)	(126,9)
20 Year Life, LCL (Lower Confidence Limit)	psi	24,596	20,335	18,666	17,554
	MPa	(169,6)	(140,2)	(128,7)	(121,0)

\* 150° F and 180° F data are interpolated

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**NOV Fiber Glass Systems**

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