

## Conley Product Data

### MARINE AND OFFSHORE PIPING – 3 PRESSURE RATINGS

#### Description



- Filament wound piping for service with 3 pressure ratings
  - 90M-150 PSI/10 BAR
  - 90M-225 PSI/15 BAR
  - 90M-250 PSI/17 BAR
- 60 mil double Nexus® reinforced corrosion barrier (inner liner)
- Premium aromatic amine cured product for operating temperatures up to 235°F
- Sizes available from 1” through 20”
- Complete line of filament wound fittings available
- In house fabrication facilities “From your blueprints to pipe assemblies”
- Color coding available
- Conductive systems available
- See Conley Piping Specification for complete description

#### Typical Applications



#### Offshore Platform and Onshore Piping

- Firewater lines
- Fire protection systems
- Dry and wet deluge systems
- Ballast and bilge
- Seawater
- Fresh water and potable water
- Brine
- Drains

#### Shipboard Piping

- Cooling water
- Ballast systems
- Bilge systems
- Sprinkler systems
- Vent and sounding pipes
- Vent pipes
- Potable Water
- Steam Condensate

#### Performance

- Excellent chemical resistance inside and outside to a variety of caustics and acids ~ See the Chemical Resistance Guide for Epoxy liner
- External UV/Corrosion barrier minimum 20 mil on all pipe and fittings
- 25 year guarantee against ‘*fiber blooming*’ on all pipe and fittings
- Straight socket joining system (No expensive tapering tools required)
- Fire Resistant Level 3 and Level 3 Modified (Wet/Dry) with low flame spread

#### Specifications

- ASTM D2996 Filament-Wound “Fiberglass” Pipe
- ASTM D2310 Classification for Machine-Made “Fiberglass” Pipe
- ASTM D3567 Determining Dimensions of “Fiberglass” Pipe and Fittings
- ASTM D4024 Machine Made “Fiberglass” Flanges
- ASTM D5685 “Fiberglass” Pressure Pipe Fittings
- ASTM F1173 Fiberglass Pipe Systems to Be Used for Marine Applications

#### Codes & Standards



- IMO A.753(18) Guidelines for the Application of Plastic Pipes on Ships
- United States Coast Guard PFM 1-98
- UKOOA GRP Piping Standards
- AWWA C950 Fiberglass Pressure Pipe Standards
- ASME B31.1 Power Piping Code
- ASME B31.3 Process Piping Code
- Compliant with U.S. Federal Regulations FDA 21 CFR 175.300

#### Type Approvals



- ABS (American Bureau of Shipping)
- Lloyd’s Register of Shipping
- United States Coast Guard Level 3 and Level 3 Modified (Wet/Dry)

**Series 90M-150  
Pipe Dimensional Data\*  
and Pressure Ratings<sup>(1)</sup>  
from -50° to 235°F**

<sup>(1)</sup>Static pressure rating; steady (stationary) pressure is created when using a gear pump, turbine pump, centrifugal pump, etc.  
<sup>(2)</sup>Vacuum Service: A full vacuum within the pipe is equivalent to 14.7 psi external pressure at sea level. Contact Conley for higher external pressure ratings.



NOM PIPE DIA	PIPE I.D. (IN)	PIPE O.D. (IN)	NOM LINER THK (IN)	NOM REINF THK (IN)	NOM UV THK (IN)	TOT THK (IN)	INT PRESS (PSI)	VAC PRESS (PSI) <sup>(2)</sup>
1"	0.88	1.32	0.060	0.120	0.040	0.220	150	2026
1 1/2"	1.38	1.88	0.060	0.150	0.040	0.250	150	1370
2"	1.88	2.17	0.060	0.075	0.010	0.145	150	111
3"	3.00	3.34	0.060	0.090	0.020	0.170	150	53
4"	4.00	4.48	0.060	0.160	0.020	0.240	150	123
6"	6.00	6.57	0.060	0.205	0.020	0.285	150	82
8"	8.00	8.60	0.060	0.220	0.020	0.300	150	45
10"	10.00	10.68	0.060	0.220	0.060	0.340	150	22.9
12"	12.25	13.00	0.060	0.275	0.040	0.375	150	24.8
14"	14.25	15.00	0.060	0.275	0.040	0.375	150	16.1
16"	16.25	17.11	0.060	0.330	0.040	0.430	150	18.8
18"	18.25	19.22	0.060	0.385	0.040	0.485	150	21.0
20"	20.25	21.22	0.060	0.385	0.020	0.485	150	15.6

\*All values are nominal. Minimum wall thickness shall not be less than 87.5% of nominal wall thickness in accordance with ASTM D2996.  
Note: For 90M L3 Fire Endurance Rating add minimum 60-mils fire coating thickness.  
For 90M-JF Jet-Fire Rating add minimum 300-mils fire coating thickness.

**Support Spans\* and Capacities at 75°F**



NOM PIPE DIA	TYPE I SIMPLE SPAN (FT)	TYPE II MAX CONT SPAN (FT)	TYPE IV FIXED END SPAN (FT)	MIN BEND RADIUS (FT)	WT/FT (LBS)	CAP (GAL/FT)
1"	7.6	8.9	11.4	20	0.62	0.03
1 1/2"	9.1	10.7	13.6	32	1.04	0.08
2"	9.0	10.6	13.5	43	0.75	0.14
3"	10.0	12.6	16.1	69	1.36	0.37
4"	13.0	15.2	19.4	93	2.57	0.65
6"	15.3	18.0	22.9	139	4.52	1.47
8"	16.9	19.8	25.3	185	6.29	2.61
10"	18.1	21.2	27.0	231	8.88	4.08
12"	20.0	23.5	30.0	284	11.96	6.12
14"	20.9	24.5	31.3	330	13.85	8.28
16"	22.6	26.4	33.7	376	18.12	10.77
18"	24.1	28.2	36.0	422	22.95	13.59
20"	24.8	29.1	37.1	469	25.40	16.73

\*NOTE: Span deflection = 1/2" with fluid of 1.0 specific gravity

**Span multipliers for fluids of different specific gravities**

FLUID SPECIFIC GRAVITY							
AIR	0.75	0.9	1.0	1.1	1.25	1.5	2.0
1.40	1.07	1.02	1.0	0.98	0.95	0.90	0.84
(MULTIPLIER FOR CORRECTED SPAN LENGTHS)							

**Span multipliers for fluids at different temperatures**

FLUID TEMPERATURE						
75°F	100°F	150°F	200°F	225°F	250°F	275°F
1.0	0.98	0.93	0.88	0.84	0.80	0.75
(MULTIPLIER FOR CORRECTED SPAN LENGTHS)						

**Series 90M-225  
Pipe Dimensional Data\*  
and Pressure Ratings<sup>(1)</sup>  
from -50° to 235°F**

<sup>(1)</sup>Static pressure rating; steady (stationary) pressure is created when using a gear pump, turbine pump, centrifugal pump, etc.  
<sup>(2)</sup>Vacuum Service: A full vacuum within the pipe is equivalent to 14.7 psi external pressure at sea level. Contact Conley for higher external pressure ratings.



NOM PIPE DIA	PIPE I.D. (IN)	PIPE O.D. (IN)	NOM LINER THK (IN)	NOM REINF THK (IN)	NOM UV THK (IN)	TOT THK (IN)	INT PRESS (PSI)	VAC PRESS (PSI) <sup>(2)</sup>
1"	0.88	1.32	0.060	0.120	0.040	0.220	225	2026
1 1/2"	1.38	1.88	0.060	0.150	0.040	0.250	225	1370
2"	1.88	2.17	0.060	0.075	0.010	0.145	225	111
3"	3.00	3.34	0.060	0.090	0.020	0.170	225	53
4"	4.00	4.48	0.060	0.160	0.020	0.240	225	123
6"	6.00	6.57	0.060	0.205	0.020	0.285	225	82
8"	8.00	8.60	0.060	0.220	0.020	0.300	225	45
10"	10.00	10.68	0.060	0.220	0.060	0.340	225	22.9
12"	12.25	13.00	0.060	0.275	0.040	0.375	225	24.8
14"	14.25	15.11	0.060	0.330	0.040	0.430	225	27.3
16"	16.25	17.22	0.060	0.385	0.040	0.485	225	29.3
18"	18.25	19.33	0.060	0.440	0.040	0.540	225	30.9
20"	20.25	21.44	0.060	0.495	0.040	0.595	225	32.2

\*All values are nominal. Minimum wall thickness shall not be less than 87.5% of nominal wall thickness in accordance with ASTM D2996.  
Note: For 90M L3 Fire Endurance Rating add minimum 60-mils fire coating thickness.  
For 90M-JF Jet-Fire Rating add minimum 300-mils fire coating thickness.

**Support Spans\* and Capacities at 75°F**



NOM PIPE DIA	TYPE I SIMPLE SPAN (FT)	TYPE II MAX CONT SPAN (FT)	TYPE IV FIXED END SPAN (FT)	MIN BEND RADIUS (FT)	WT/FT (LBS)	CAP (GAL/FT)
1"	7.6	8.9	11.4	20	0.62	0.03
1 1/2"	9.1	10.7	13.6	32	1.04	0.08
2"	9.0	10.6	13.5	43	0.75	0.14
3"	10.7	12.6	16.1	69	1.36	0.37
4"	13.0	15.2	19.4	93	2.57	0.65
6"	15.3	18.0	22.9	139	4.52	1.47
8"	16.9	19.8	25.3	185	6.29	2.61
10"	18.4	21.6	27.5	231	8.88	4.08
12"	20.3	23.8	30.3	284	11.96	6.12
14"	21.9	25.6	32.7	330	15.94	8.28
16"	23.3	27.3	34.8	376	20.50	10.77
18"	24.7	29.0	37.0	422	25.63	13.59
20"	26.1	30.6	39.0	469	31.33	16.73

\*NOTE: Span deflection = 1/2" with fluid of 1.0 specific gravity

**Span multipliers for fluids of different specific gravities**

FLUID SPECIFIC GRAVITY							
AIR	0.75	0.9	1.0	1.1	1.25	1.5	2.0
1.40	1.07	1.02	1.0	0.98	0.95	0.90	0.84
(MULTIPLIER FOR CORRECTED SPAN LENGTHS)							

**Span multipliers for fluids at different temperatures**

FLUID TEMPERATURE						
75°F	100°F	150°F	200°F	225°F	250°F	275°F
1.0	0.98	0.93	0.88	0.84	0.80	0.75
(MULTIPLIER FOR CORRECTED SPAN LENGTHS)						

**Series 90M-250  
Pipe Dimensional Data\*  
and Pressure Ratings<sup>(1)</sup>  
from -50° to 235°F**

<sup>(1)</sup>Static pressure rating; steady (stationary) pressure is created when using a gear pump, turbine pump, centrifugal pump, etc.  
<sup>(2)</sup>Vacuum Service: A full vacuum within the pipe is equivalent to 14.7 psi external pressure at sea level. Contact Conley for higher external pressure ratings



NOM PIPE DIA	PIPE I.D. (IN)	PIPE O.D. (IN)	NOM LINER THK (IN)	NOM REINF THK (IN)	NOM UV THK (IN)	TOT THK (IN)	INT PRESS (PSI)	VAC PRESS (PSI) <sup>(2)</sup>
1"	0.88	1.32	0.060	0.120	0.040	0.220	250	2026
1 1/2"	1.38	1.88	0.060	0.150	0.040	0.250	250	1370
2"	1.88	2.17	0.060	0.075	0.010	0.145	250	111
3"	3.00	3.34	0.060	0.090	0.020	0.170	250	53
4"	4.00	4.48	0.060	0.160	0.020	0.240	250	123
6"	6.00	6.57	0.060	0.205	0.020	0.285	250	82
8"	8.00	8.60	0.060	0.220	0.020	0.300	250	45
10"	10.00	10.79	0.060	0.275	0.060	0.395	250	43.3
12"	12.25	13.11	0.060	0.350	0.020	0.430	250	49.8
14"	14.25	15.22	0.060	0.385	0.040	0.485	250	42.4
16"	16.25	17.33	0.060	0.440	0.040	0.540	250	42.9
18"	18.25	19.44	0.060	0.495	0.040	0.595	250	43.2
20"	20.25	21.55	0.060	0.550	0.040	0.650	250	43.5

\*All values are nominal. Minimum wall thickness shall not be less than 87.5% of nominal wall thickness in accordance with ASTM D2996.  
Note: For 90M L3 Fire Endurance Rating add minimum 60-mils fire coating thickness.  
For 90M-JF Jet-Fire Rating add minimum 300-mils fire coating thickness.

**Support Spans\* and Capacities at 75°F**



NOM PIPE DIA	TYPE I SIMPLE SPAN (FT)	TYPE II MAX CONT SPAN (FT)	TYPE IV FIXED END SPAN (FT)	MIN BEND RADIUS (FT)	WT/FT (LBS)	CAP (GAL/FT)
1"	7.6	8.9	11.4	20	0.62	0.03
1 1/2"	9.1	10.7	13.6	32	1.04	0.08
2"	9.0	10.6	13.5	43	0.75	0.14
3"	10.7	12.6	16.1	69	1.36	0.37
4"	13.0	15.2	19.4	93	2.57	0.65
6"	15.3	18.0	22.9	139	4.52	1.47
8"	16.9	19.8	25.3	185	6.29	2.61
10"	18.9	22.1	28.2	231	10.37	4.08
12"	21.0	24.6	31.4	284	13.77	6.12
14"	22.4	26.2	33.5	330	18.05	8.28
16"	23.9	28.0	35.7	376	22.90	10.77
18"	25.3	29.7	37.9	422	28.32	13.59
20"	26.7	31.2	39.9	469	34.31	16.73

\*NOTE: Span deflection = 1/2" with fluid of 1.0 specific gravity

**Span multipliers for fluids of different specific gravities**

FLUID SPECIFIC GRAVITY							
AIR	0.75	0.9	1.0	1.1	1.25	1.5	2.0
1.40	1.07	1.02	1.0	0.98	0.95	0.90	0.84
(MULTIPLIER FOR CORRECTED SPAN LENGTHS)							

**Span multipliers for fluids at different temperatures**

FLUID TEMPERATURE						
75°F	100°F	150°F	200°F	225°F	250°F	275°F
1.0	0.98	0.93	0.88	0.84	0.80	0.75
(MULTIPLIER FOR CORRECTED SPAN LENGTHS)						

## Typical Properties



TEMPERATURE	75°F	250°F	METHOD
PROPERTY	VALUE	VALUE	
AXIAL TENSILE STRENGTH	14,200 psi	10,650 psi	ASTM D2105
AXIAL TENSILE DESIGN STRENGTH	3,550 psi	2,660 psi	ASTM D2105
AXIAL MODULUS OF ELASTICITY	1.75 x 10 <sup>6</sup> psi	1.30 x 10 <sup>6</sup> psi	ASTM D2105
COMPRESSIVE STRENGTH	22,750 psi	17,000 psi	ASTM D695
COMPRESSIVE DESIGN STRENGTH	5,685 psi	4,250 psi	ASTM D695
COMPRESSION MODULUS	2.80 x 10 <sup>6</sup> psi	2.10 x 10 <sup>6</sup> psi	ASTM D695
POISSON'S RATIO $V_{a/h}$ ( $V_{n/a}$ )	0.33 (0.23)		*CONLEY METHOD #20
BEAM BENDING, ULTIMATE STRESS	30,000 psi	22,500 psi	CONLEY METHOD 8
BEAM BENDING, DESIGN STRESS <sup>(1)</sup>	3,750 psi	2,810 psi	CONLEY METHOD 8
SHEAR MODULUS	1.30 x 10 <sup>6</sup> psi	1.00 x 10 <sup>6</sup> psi	*CONLEY METHOD #9
HYDROSTATIC DESIGN BASIS	10,000 psi	5,000 psi	ASTM D2992 PROCEDURE B
HYDROSTATIC BURST (WALL STRESS @ 72°F)	32,000 psi	24,000 psi	ASTM D1599
CIRCUMFERENTIAL MODULUS OF ELASTICITY	2.50 x 10 <sup>6</sup> psi	1.87 x 10 <sup>6</sup> psi	ASTM D1599
FLEXURAL MODULUS OF ELASTICITY	1.75 x 10 <sup>6</sup> psi	1.30 x 10 <sup>6</sup> psi	ASTM 2790
COEFFICIENT OF LINEAR THERMAL EXPANSION	9.5 x 10 <sup>-6</sup> IN/IN-°F		CONLEY METHOD 3
COEFFICIENT OF THERMAL CONDUCTIVITY	2.9 BTU/HR-IN/FT <sup>2</sup> -°F		CONLEY METHOD 16
SPECIFIC GRAVITY	1.85		
DENSITY	0.067 LB/CU IN		
DIELECTRIC STRENGTH	535 VOLTS/MIL		ASTM D149
GROUNDING RESISTANCE FOR CONDUCTIVE PIPING	≤1.0 x 10 <sup>6</sup> ohms		IMO A.753(18)
DEGREE OF CURE	175°C (347°F) Tg		DMA
HEAT DEFLECTION TEMPERATURE	150°C (302°F)		ISO 75-3
FLOW FACTOR (HAZEN-WILLIAMS)	150		
SURFACE ROUGHNESS	1.7 X 10 <sup>-5</sup> FEET		
MANNING'S "n"	0.009 INCH		
<sup>(1)</sup> Beam bending design stress is 1/8 of ultimate to allow for combined stress (bending and pressure)			

## Surge Pressure

Maximum allowable surge pressure is 150% of rated pressure.

## Technical Support

Consult Conley Composites for further recommendations regarding the offshore or onshore use of Conley piping systems.



**Series 90M-150  
Pipe Section  
Properties**

<sup>(1)</sup>Use these values to calculate permissible spans.  
<sup>(2)</sup>Use these values for calculating longitudinal thrust.



NOMINAL PIPE SIZE (IN)	REINFORCEMENT ONLY(STRUCTURAL CAGE)			TOTAL WALL END AREA (IN <sup>2</sup> ) <sup>(2)</sup>
	END AREA (IN <sup>2</sup> )	MOMENT OF INERTIA (IN <sup>4</sup> ) <sup>(1)</sup>	SECTION MODULUS (IN <sup>3</sup> )	
1	0.42	0.07	0.11	0.77
1 ½	0.78	0.27	0.30	1.28
2	0.49	0.26	0.25	0.92
3	0.91	1.17	0.71	1.69
4	2.15	4.93	2.22	3.20
6	4.07	20.40	6.23	5.63
8	5.76	50.16	11.70	7.82
10	7.15	95.58	18.07	11.05
12	10.93	218.51	33.76	14.87
14	12.65	339.41	45.41	17.23
16	17.31	603.96	70.78	22.53
18	22.68	998.08	104.08	28.55
20	25.10	1352.54	127.70	31.59

**Series 90M-225  
Pipe Section  
Properties**

<sup>(1)</sup>Use these values to calculate permissible spans.  
<sup>(2)</sup>Use these values for calculating longitudinal thrust.



NOMINAL PIPE SIZE (IN)	REINFORCEMENT ONLY(STRUCTURAL CAGE)			TOTAL WALL END AREA (IN <sup>2</sup> ) <sup>(2)</sup>
	END AREA (IN <sup>2</sup> )	MOMENT OF INERTIA (IN <sup>4</sup> ) <sup>(1)</sup>	SECTION MODULUS (IN <sup>3</sup> )	
1	0.42	0.07	0.11	0.77
1 ½	0.78	0.27	0.30	1.28
2	0.49	0.26	0.25	0.92
3	0.91	1.17	0.71	1.69
4	2.15	4.93	2.22	3.20
6	4.07	20.40	6.23	5.63
8	5.76	50.16	11.70	7.82
10	7.15	95.58	18.07	11.05
12	10.93	218.51	33.76	14.87
14	15.24	411.96	54.71	19.83
16	20.27	711.70	82.88	25.50
18	26.00	1150.88	119.33	31.88
20	32.45	1767.16	165.13	38.97



**Series 90M-250  
Pipe Section  
Properties**

<sup>(1)</sup>Use these values to calculate permissible spans.

<sup>(2)</sup>Use these values for calculating longitudinal thrust.



NOMINAL PIPE SIZE (IN)	REINFORCEMENT ONLY(STRUCTURAL CAGE)			TOTAL WALL END AREA (IN <sup>2</sup> ) <sup>(2)</sup>
	END AREA (IN <sup>2</sup> )	MOMENT OF INERITA (IN <sup>4</sup> ) <sup>(1)</sup>	SECTION MODULUS (IN <sup>3</sup> )	
1	0.42	0.07	0.11	0.77
1 ½	0.78	0.27	0.30	1.28
2	0.49	0.26	0.25	0.92
3	0.91	1.17	0.71	1.69
4	2.15	4.93	2.22	3.20
6	4.07	20.40	6.23	5.63
8	5.76	50.16	11.70	7.82
10	8.98	121.42	22.71	12.90
12	13.99	283.16	43.24	17.13
14	17.85	486.12	64.09	22.45
16	23.24	821.53	95.06	28.48
18	29.34	1306.31	134.68	35.23
20	36.15	1979.34	184.01	42.68





ISO 9001:2008  
CERTIFIED  
Conley  
Composites  
Tulsa,  
Oklahoma USA

This product data sheet and recommendations it contains are based on data reasonably believed to be reliable. It is intended that this data be used by competent personnel having acceptable training in accordance with current industry practice and operating conditions. Variation in environment, application or installation, changes in operating procedures, or extrapolation of data may cause unsatisfactory results. Conley Composites makes no representation or warranty, express or implied, including warranties of merchantability or fitness for purpose, as to accuracy, adequacy or completeness of the recommendations or information contained herein. Conley Composites assumes no liability whatsoever in connection with this literature or the information or recommendations it contains.

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