

GREEN THREAD® 250-F/250-CF

Applications

- Firewater Systems
- Salt Water Supply Lines
- Cooling Water
- Waste Lines
- Potable Water
- Process Lines
- Ballast Piping
- Cargo Lines
- Bilge Piping
- Sprinkler Systems
- Fresh Water Lines
- Sanitary Lines
- Scuppers
- Sounding Tubes
- Vent Lines
- Drains
- Conduit

Characteristics

GREEN THREAD 250-F

Filament wound Glassfiber Reinforced Epoxy (GRE) pipe supplied with a reinforced "Fire Jacket" qualified for Level-3 Modified (Wet/Dry) (a.k.a. L3-W/D) fire resistance.

GREEN THREAD 250-CF

Filament wound Glassfiber Reinforced Epoxy (GRE) pipe supplied with integral conductive carbon fibers and supplied with a reinforced "Fire Jacket" qualified for Level-3 Modified (Wet/Dry) (a.k.a. L3-W/D) fire resistance.

Pipe Diameter: 25-900 mm (1-36 in)

Maximum Operating Temperature: up to 110° C (230° F)

Maximum Operating Pressure: up to 18 bar (250 psig)

Materials and Construction

Pipe

All pipe manufactured by filament winding process using an amine cured epoxy thermosetting resin to impregnate strands of continuous glass filaments.

All pipe supplied with square-cut ends for use with mechanical couplings or with positive-stop socket joint or matching tapered fittings.

Fittings and Flanges

All fittings manufactured using the same type material as the pipe; filament winding.

Standard flanges have ANSI B16.5 Class 150 bolt hole patterns, unless otherwise specified.

Conductive

A nominal 0.5 mm (0.020 in) thick conductive liner reinforced with conductive veil, to prevent the accumulation of potentially incensive static charge buildup.

Continuous conductive filaments are utilized throughout the pipe wall of GREEN THREAD 250-C/250-CF at a predetermined pattern to prevent the accumulation of static charges and enable efficient grounding of charges through grounding saddles bonded to the pipe.

Fire Endurance

Fully qualified for IMO Resolution A.753(18) Level-3 fire resistance in 25-900 mm (1-36 in) sizes.

GREEN THREAD 250-F/250-CF is supplied with a unique reinforced "Fire Jacket" that has been fully qualified for Level-3 Modified (Wet/Dry) (a.k.a. L3-W/D) fire resistance in accordance with United States Coast Guard (USCG) PFM 1-98. Pipe protected by the Fire Jacket exhibits zero heat release when tested in accordance with IMO A.653(16).

Joining Systems

Socket Joint

25-300 mm (1-12 in)

Positive stop lands simplify precise makeup of complex piping configurations



Bell & Spigot

350-900 mm (14-36 inch)

A matched-taper joint secured with epoxy adhesive.

Stronger than the pipe itself, in both internal-pressure and axial-tension capability.



Fittings

Filament Wound - 25-900 mm (1-36 in)

Standard radius in 200-900 mm (8-36 in); Long radius 200-900 mm (8-36 in) fittings are available upon request

Long radius (1.5 D) in 25-150 mm (1-6 in).

Specifications

ASTM D2996 Designation Code

25-40 mm (1-1½ in); RTRP-11FF1-3111
 50-200 mm (2-8 in); RTRP-11FF1-3112
 250 mm (10 in); RTRP-11FF1-3114
 300-900 mm (12-36 in); RTRP-11FF1-3116

ISO 15840 Designation Code

25-900 mm (1-36 in) - Type 1, Resin 1, Class B, Rating
 Method 1, Fluid EF, Fire Type IF, Fire Integrity A

Type Approvals

- American Bureau of Shipping (ABS)
- Bureau Veritas
- China Classification Society (CCS)
- Det Norske Veritas (DNV)
- Germanischer Lloyd's
- Lloyd's Register
- United States Coast Guard (USGC)
- Korean Register of Shipping

Pipe Dimensions and Weights

Nominal Pipe Size		Nominal I.D.		Nominal O.D. ⁽¹⁾		Nominal Wall Thickness ⁽²⁾		Nominal Weight	
in	(mm)	in	(mm)	in	(mm)	in	(mm)	lbs/ft	kg/m
1	25	1.00	25.0	1.33	34.0	0.16	4.2	0.7	1.0
1 ½	40	1.50	38.1	1.96	49.8	0.21	5.4	1.2	1.8
2	50	2.15	54.6	2.51	63.7	0.19	4.7	1.4	2.1
2½	65	2.72	69.1	3.11	79.0	0.19	4.8	1.8	2.7
3	80	3.28	83.3	3.66	93.0	0.19	4.8	2.1	3.1
4	100	4.28	108.7	4.66	118.4	0.19	4.8	2.7	4.0
5	125	5.2	132.1	5.73	144.9	0.23	5.8	3.5	5.2
6	150	6.35	161.3	6.80	172.7	0.23	5.8	4.4	6.6
8	200	8.36	212.3	8.95	227.3	0.30	7.6	7.0	10.4
10	250	10.36	263.1	11.06	280.9	0.35	8.9	9.9	14.7
12	300	12.28	311.9	13.09	332.5	0.41	10.4	13.2	19.7
14	350	14.04	356.6	14.94	379.5	0.46	11.7	16.5	24.6
16	400	16.04	407.4	17.07	433.6	0.52	13.2	20.8	31.0
18	450	17.83	452.8	18.96	481.6	0.57	14.5	25.1	37.4
20	500	19.83	503.6	21.08	535.4	0.62	15.7	30.3	45.1
24	600	23.84	605.5	25.31	642.9	0.74	18.8	42.3	63.0
26	650	25.59	650.0	27.03	686.5	0.72	18.3	52.0	77.55
28	700	27.56	700.0	29.05	737.9	0.75	18.9	58.0	86.49
30	750	29.53	750.0	31.12	790.5	0.80	20.2	66.0	98.42
32	800	31.50	800.0	33.20	843.3	0.85	21.7	75.0	111.85
36	900	35.43	900.0	37.34	948.5	0.96	24.3	95.0	141.67

⁽¹⁾ Nominal O.D. is for the primary pipe. The Fire Jacket thickness is 2.5 mm (0.10 in), resulting in the finished product to have a Nominal O.D. dimension that is 5 mm (0.20 in) greater than shown.

⁽²⁾ Nominal Wall Thickness is for primary pipe only. The Fire Jacket thickness is 2.5 mm (0.10 in) but does not add any structural strength to the pipe.

Engineering Data

Nominal Pipe Size		Pressure Rating		Vacuum/External Pressure @ Ambient Temperature ⁽¹⁾			
				Ultimate Collapse Pressure		Rated Pressure	
in	mm	psig	bar	psig	bar	psig	bar
1	25	250	18	>3000	>210	>1000	>70
1½	40	250	18	>3000	>210	>1000	>70
2	50	250	18	>1700	>117	>563	>38.8
2½	65	250	18	>1500	>100	500	34.5
3	80	250	18	855	59.0	210	14.5
4	100	250	18	305	21.0	96	6.6
5	125	250	18	380	26.2	55	3.8
6	150	250	18	175	12.1	55	3.8
8	200	250	18	175	12.1	55	3.8
10	250	250	18	175	12.1	55	3.8
12	300	250	18	175	12.1	55	3.8
14	350	250	18	175	12.1	55	3.8
16	400	250	18	175	12.1	55	3.8
18	450	250	18	175	12.1	55	3.8
20	500	250	18	175	12.1	55	3.8
24	600	250	18	175	12.1	55	3.8
26	650	250	18	150	10.3	50	3.4
28	700	250	18	150	10.3	50	3.4
30	750	250	18	150	10.3	50	3.4
32	800	250	18	150	10.3	50	3.4
36	900	250	18	150	10.3	50	3.4

⁽²⁾ Long term rating incorporating the DEP Safety Factor of 3.0

Pipe Lengths

Nominal Pipe Size		Americas		Asia	
in	(mm)	ft	(m)	ft	(m)
1	25	18, 13	5.5, 4.0	13.0	4.0
1.5	40	18, 29.5	5.5, 9.0	29.5	9.0
2-4	50	19.25, 39.0	5.9, 11.9	29.5	9.0
2 ½-4	65-100	19.25, 39.0	5.9, 11.9	16.5, 33.0	5.0, 10.0
5-36	125-900	19.25, 39.0	5.9, 11.9	19.5, 39.0	5.9, 11.9

Typical Physical Properties

Property	Value (psi)		Value (MPa)	
	@ 75°F	@ 200°F	@ 24°C	@ 93°C
Axial Tensile - ASTM D2105				
Ultimate Stress	10,550	7,680	71	52.9
Design Stress	2,637	1,920	17.8	13.2
Modulus of Elasticity	1.61 x 10 ⁶	1.16 x 10 ⁶	12411	7997
Poisson's Ratio	0.38		0.38	
Axial Compression - ASTM D695				
Ultimate Stress	33,300	20,383	230.0	140.5
Design Stress	8,300	5,090	57.4	35.1
Modulus of Elasticity	1.26 x 10 ⁶	0.66 x 10 ⁶	8687	4550
Beam Bending - ASTM D2925				
Ultimate Stress	23,000	17,166	159	118.3
Design Stress ⁽¹⁾	2,900	2,145	20.0	14.8
Modulus of Elasticity (long-term)	2.18 x 10 ⁶	1.29 x 10 ⁶	15031	8894
Hydrostatic Burst - ASTM D1599				
Ultimate Hoop Tensile Stress	46,300	47,990	319	330
Hydrostatic Design - ASTM D2992				
Procedure A - Hoop Tensile Stress Cyclic 150 x 10 ⁶ Cycles LTHS	8,850	6,090	61.0	41.9
Procedure B - Hoop Tensile Stress LTHS Static 20 Year Life at 200° F LCL		16,945 14,654		116.8 101.0
Coefficient of Linear Thermal Expansion ASTM D696	1.26 x 10 ⁻⁵ in/in/°F		2.27 x 10 ⁻⁵ mm/mm/°C	
Thermal Conductivity	0.23 BTU/(ft)(hr)(°F)		0.4 W/(m)(°C)	
Specific Gravity - ASTM D792	1.8		1.8	
Flow Factor - SF Hazen-Williams Coefficient	150		150	

⁽¹⁾ Beam bending design stress is 1/8 of ultimate to account for combined stress (i.e. bending and pressure)

Maximum Support Spacing*

Pipe Size		75° F (24° C)		200° F (93° C)	
in	(mm)	ft	(m)	ft	(m)
1	25	12.8	3.9	11.2	3.4
1½	40	15.2	4.6	13.3	4.1
2	50	16.2	5.0	14.2	4.3
2½	65	17.2	5.2	15.0	4.6
3	80	18.6	5.7	16.3	5.0
4	100	20.0	6.1	17.5	5.3
5	125	22.0	6.7	19.0	5.8
6	150	23.1	7.0	20.2	6.2
8	200	26.6	8.1	23.4	7.1
10	250	29.5	9.0	25.9	7.9
12	300	32.0	9.8	28.1	8.6
14	350	34.1	10.4	29.9	9.1
16	400	36.4	11.1	31.9	9.7
18	450	38.3	11.7	33.6	10.2
20	500	40.4	12.3	35.4	10.8
24	600	44.2	13.5	38.7	11.8
26	650	44.6	13.6	37.7	11.5
28	700	45.9	14.0	38.8	11.8
30	750	47.5	14.5	40.1	12.2
32	800	49.0	14.9	41.4	12.6
36	900	52.0	15.8	43.9	13.4

* Values are based on continuous (4 or more spans) beam equations.

For other span conditions, please refer to Brochure E5000 "Engineering Piping Design" or the "Success by Design" software available from Fiber Glass Systems.

Properties of Pipe Sections*

Nominal Pipe Size		Minimum Cross Sectional Area		Minimum Moment of Inertia	
in	(mm)	in ²	(mm ²)	in ⁴	(mm ⁴ x10 ⁵)
1	25	0.5	303	0.08	0.34
1½	40	0.9	592	0.34	1.41
2	50	1.0	666	0.7	2.93
2½	65	1.4	903	1.5	6.24
3	80	1.6	1052	2.5	10.2
4	100	2.1	1355	5.3	21.9
5	125	3.1	2000	11.3	47.0
6	150	3.7	2387	19.9	82.8
8	200	5.2	3368	48.2	201
10	250	7.6	4923	108	449
12	300	10.2	6581	203	845
14	350	13.1	8452	337	1400
16	400	16.7	10774	563	2340
18	450	20.3	13097	845	3520
20	500	24.8	16000	1,276	5310
24	600	35.5	22903	2,633	11000
26	650	52.0	33548	4476	18631
28	700	58.0	37419	5783	24071
30	750	66.0	42581	7596	31617
32	800	76.0	49032	9866	41065
36	900	95.0	61290	15720	65432

* Based on Minimum Reinforced Wall

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