Bondstrand™ 7000 Antistatic Pipe Product Data

Industrial Service Piping

Uses and Applications

General industrial service where static electrical charge build-up is possible or through hazardous areas (Class 1,Div. 1 and 2)

Performance

Bondstrand Series 7000 fiberglass pipe, fittings and flanges incorporate high-strength conductive filaments to prevent accumulation and discharge of potentially dangerous levels of static electrical charges. Series 7000 piping systems are made electrically continuous by using a conductive adhesive in the adhesive-bonded joint and for mounting flanges. Accumulated charges are dissipated from the fiberglass pipe system by stainless steel cables embedded in fiberglass grounding saddles. The grounding saddles are adhesive bonded to the pipe at appropriate locations to assure resistance to ground is less than one MEG OHM.

The system rating[(1)] is 150 psig at 210°F (10 bar at 99°C).

[(1)] *Individual system components may not have the same ratings as the pipe. Refer to the specific component product information to determine the pressure rating for the system as a whole.*

Composition

Pipe: Filament-wound fiberglass reinforced epoxy resin pipe with conductive filaments in the pipe wall.

Fittings: Wide range of filament-wound epoxy resin fittings reinforced with fiberglass strands and conductive veils employing Quick-Lock® adhesive joint or flanged ends.

Flanges: Filament-wound epoxy reinforced with fiberglass strands and conductive filaments.

Blind flanges: Injection molded non-conductive epoxy in 2 through 12-inch (50 to 300 mm) sizes.

Grounding saddles: Filament-wound fiberglass with stainless steel grounding cable.

Adhesive: PSX•60 two-part thermosetting electrically conductive epoxy.

Joining Systems

Quick-Lock straight/taper adhesive-bonded joint featuring integral pipe stop in bell for precise laying lengths.

One-piece flanges in hubbed (standard) and hubless (heavy duty) configuration. All pipe is shipped ready for assembly with Quick-Lock bell x shaved spigot.

Static Electricity Generation and Accumulation

Static electricity accumulation is most likely to be a problem in pipes conveying non conducting fluids at high velocities (less than 1000 pico-Siemens per meter). Measurable amounts of electricity can be generated in the fluid when the flow velocity exceeds 9 ft/sec in fiberglass pipe and 20 ft/sec in metallic systems. Filtration units and valves typically experience the highest rate of static electricity accumulation when high flow rates occur. Charge densities are affected by the conductivity of the fluid,the pipe and the filter media. Depending on the media, flow through filters generally tends to give rise to charge densities 5 to 1000 times greater than flow through unrestricted pipes.

Pipe Lengths

Bondstrand pipe is produced in different lengths depending on pipe size and location of manufacture. Pipe can be cut to specified lengths at the factory. Consult your FGS representative.

Nominal Pipe Size		Standard Length	
in	mm	ft	m
2 - 6	50 - 150	20 - 30	6 - 9
8 - 16	250 - 400	400	12

Fittings and Flanges

90° and 45° elbows

Tees and reducing tees, reducers

Reducing saddles furnished with:
- Quick-Lock spigot outlet
- Flanged outlet
- Metallic bushing outlet

Grounding saddles

45° laterals

Crosses

Nipples and couplings

Flanges are produced with ANSI B16.5 Class 150 drilling. Other drill patterns as well as blank flanges are available.

Typical Pipe Dimensions and Weight

Nominal Pipe Size		Pipe Inside Diameter		Nominal Wall Thickness		Shipping Weight	
in	mm	in	mm	in	mm	lb/ft	kg/m
2	50	2.09	53	0.16	4.1	1.0	1.5
3	80	3.22	82	0.16	4.1	1.5	2.3
4	100	4.14	105	0.20	5.2	2.4	3.5
6	150	6.26	159	0.20	5.2	3.5	5.2
8	200	8.22	209	0.25	6.5	5.0	7.4
10	250	10.35	263	0.32	8.1	6.2	9.3
12	300	12.35	314	0.38	9.6	7.4	11.0
14	350	13.56	344	0.41	10.5	8.7	14.7
16	400	15.50	394	0.47	11.9	11.2	19.0

Typical Pipe Performance

Nominal Pipe Size		Internal Pressure Rating[1]		Ultimate Collapse Pressure[2]		Designation per ASTM D2996
in	mm	psig	MPa	psig	MPa	
2	50	450	3.10	500	3.46	RTRP-11FE-1112
3	80	425	2.93	400	2.76	RTRP-11FE-1112
4	100	400	2.76	400	2.76	RTRP-11FE-1113
6	150	300	2.07	163	1.12	RTRP-11FE-1113
8	200	250	1.72	150	1.03	RTRP-11FE-1114
10	250	200	1.38	150	1.03	RTRP-11FE-1114
12	300	170	1.17	150	1.03	RTRP-11FE-1114
14	350	165	1.14	150	1.03	RTRP-11FE-1115
16	400	165	1.14	150	1.03	RTRP-11FE-1116

[1] At 21°F(99°C) using Bondstrand PSX•60 adhesive.

[2] At 70°F (21°C).Reduce linearly to 90% at 150°F(66°C) and 80% at 200°F(93°C).

Typical Properties

Typical Mechanical Properties

Pipe Property	Units	Value 21°C	Value 93°C	Method
Hydrostatic Design Basis	N/mm²	161 (1)	121	ASTM D2992, Proc. B (20 years)
Ultimate Hoop Stress at Weeping	N/mm²	280	334	ASTM D1599
Circumferential				
Hoop Tensile Strength	N/mm²	380	-	ASTM D2290
Hoop Tensile Modulus	N/mm²	26,700	16,300	ASTM D2290
Poisson's Ratio ν_{ha} (2)	-	0.61	0.80	NOV FGS
Longitudinal				
Axial Tensile Strength	N/mm²	80	65	ASTM D2105
Axial Strength Modulus	N/mm²	15,500	8,550	ASTM D2105
Poisson's Ratio ν_{ah} (3)	-	0.35	0.42	ASTM D2105
Axial Bending Strength	N/mm²	85	-	NOV FGS
Axial Bending Modulus	N/mm²	15,500	9,900	ASTM D2925
Shear Modulus	N/mm²	12,100	11,500	NOV FGS

Typical Physical Properties

Pipe Property	Units	Value	Method
Thermal Conductivity Pipe Wall	W/m°C	0.33	NOV FGS
Thermal Expansion @ 21°C	mm/mm°C	18×10^{-6}	ASTM D696
Thermal Expansion @ 93°C	mm/mm°C	24×10^{-6}	ASTM D696
Flow Efficient, Hazen Williams	-	150	-
Absolute Roughness	m	5.3×10^{-6}	-
Density	kg/m³	1,800	-
Specific Gravity	-	1.8	ASTM D792
Specific Heat	J/kg°C	910	-
Grounding Resistance @ 500 Volt-Pipe	Ohm/m	$<1 \times 10^{-6}$	ASTM D257
Grounding Resistance @ 500 Volt-Ftg.	Ohm/ea	$<1 \times 10^{-6}$	ASTM D257
Shielding Capability	Volt	100	-

(1) value obtained at 65°C

(2) ν_{ha} = The ratio of axial strain to hoop strain resulting from stress in the hoop direction.

(3) ν_{ah} = The ratio of hoop strain to axial strain resulting from stress in the axial direction.

Support Spacing

Maximum recommended support spans for Bondstrand Series 7000 pipe at various operating temperatures. Values based on 0.5 inch (12 mm) deflection at mid-span for a fluid with specific gravity of 1.0.

Nominal Pipe Size		Span in Feet (m)[1] Temperature in °F (°C)					
in	mm	100	(38)	150	(66)	200	(93)
2	50	11.8	(3.6)	11.2	(3.4)	10.4	(3.2)
3	80	13.6	(4.1)	12.8	(3.9)	11.9	(3.6)
4	100	15.4	(4.7)	14.6	(4.5)	13.6	(4.1)
6	150	17.2	(5.2)	16.4	(5.0)	15.1	(4.6)
8	200	19.2	(5.9)	18.1	(5.5)	16.9	(5.2)
10	250	20.3	(6.2)	19.2	(5.9)	17.9	(5.5)
12	300	21.3	(6.5)	20.1	(6.1)	18.7	(5.7)
14	350	22.3	(6.8)	21.2	(6.5)	19.6	(6.0)
16	400	23.3	(7.1)	22.3	(6.8)	20.5	(6.2)

[1] Span recommendations are intended for normal horizontal piping support arrangements,a compromise between continuous spans and simple spans, but include no provision for weight such as fittings, valves, flanges,etc. or thrust from branches and turns. Fully continuous spans may be installed with support spacing up to 20% greater than values shown for this deflection; for simple spans the support spacing should be reduced by 20% from tabulated values.

Typical Pipe Performance

Nominal Pipe Size		Stiffness Factor[1]		Pipe Stiffness		Beam Moment of Inertia[2]	
in	mm	lb•in	N•m	psi	MPa	in^4	$10^6\,mm^4$
2	50	620	70	2,900	20.0	0.59	0.25
3	80	620	70	860	5.93	1.99	0.83
4	100	1,360	154	890	6.14	5.50	2.29
6	150	1,360	154	270	1.86	18.1	7.53
8	200	1,890	214	170	1.17	45.1	18.8
10	250	1,890	214	86	0.59	88.6	36.9
12	300	1,890	214	51	0.35	149.0	62.0
14	350	2,230	252	46	0.32	208.0	86.6
16	400	3,250	367	45	0.31	353.0	147.0

[1] Per ASTM D2412 - Parallel Plate Loading

[2] Use these values to calculate permissible spans

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