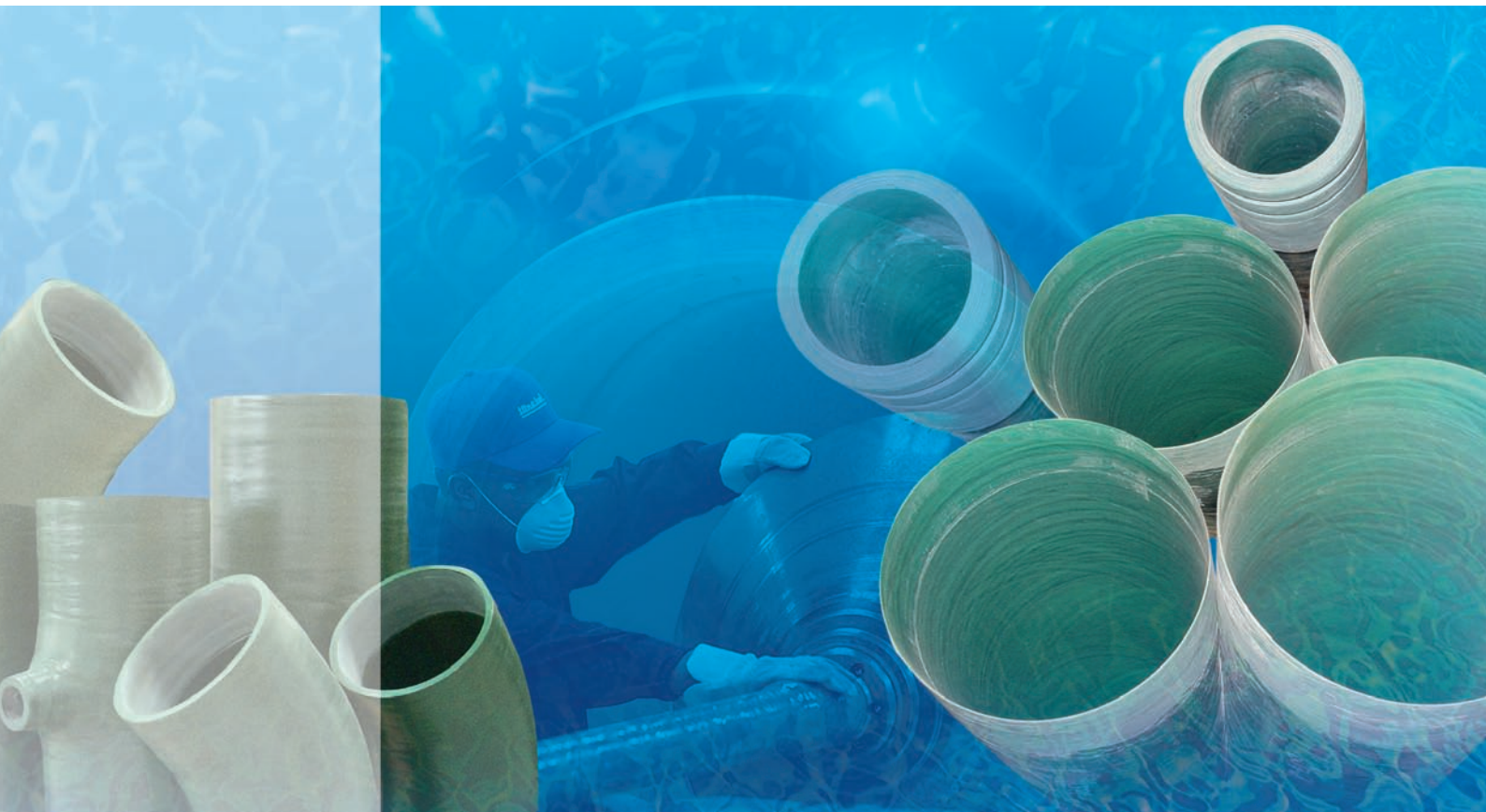


AMIPOX AMIPOX GRE Fiberglass Systems
Series AT - ASL



AMIATIT PIPE SYSTEMS

Uses and Applications

- Brackish water
 - Brine
 - Crude oil transmission
 - Electrical conduits
 - Fire fighting systems
 - Oilfield injection
 - Potable water
 - Saltwater and seawater
 - Sewage, draining systems
- Other applications on request

Performance

Hydrostatic Design Basis

The pipe wall design uses a 148 MPa (21,400 psi) HDB with a 0.5-service factor for static design (ASTM D-2992 Procedure B). The laminate meets the requirements of API 15LR Specification, ANSI/AWWA-C950 and ISO Standard. Classification as per ASTM D-2310 / ASTM D-2996: RTRP-11FW (Static) (ISO).

Design Pressure

The series are designed for the following pressure ratings:

AT	series up to	100 bar (1450 psi)
ASL	series up to	70 bar (1015 psi)

The systems are designed to provide a minimal 3:1 safety factor in accordance with ASTM D-1599.

Maximum Operating Temperature

The maximum operating temperature is 120°C (250°F). Between 90°C and 120°C values must be degraded. For detailed specifications please contact us.

Pipe Description

Amipox GRE pipe Series AT and ASL are produced by a filament winding process. The pipe structural wall consists of continuous glass fibers (E-glass) wound at a 54 ¾° helical angle in a matrix of amine-cured epoxy resin. The (optional) resin-rich liner 0.5 mm (20 mills) consists of C-glass (C-veil) and the same resin system as found in the pipe wall. Conductive pipes can be produced on request.

Fittings

Amipox fittings are either filament-wound or made of segments. They are made from the same glass and resin materials as the pipe. The optional fitting liner has the same thickness and chemical resistance as the pipe liner.



Pipe Properties

Dimensions

Our Amipox GRE Pipes Series AT and AS/ASL are produced from DN 80 (3") up to DN 600 (24"). The standard length supplied is 9 m (30 ft). Smaller dimensions are available on request.

Conversions

1 bar	= 10 ⁵ Pa	= 14.5 Psi	= 1.02 kg/cm ²
1 MPa	= 1 N/mm ²	= 145 Psi	= 10.2 kg/cm ²
1 inch	= 25.4 mm		
1 lb.in	= 0.113 Nm		
1 Btu (int.)			
in/hr.sqft. °F	= 0.1442 W (mK)		

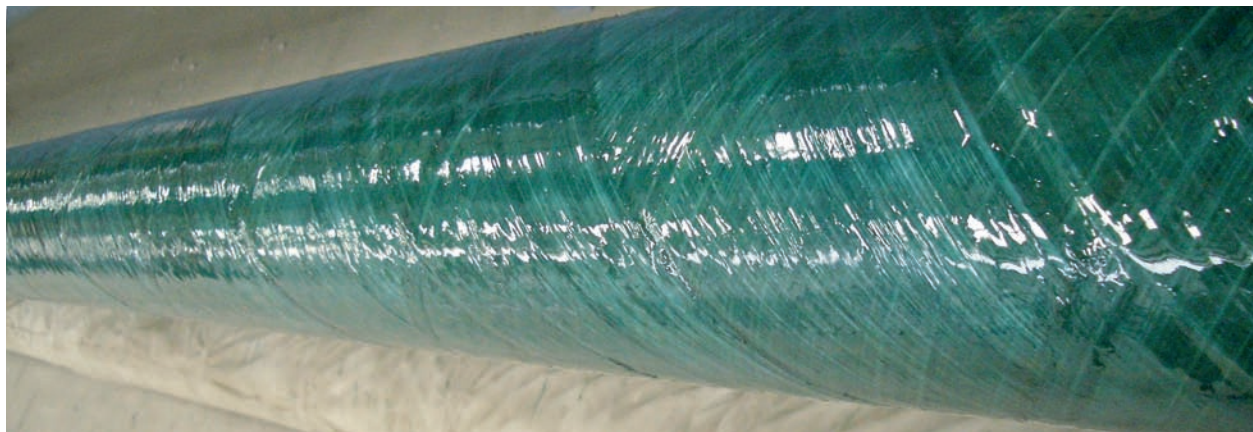
Physical properties

Thermal Conductivity (ASTM C-177)	0.33 W/(mK)
Thermal linear Expansion (ASTM D-696)	18.0x10 ⁻⁶ mm/mm °C
Flow Coefficient (Hazen-Williams)	150
Absolute Roughness	5.3x10 ⁻⁶ m
Density	1.8 g/cm ³

Mechanical properties

	Method	Value at 21°C	Value at 93°C	Unit
Bi-Axial				
• Ultimate hoop stress at weeping	ASTM D-1599	200	-	N/mm ²
Circumferential				
• Hoop tensile stress	ASTM D-2290	220	-	N/mm ²
• Hoop tensile modulus	ASTM D-2290	25200	22100	N/mm ²
• Poisson's ratio: axial/hoop		0.65	0.81	N/mm ²
Longitudinal				
• Axial tensile strength	ASTM D-2105	80.0	65	N/mm ²
• Tensile modulus	ASTM D-2105	12500	9700	N/mm ²
• Poisson's ratio: hoop/axial	ASTM D-2105	0.4	0.44	
• Axial bending strength		85	-	N/mm ²
Beam				
• Apparent elastic modulus	ASTM D-2925	12500	8000	N/mm ²
Hydrostatic Design Basis				
• Static HDB	ASTM D-2992, procedure B, 50 years	-	148*	N/mm ²

* at 65°C (1500 F)



Wall Thickness

Nominal Size		ID mm	Minimum wall thickness in mm									
mm	in		Pressure class (bar)									
mm	in	mm	10	12	16	20	25	32	40	50	60	70
80	3	80	2.8	2.8	2.8	2.8	2.8	2.8	3.2	3.9	4.6	5.4
100	4	100	2.8	2.8	2.8	2.8	2.8	3.2	3.9	4.8	5.7	6.6
150	6	150	2.8	2.8	2.8	2.8	3.6	4.5	5.6	6.9	8.3	9.6
200	8	200	2.8	2.8	3.2	3.8	4.7	5.9	7.3	9.0	10.8	12.7
250	10	250	2.8	2.8	3.8	4.7	5.7	7.2	9.0	11.2	13.4	15.7
300	12	300	3.0	3.5	4.5	5.5	6.8	8.6	10.7	13.3	16	18.8
350	14	350	3.5	4.0	5.2	6.3	7.8	9.9	12.4	15.5	18.6	21.8
400	16	400	3.9	4.5	5.8	7.2	8.9	11.3	14.1	17.6	21.2	24.8
450	18	450	4.5	5.0	6.5	8.0	9.9	12.6	15.8	19.7	23.8	-
500	20	500	5.0	5.5	7.1	8.8	11.0	14.0	17.4	21.9	-	-
600	24	600	5.5	6.5	8.5	10.5	13.1	16.7	20.8	-	-	-

Indicated wall thickness is exclusive the optional liner

Non standard products



Weight

Nominal Size		ID mm	Approx. weight per pipe excluding joints in kg/m									
mm	in		Pressure class (bar)									
mm	in	mm	10	12	16	20	25	32	40	50	60	70
80	3	80	1.3	1.3	1.3	1.3	1.3	1.3	1.5	1.9	2.2	2.6
100	4	100	1.2	1.6	1.6	1.6	1.6	1.9	2.3	2.8	3.4	4.0
150	6	150	2.4	2.4	2.4	2.4	3.1	3.9	4.9	6.1	7.4	8.7
200	8	200	3.2	3.2	3.7	4.4	5.4	6.9	8.6	10.6	12.9	15.3
250	10	250	4.0	4.0	5.5	6.8	8.2	10.5	13.2	16.5	20.0	23.6
300	12	300	5.1	6.0	7.7	9.5	11.8	1.0	18.8	23.6	28.6	33.9
350	14	350	7.0	8.0	10.4	12.7	15.8	20.1	25.4	32.0	38.8	45.8
400	16	400	8.9	10.3	13.3	16.6	20.6	26.3	33.0	41.6	50.5	59.6
450	18	450	11.6	12.9	16.8	20.7	25.7	33.0	41.6	52.3	63.8	-
500	20	500	14.3	15.7	20.1	25.3	31.8	40.7	50.9	64.6	-	-
600	24	600	18.8	22.3	29.2	36.2	45.4	58.2	73.0	-	-	-

Indicated weight is exclusive integral joints and optional liner

Non standard products

Pressure Rating

Nominal Size		ID mm	Allowable collapse pressure (bar) at 21°C									
mm	in		Pressure class (bar)									
mm	in	mm	10	12	16	20	25	32	40	50	60	70
80	3	80	14.49	14.49	14.49	14.49	14.49	14.49	21.63	39.16	64.27	103.96
100	4	100	2.71	7.42	7.42	7.42	7.42	11.08	20.05	37.39	62.60	97.18
150	6	150	2.20	2.20	2.20	2.20	4.67	9.13	17.59	32.90	57.27	88.61
200	8	200	0.92	0.92	1.39	2.32	4.39	8.68	16.44	30.81	53.23	86.56
250	10	250	0.48	0.48	1.19	2.24	4.01	8.07	15.77	30.40	52.05	83.72
300	12	300	0.34	0.54	1.14	2.08	3.94	7.97	15.34	29.45	51.28	83.19
350	14	350	0.34	0.50	1.11	1.97	3.74	7.65	15.03	29.36	50.73	81.69
400	16	400	0.31	0.48	1.03	1.97	3.73	7.62	14.81	28.80	50.32	80.57
450	18	450	0.34	0.46	1.02	1.90	3.60	7.42	14.63	28.36	50.01	-
500	20	500	0.34	0.45	0.92	1.84	3.60	7.42	14.24	28.41	-	-
600	24	600	0.26	0.43	0.96	1.81	3.52	7.29	14.08	-	-	-

Pressure ratings at 21°C. Use 70% of the above values for industrial applications and 30% for marine applications.

Non standard products

Surge Pressure

The maximum allowable surge pressure is 1.5 times the rated pressure.

Field Testing

The pipe system is designed for field testing with water at 1.5 times the rated operating pressure.

Stiffness SF

Nominal Size		ID	SF per ASTM D-2412 in Nm at 21°C									
			Pressure class (bar)									
mm	in	mm	10	12	16	20	25	32	40	50	60	70
80	3	80	46	46	46	46	46	46	69	125	205	332
100	4	100	17	46	46	46	46	69	125	233	390	606
150	6	150	46	46	46	46	98	192	370	693	1206	1865
200	8	200	46	46	69	116	219	433	820	1537	2656	4319
250	10	250	46	46	116	219	390	787	1537	2962	5073	8159
300	12	300	57	90	192	351	663	1341	2583	4960	8636	14009
350	14	350	90	135	296	527	1001	2046	4020	7851	13567	21843
400	16	400	125	192	411	787	1486	3042	5910	11494	20088	32158
450	18	450	192	264	579	1079	2046	4217	8316	16119	28423	-
500	20	500	264	351	723	1437	2806	5785	11107	22145	-	-
600	24	600	351	579	1295	2441	4740	9819	18973	-	-	-

Non standard products

Stiffness PS

Nominal Size		ID	PS per ASTM D-2412 in N/m ² at 21°C (x 10 ⁴)									
			Pressure class (bar)									
mm	in	mm	10	12	16	20	25	32	40	50	60	70
80	3	80	437.7	437.7	437.7	437.7	437.7	437.7	644.1	1137.0	1819.7	2861.9
100	4	100	85.3	228.7	228.7	228.7	228.7	337.5	598.7	1087.6	1775.2	2686.6
150	6	150	69.7	69.7	69.7	69.7	145.7	279.7	527.7	962.8	1631.7	2463.5
200	8	200	29.8	29.8	44.2	73.4	137.0	266.3	494.3	903.9	1522.3	2409.6
250	10	250	15.4	15.4	38.0	71.1	125.4	248.3	475.0	892.4	1490.4	2335.4
300	12	300	11.0	17.4	36.5	66.1	123.3	245.0	462.3	866.0	1469.4	2321.5
350	14	350	11.0	16.3	35.5	62.6	117.3	235.6	453.5	863.3	1454.5	2281.8
400	16	400	10.2	15.6	33.1	62.6	116.7	234.7	446.9	847.4	1443.4	2252.4
450	18	450	11.0	15.0	32.7	60.3	112.9	228.7	441.8	835.2	1434.8	-
500	20	500	11.0	14.6	29.8	58.6	112.9	228.7	430.5	836.4	-	-
600	24	600	8.5	13.9	30.9	57.6	110.4	224.8	425.8	-	-	-

Non standard products

Specific Tangential Stiffness STIS

Nominal Size		ID	STIS in N/mm ² at 21°C (x 10 ³)									
			Pressure class (bar)									
mm	in	mm	10	12	16	20	25	32	40	50	60	70
80	3	80	81.53	81.53	81.53	81.53	81.53	81.53	119.96	211.76	338.92	533.02
100	4	100	15.89	42.60	42.60	42.60	42.60	62.86	111.50	202.57	330.63	500.38
150	6	150	12.97	12.97	12.97	12.97	27.14	52.09	98.28	179.32	303.90	458.83
200	8	200	5.55	5.55	8.23	13.67	25.52	49.61	92.07	168.36	283.53	448.79
250	10	250	2.86	2.86	7.08	13.25	23.35	46.25	88.46	166.22	277.59	434.97
300	12	300	2.05	3.23	6.80	12.30	22.96	45.63	86.11	161.29	273.68	432.37
350	14	350	2.05	3.04	6.62	11.66	21.84	43.88	84.46	160.79	270.90	424.99
400	16	400	1.90	2.90	6.16	11.66	21.74	43.72	83.23	157.83	268.83	419.51
450	18	450	2.05	2.80	6.09	11.24	21.03	42.60	82.28	155.55	267.23	-
500	20	500	2.05	2.72	5.55	10.91	21.03	42.60	80.19	155.78	-	-
600	24	600	1.58	2.60	5.75	10.73	20.57	41.87	79.30	-	-	-

Non standard products

Bending Radius

Nominal Size		ID	Minimum allowable bending radius in meter at 21°C and standard pressure rating									
			Pressure class (bar)									
mm	in	mm	10	12	16	20	25	32	40	50	60	70
80	3	80	14.51	15.24	16.96	19.11	22.71	30.86	41.61	41.96	42.32	42.68
100	4	100	19.13	20.42	23.63	28.04	36.55	51.60	51.94	52.39	52.84	53.29
150	6	150	33.64	37.88	50.65	76.40	76.82	77.27	77.79	78.46	79.13	79.82
200	8	200	54.69	66.86	101.58	101.92	102.34	102.94	103.64	104.52	105.42	106.34
250	10	250	87.93	124.33	126.91	127.33	127.87	128.62	129.49	130.59	131.72	132.86
300	12	300	148.41	151.75	152.24	152.75	153.39	154.29	155.33	156.66	158.01	159.38
350	14	350	176.75	177.00	177.58	178.17	178.91	179.96	181.18	182.73	184.30	185.90
400	16	400	201.95	202.25	202.91	203.58	204.43	205.64	207.03	208.80	210.59	212.42
450	18	450	227.25	227.50	228.24	229.00	229.96	231.31	232.88	234.87	236.89	-
500	20	500	252.50	252.75	253.57	254.42	255.48	256.98	258.72	260.93	-	-
600	24	600	302.75	303.25	304.24	305.25	306.53	308.33	310.42	-	-	-

Non standard products

Span lengths

Span recommendations are based on pipes filled with water with a specific gravity of 1000 kg/m³ and include no provision for weights caused by valves, flanges or other heavy objects.

Span recommendations are calculated for a maximum long time deflection of 13 mm to ensure good appearance and adequate drainage.

Nominal Size		Support Type *	Span recommendations in meters at 21°C for Horizontal support arrangement									
			Pressure class (bar)									
mm	in	mm	10	12	16	20	25	32	40	50	60	70
80	3	S	3.23	3.23	3.23	3.23	3.23	3.23	3.27	3.45	3.59	3.72
		P	4.02	4.02	4.02	4.02	4.02	4.02	4.07	4.29	4.47	4.63
		C	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.89	5.15	5.37
100	4	S	3.43	3.43	3.43	3.43	3.43	3.48	3.67	3.86	4.02	4.17
		P	4.27	4.27	4.27	4.27	4.27	4.33	4.56	4.80	5.01	5.19
		C	5.13	5.13	5.13	5.13	5.13	5.20	5.48	5.77	6.01	6.22
150	6	S	3.83	3.83	3.83	3.83	4.03	4.27	4.50	4.74	4.94	5.11
		P	4.77	4.77	4.77	4.77	5.02	5.32	5.60	5.90	6.15	6.37
		C	5.72	5.72	5.72	5.72	6.02	6.38	6.72	7.08	7.38	7.64
200	8	S	4.14	4.14	4.19	4.42	4.66	4.94	5.20	5.48	5.71	5.91
		P	5.15	5.15	5.22	5.50	5.80	6.15	6.48	6.82	7.11	7.36
		C	6.18	6.18	6.26	6.60	6.96	7.38	7.77	8.18	8.53	8.83
250	10	S	4.39	4.39	4.69	4.95	5.22	5.53	5.82	6.13	6.39	6.61
		P	5.46	5.46	5.84	6.16	6.49	6.88	7.25	7.63	7.95	8.23
		C	6.55	6.55	7.00	7.39	7.79	8.26	8.70	9.16	9.54	9.88
300	12	S	4.60	4.79	5.14	5.42	5.72	6.06	6.38	6.72	7.00	7.25
		P	5.72	5.97	6.40	6.75	7.12	7.54	7.94	8.36	8.72	9.02
		C	6.86	7.16	7.68	8.10	8.54	9.05	9.53	10.03	10.46	10.83
350	14	S	4.95	5.18	5.55	5.86	6.18	6.55	6.90	7.26	7.57	7.83
		P	6.16	6.45	6.91	7.29	7.69	8.15	8.58	9.03	9.42	9.75
		C	7.40	7.74	8.30	8.75	9.23	9.78	10.30	10.84	11.30	11.70
400	16	S	5.30	5.54	5.94	6.27	6.61	7.00	7.37	7.76	8.09	8.37
		P	6.59	6.89	7.39	7.80	8.22	8.72	9.18	9.66	10.07	10.42
		C	7.91	8.27	8.87	9.36	9.87	10.46	11.01	11.59	12.08	12.51
450	18	S	5.62	5.88	6.30	6.65	7.01	7.43	7.82	8.23	8.58	-
		P	6.99	7.31	7.84	8.27	8.72	9.25	9.74	10.25	10.68	-
		C	8.39	8.78	9.41	9.93	10.47	11.10	11.69	12.30	12.82	-
500	20	S	5.92	6.20	6.64	7.01	7.39	7.83	8.25	8.68	-	-
		P	7.37	7.71	8.27	8.72	9.20	9.75	10.27	10.81	-	-
		C	8.84	9.25	9.92	10.47	11.04	11.70	12.32	12.97	-	-
600	24	S	6.49	6.79	7.28	7.68	8.10	8.58	9.04	-	-	-
		P	8.08	8.45	9.06	9.56	10.08	10.68	11.25	-	-	-
		C	9.70	10.14	10.87	11.47	12.09	12.82	13.50	-	-	-

* Support type: S = simple support span, P = partial support span
C = continues support span

Non standard products

Fittings

Filament-wound Fittings

Filament-wound fittings are made on steel moulds. Sizes available are from 80-400 mm (3-16"). The wall construction consists of a reinforcement structure (which consists of a combination of E-glass materials impregnated with amine-cured epoxy resin) and an optional inner liner (C-veil glass impregnated with the same resin system as the reinforcement structure).

Available range:

- 90° and 45° Elbows
- Tees and Laterals
- Tapered-Body Reducers
- Reducer Bushings and Plugs
- Plugs and Pipe Caps
- Nipples
- Saddles
- Coupling
- Flanges and Reducing Flanges

Laminated segmented Fittings

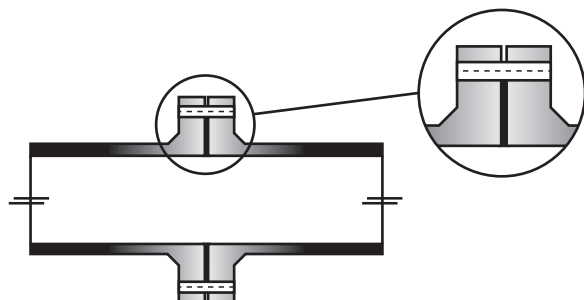
Laminated segmented fittings are available in sizes from DN 80 mm up to DN 600 mm (3"-24"). They are made out of GRE pipe segments which are cut, fitted and laminated to the required shape.

Available range:

- 90° and 45° Elbows
- Equal and Reducing Tees
- Equal and Reducing Laterals
- Other non standard fittings

Flanges

The range includes DN 80-600 mm (3"-24") flanged fittings which are in accordance with ANSI B16.1 and B16.5 drillings. Other flange drilling patterns such as DIN, ISO and JIS are available on request. Flanges are available in standard, heavy-duty or "O" ring configuration.



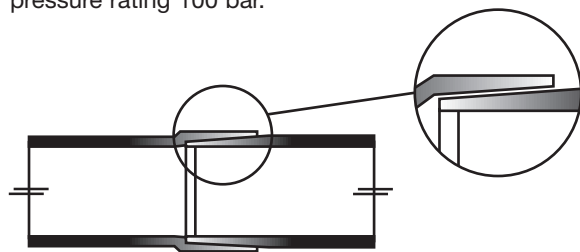
Joining Systems

We offer various different joining systems

- The AT series with taper-taper joints
- The ASL series with traditional seal lock "O" ring connection and with locking key; alternatively also without the locking key for restrained applications

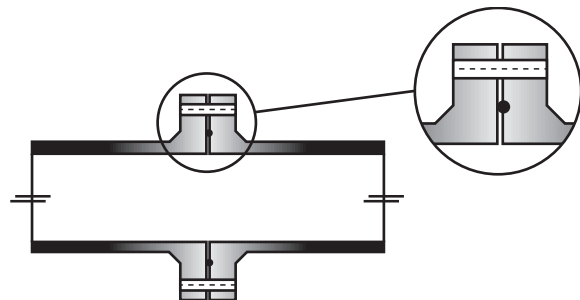
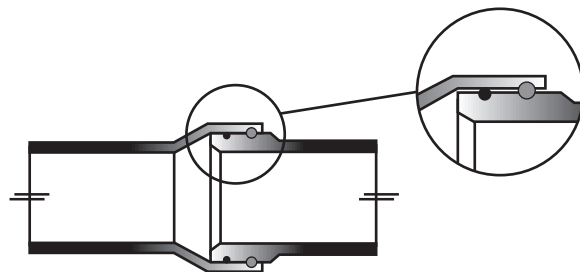
AT Adhesive "Taper-Taper" Joint

AT series, adhesive bonded taper-taper joint, max. pressure rating 100 bar.



ASL "Seal-Lock" Joint Key and "O" Ring Sealing

ASL series "Seal-lock-joint" is a connection with an "O" ring and a locking key; max. pressure rates 70 bar.



Utmost care has been taken to ensure that all contents of this brochure are accurate. However, **Amiantit** and its subsidiaries do not accept responsibility for any problems which may arise as a result of errors in this publication. Therefore customers should make inquiries into the potential product supplier and convince themselves of the suitability of any products supplied or manufactured by **Amiantit** and/or its subsidiaries before using them.



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