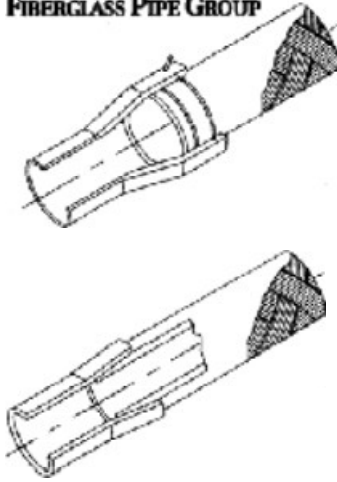




## Bondstrand® Product Data

### FIBERGLASS PIPE GROUP



## Series 2400 Fiberglass Pipe and Fittings

using Key-Lock® mechanical joint,  
Double O-ring or Taper/ Taper adhesive joint

### Uses and applications

- Saltwater and seawater lines
- Brackish water lines
- Fire protection systems
- Potable water lines
- Waste water and sewage systems
- Drainage systems
- Oil field reinjection systems
- Crude oil transmission lines
- Temporary pipelines
- Electrical conduit
- General industrial service for mildly corrosive liquids

### Performance

Laminate meets requirements of API Specification 15LR.  
Pipe wall design using a 124 N/mm<sup>2</sup> hydrostatic design basis (Procedure B.) with a 0.5 service factor. Liner thickness: 0.5 mm.  
Maximum operating temperature: 120°C (250°F)  
ASTM D-2310 Classification: RTRP-11FW (or RTRP-11 FE as applicable).  
This system is designed to provide minimal 4:1 safety factor in accordance with ASTM D-1599.

### Description

#### **Pipe**

Filament-wound fiberglass reinforced epoxy pipe with Key-Lock® male and female or Double O-Ring male and female mechanical joint or Taper/ Taper male and female adhesive joint.

#### **Fittings**

Standard filament-wound couplings, 45° and 90° Elbows, Tees and Reducing Tees, Concentric Reducers, Flanges\* and Nipples. Special fittings are available on request.

\* Flanges are available with the following drillings : ANSI B16.5 Class 150 and 300, DIN, ISO & JIS. Other drilling patterns are available on request.

For dimensional data and standard configurations for fittings, please refer to respective Fitting Guides.

Optional, the system can be supplied conductive - Bondstrand 2400C or Fireproofing 2400-FP.  
For Conductive ASTM D-2310 Classification: RTRP-11AW for pipes or RTRP-11AE as applicable

## Joining systems

Key-Lock® integral filament-wound male and female or Double O-Ring male and female mechanical joint assembled with locking keys. Hydrostatic seal by means of an elastomeric O-ring. Taper/ Taper integral filament-wound male and female adhesive bonded joint.

## Pipe sizes

From 50 - 100 mm (2-4 ) : 5.85 or 9 m depends on end configuration.  
 For 150 (6 ) : 5.85, 9 or 11.89 m depends on end configuration.  
 From 200 - 1000 mm (8-40 ) : 11.89 m random length.

## Physical properties

Pipe property	Units	Value	Method
Thermal conductivity	W/(m•k)	.33	Ameron
Thermal expansivity (lineair)	10 <sup>-6</sup> mm/mm/°C	18.0	Ameron
Flow coefficient	Hazen-Williams	150	-
Absolute roughness	10 <sup>-6</sup> m	5.3	-
Density	g/cm <sup>3</sup>	1.8	-
Shielding capability*	volts	100 <sup>1</sup>	-
Grounding resistance @1500 volts*	10 <sup>6</sup> ohms	1.0 <sup>1</sup>	-

\* Applicable for conductive

## Mechanical properties

Pipe property	Units	21°C	93°C	Method
<b>Bi-axial</b>				
Ultimate hoop stress at weeping	N/mm <sup>2</sup>	250	-	ASTM D-1599
<b>Circumferential</b>				
Hoop tensile strength	N/mm <sup>2</sup>	220	-	ASTM D-2290
Hoop tensile modulus	N/mm <sup>2</sup>	25200	22100	ASTM D-2290
Poisson's ratio axial/ hoop	-	0.65	0.81	Ameron
<b>Longitudinal</b>				
Axial tensile strength	N/mm <sup>2</sup>	80	65	ASTM D-2105
Axial tensile modulus	N/mm <sup>2</sup>	12500	9700	ASTM D-2105
Poisson's ratio hoop/ axial	-	0.40	0.44	ASTM D-2105
Axial bending strength	N/mm <sup>2</sup>	85	-	Ameron
<b>Beam</b>				
Apparent elastic modulus	N/mm <sup>2</sup>	12500	8000	ASTM D-2925
<b>Hydrostatic Design Basis</b>				
Static	N/mm <sup>2</sup>	-	124	ASTM D-2992 (Proc.B.)
Cyclic	N/mm <sup>2</sup>	41.5*	-	ASTM D-2992 (Proc.A.)

\* at 65°C

## Typical pipe dimensions

Nominal Pipe size (mm)	Pipe ID (in)	Pipe ID (mm)	Minimum total wall thickness* (mm)									
			2410	2412	2414	2416	2420	2425	2432	2440	2450	
50	2	53.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.8	3.3
80	3	81.8	2.3	2.3	2.3	2.3	2.3	2.7	3.1	3.1	3.9	4.7
100	4	105.2	2.3	2.3	2.3	2.5	2.7	3.3	3.9	3.9	4.9	5.9
150	6	159.0	2.5	2.7	3.0	3.4	3.8	4.6	5.6	5.6	7.0	8.7
200	8	208.8	3.1	3.2	3.7	4.2	4.8	5.8	7.2	7.2	9.1	11.2
250	10	262.9	3.5	3.9	4.5	5.1	5.8	7.2	8.8	8.8	11.2	14.0
300	12	313.7	3.9	4.5	5.3	6.0	6.8	8.4	10.4	10.4	13.4	16.6
350	14	344.4	4.1	4.8	5.7	6.6	7.4	9.2	11.4	11.4	14.6	18.2
400	16	393.7	4.5	5.5	6.4	7.4	8.4	10.5	12.9	12.9	15.6	
450	18	433.8	4.9	6.0	7.0	8.1	9.2	11.5	14.2	14.2	18.2	
500	20	482.1	5.4	6.6	7.7	8.9	10.1	12.7	15.7	15.7	20.1	
600	24	578.6	6.3	7.7	9.3	10.6	12.1	15.1	18.8			
700	28	700.0	7.4	9.1	10.8	12.6	14.3	17.9	22.3			
750	30	750.0	7.9	9.7	11.6	13.5	15.3	19.1	23.9			
800	32	800.0	8.4	10.3	12.3	14.3	16.3	20.4	25.5			
900	36	900.0	9.3	11.5	13.7	16.0	18.2	22.8	28.5			
1000	40	1000.0	10.3	12.8	15.3	17.8	20.3					

\* Total wall thickness is including 0.5 mm liner. No liner for conductive pipe

**Note: Pipe series designation: First two digits indicate product series. Final two digits indicate internal pressure class (bar).**

## External pressure performance

Nominal Pipe size		Ultimate Collapse Pressure* (bar)						
(mm)	(in)	2410	2412	2414	2416	2420	2425*	
50	2	26.4	26.4	26.4	26.4	26.4	26.4	
80	3	7.3	7.3	7.3	7.3	7.3	13.2	
100	4	3.4	3.4	3.4	4.7	6.2	12.8	
150	6	1.4	1.8	2.6	4.1	6.1	11.7	
200	8	1.3	1.5	2.5	3.8	5.9	11.1	
250	10	1.0	1.5	2.4	3.6	5.6	11.3	
300	12	0.9	1.4	2.4	3.7	5.5	10.9	
350	14	0.8	1.3	2.3	3.8	5.5	11.0	
400	16	0.7	1.4	2.3	3.7	5.5	11.2	
450	18	0.7	1.4	2.3	3.7	5.5	11.1	
500	20	0.7	1.4	2.3	3.6	5.4	11.0	
600	24	0.7	1.3	2.4	3.6	5.5	10.9	
700	28	0.7	1.3	2.2	3.5	4.9	10.0	
750	30	0.7	1.3	2.2	3.5	4.9	9.9	
800	32	0.7	1.3	2.2	3.5	4.9	10.0	
900	36	0.6	1.2	2.1	3.5	4.9	10.0	
1000	40	0.6	1.3	2.2	3.5	4.9	9.9	

\* Ultimate collapse pressures for higher pressure classes exceed values shown.

## Pipe weight

Nominal Pipe size		Minimum weight empty pipe kg/m								
(mm)	(in)	2410	2412	2414	2416	2420	2425	2432	2440	2450
50	2	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.84	1.00
80	3	1.02	1.02	1.02	1.02	1.02	1.21	1.41	1.81	2.22
100	4	1.30	1.30	1.30	1.42	1.55	1.93	2.31	2.95	3.61
150	6	2.13	2.32	2.60	2.97	3.35	4.11	5.06	6.42	8.10
200	8	3.52	3.64	4.25	4.86	5.60	6.84	8.60	11.02	13.74
250	10	5.02	5.64	6.56	7.48	8.56	10.75	13.27	17.11	21.67
300	12	6.71	7.80	9.26	10.55	12.03	15.00	18.76	24.49	30.71
350	14	7.75	9.15	10.96	12.78	14.40	18.07	22.61	29.31	
400	16	9.76	12.04	14.11	16.41	18.73	23.63	29.29	35.74	
450	18	11.75	14.51	17.04	19.83	22.64	28.55	35.56	46.11	
500	20	14.43	17.78	20.87	24.26	27.66	35.08	43.74	56.63	
600	24	20.29	24.98	30.37	34.77	39.87	50.15	62.96		
700	28	28.94	35.83	42.75	50.11	56.90	61.98	90.30		
750	30	33.15	40.96	49.25	57.58	65.30	71.93	103.80		
800	32	37.65	46.44	55.74	65.09	74.30	82.25	118.10		
900	36	46.97	58.43	69.94	82.03	93.10	93.75	148.10		
1000	40	57.90	72.37	86.90	101.51	115.90				

Note: Excluding integral joints

## Specific Tangential Initial Stiffness

Nominal Pipe size		Specific Tangential Initial Stiffness (STIS) in N/m <sup>2</sup> at 21°C								
(mm)	(in)	2410	2412	2414	2416	2420	2425	2432	2440	2450
50	2	73612	73612	73612	73612	73612	73612	73612	149460	262500
80	3	20961	20961	20961	20961	20961	37727	61392	133456	244609
100	4	9997	9997	9997	13637	18050	36595	64442	135877	244419
150	6	4026	5338	7790	12069	17652	33359	63038	127223	247715
200	8	3907	4369	7222	11085	17253	31856	63111	129998	243258
250	10	3016	4371	7069	10679	16206	32232	60198	125609	244685
300	12	2589	4191	7188	10743	16025	31128	60131	129402	244312
350	14	2325	3938	6911	11070	15912	31411	60634	127764	
400	16	2137	4142	6759	10731	15985	31919	59784	105832	
450	18	2126	4121	6756	10719	15960	31762	60256	126522	
500	20	2139	4097	6691	10547	15629	31574	59965	125215	
600	24	2053	3899	7061	10605	15944	31309	60516		
700	28	1953	3754	6403	10303	15175	29963	57855		
750	30	1959	3737	6514	10387	15218	29962	58164		
800	32	1963	3722	6449	10240	15256	30026	58435		
900	36	1907	3697	6342	10192	15221	29985	58265		
1000	40	1920	3767	6514	10328	15370				

## Stiffness Factor

Nominal Pipe size		Stiffness Factor (SF) per ASTM D-2412 in in/lbs at 21°C									
(mm)	(in)	2410	2412	2414	2416	2420	2425	2432	2440	2450	
50	2	108	108	108	108	108	108	108	226	408	
80	3	108	108	108	108	108	198	327	730	1377	
100	4	108	108	108	149	198	408	730	1583	2926	
150	6	149	198	290	453	668	1281	2465	5104	10247	
200	8	327	366	609	941	1478	2767	5590	11821	22767	
250	10	502	730	1189	1809	2767	5590	10627	22767	45726	
300	12	730	1189	2055	3092	4647	9163	18033	39896	77560	
350	14	867	1478	2613	4218	6105	12238	24068	52098		
400	16	1189	2323	3817	6105	9163	18585	35435	63987		
450	18	1583	3092	5104	8158	12238	24737	47789	103058		
500	20	2187	4218	6937	11015	16443	33748	65267	139936		
600	24	3626	6937	12665	19148	29009	57839	113898			
700	28	6105	11821	20308	32924	48845	97911	192554			
750	30	7531	14472	25417	40831	60252	119598	238139			
800	32	9163	17492	30536	48843	73309	146468	290405			
900	36	12665	24737	42745	69208	103063	206110	407998			
1000	40	17492	34584	60249	96228	144271					

## Pipe Stiffness

Nominal Pipe size		Pipe Stiffness (SF) per ASTM D-2412 in psi at 21°C									
(mm)	(in)	2410	2412	2414	2416	2420	2425	2432	2440	2450	
50	2	573.1	573.1	573.1	573.1	573.1	573.1	573.1	1163.6	2043.6	
80	3	163.2	163.2	163.2	163.2	163.2	293.7	478.0	1039.0	1904.3	
100	4	77.8	77.8	77.8	106.2	140.5	284.9	501.7	1057.8	1902.9	
150	6	31.3	41.6	60.6	94.0	137.4	259.7	490.8	990.5	1928.5	
200	8	30.4	34.0	56.2	86.3	134.3	248.0	491.3	1012.1	1893.8	
250	10	23.5	34.0	55.0	83.1	126.2	250.9	468.7	977.9	1904.9	
300	12	20.2	32.6	56.0	83.6	124.8	242.3	468.1	1007.4	1902.0	
350	14	18.1	30.7	53.8	86.2	123.9	244.5	472.0	994.7		
400	16	16.6	32.2	52.6	83.5	124.4	248.5	465.4	823.9		
450	18	16.6	32.1	52.6	83.5	124.3	247.3	469.1	985.0		
500	20	16.7	31.9	52.1	82.1	121.7	245.8	466.8	974.8		
600	24	16.0	30.4	55.0	82.6	124.1	243.8	471.1			
700	28	15.2	29.2	49.9	80.2	118.1	233.3	450.5			
750	30	15.2	29.1	50.7	80.9	118.5	231.7	452.9			
800	32	15.3	29.0	50.2	79.7	118.8	233.8	455.0			
900	36	14.8	28.8	49.4	79.3	118.5	233.5	453.7			
1000	40	14.9	29.3	50.7	80.4	119.7					

## Span lengths

Nominal Pipe size		Parital span recommendations* (in meters) for horizontal support arrangements at 21°C									
(mm)	(in)	2410	2412	2414	2416	2420	2425	2432	2440	2450	
50	2	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.60	3.75	
80	3	3.85	3.85	3.85	3.85	3.85	4.02	4.16	4.41	4.60	
100	4	4.11	4.11	4.11	4.21	4.30	4.53	4.72	4.99	5.21	
150	6	4.69	4.79	4.93	5.10	5.25	5.51	5.78	6.09	6.40	
200	8	5.35	5.39	5.60	5.79	5.99	6.28	6.61	6.98	7.32	
250	10	5.87	6.04	6.26	6.47	6.68	7.04	7.38	7.81	8.21	
300	12	6.32	6.56	6.84	7.06	7.28	7.66	8.06	8.54	8.96	
350	14	6.56	6.84	7.14	7.41	7.62	8.03	8.45	8.94		
400	16	6.96	7.33	7.62	7.90	8.15	8.60	9.02	9.42		
450	18	7.30	7.69	7.99	8.29	8.55	9.02	9.47	10.02		
500	20	7.69	8.10	8.42	8.72	8.99	9.50	9.98	10.55		
600	24	8.39	8.83	9.25	9.55	9.86	10.39	10.94			
700	28	9.19	9.68	10.09	10.48	10.70	11.30	11.90			
750	30	9.51	10.01	10.46	10.85	11.10	11.70	12.30			
800	32	9.82	10.33	10.79	11.19	11.50	12.10	12.80			
900	36	10.39	10.95	11.43	11.86	12.20	12.80	13.50			
1000	40	10.95	11.55	12.07	12.52	12.90					

\* Note: For continuous span use of above values: plus 20%  
For simple span use of above values: minus 20%

- 1) Span recommendations are based on pipes filled with water with a specific gravity of 1000kg/m<sup>3</sup> and include no provision for weights caused by valves, flanges or other heavy objects.
- 2) Span recommendations are calculated for a maximum long time deflection of 13 mm to ensure good appearance and adequate drainage.

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## Bending radius

Nominal Pipe size		<i>Minimum allowable bending radius (Rb) in m at 21°C and standard pressure rating</i>								
(mm)	(in)	2410	2412	2414	2416	2420	2425	2432	2440	2450
50	2	10	11	11	12	12	14	17	17	19
80	3	17	18	19	21	24	26	29	29	31
100	4	24	26	28	30	34	35	38	38	41
150	6	42	46	48	48	54	57	61	62	64
200	8	58	66	66	67	74	78	83	82	86
250	10	79	85	86	87	99	100	109	107	109
300	12	101	105	104	106	120	123	131	127	131
350	14	116	119	117	116	134	136	144	141	
400	16	139	136	137	135	154	155	168	180	
450	18	155	151	152	150	171	173	185	180	
500	20	174	170	171	169	194	194	207	202	
600	24	216	212	203	204	233	236	249		
700	28	273	264	259	253	274	275			
750	30	294	285	276	271	293	296			
800	32	315	306	297	291	312	314			
900	36	363	348	339	330	324	352			
1000	40	405	385	374	366	363				

Note : Do not bend pipe until adhesive has cured. At rated pressure, sharper bends may create excessive stress concentrations.

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## Field testing

Pipe system is designed for field testing with water at 150% of rated pressure.

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## Surge pressure

Maximum allowable surge pressure is 150% of rated pressure.

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## Conversions

1 psi	= 6895 Pa	= 0.07031 kg/cm <sup>2</sup>	
1 bar	= 10 <sup>5</sup> Pa	= 14.5 psi	= 1.02 kg/cm <sup>2</sup>
1 Mpa	= 1 N/mm <sup>2</sup>	= 145 psi	= 10.2 kg/cm <sup>2</sup>
1 inch		= 25.4 mm	
1 Btu.in/(h•ft <sup>2</sup> •°F)		= 0.1442 W/(m•K)	
°C		= 5/9 ( °F-32)	

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## Important notice

This product literature and the recommendations for usage it contains are based on test data reasonably believed to be reliable. It is intended that this literature be used by personnel having specialised training in accordance with currently accepted industry practice and normal operating conditions. Variation in environment, changes in operating procedures, or extrapolation of data may cause unsatisfactory results. We recommend that your engineers verify the suitability of this product for your intended application. Since we have no control over the conditions of service, we expressly disclaim responsibility for the results obtained or for any consequential or incidental damages of any kind incurred.



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**AMERON**  
INTERNATIONAL

FIBERGLASS - COMPOSITE PIPE GROUP

## Bondstrand Guide Specification

# Bondstrand 2400 Pipe & Fittings

Fiberglass reinforced thermosetting epoxy resin pipe for plant piping in general service

**Scope** This specification defines the reinforced thermosetting resin (RTR) piping system to be used in those sections of Plant Piping-General Services calling for fiberglass piping systems.

**Reference, Quality Assurance** References are made to other standards and tests which are a part of this section as modified. Where conflict exists between the requirements of this specification and listed references, the specification shall prevail.

Physical properties	Pipe property	Units	Value	Method
	Thermal conductivity	W(m•k)	.33	Ameron
	Thermal expansivity (linear)	10 <sup>-6</sup> mm/mm/°C	18.0	Ameron
	Flow coefficient	Hazen-Williams	150	-
	Absolute roughness	10 <sup>-6</sup> m	5.3	-
	Density	g/cm <sup>3</sup>	1.8	-

\* Applicable for conductive

Mechanical properties	Pipe property	Units	21°C	93°C	Method
	<b>Bi-axial</b>				
	Ultimate hoop stress at weeping	N/mm <sup>2</sup>	250	-	ASTM D-1599
	<b>Circumferential</b>				
	Hoop tensile strength	N/mm <sup>2</sup>	220	-	ASTM D-2290
	Hoop tensile modulus	N/mm <sup>2</sup>	25200	22100	ASTM D-2290
	Poisson's ratio axial/ hoop	-	0.65	0.81	Ameron
	<b>Longitudinal</b>				
	Axial tensile strength	N/mm <sup>2</sup>	80	65	ASTM D-2105
	Axial tensile modulus	N/mm <sup>2</sup>	12500	9700	ASTM D-2105
	Poisson's ratio hoop/ axial	-	0.40	0.44	ASTM D-2105
	Axial bending strength	N/mm <sup>2</sup>	85	-	Ameron
	<b>Beam</b>				
	Apparent elastic modulus	N/mm <sup>2</sup>	12500	8000	ASTM D-2925
	<b>Hydrostatic Design Basis</b>				
	Static	N/mm <sup>2</sup>	-	124	ASTM D-2992 (Proc.B.)
	Cyclic	N/mm <sup>2</sup>	41.5*	-	ASTM D-2992 (Proc.A.)

\* at 65°C

**Performance Requirements** Pipe shall be manufactured according to ASTM D2996 Specification for RTRP. When classified under ASTM D2310, the pipe shall meet Type I, Grade I and Class F (RTRP - 11F) cell limits in 2 through 40 nominal pipe sizes.

**Pipe Construction** The structural wall of fiberglass pipe in 2 through 40-inch sizes shall have continuous glass fibers wound at a 54¾ helical angle in a matrix of aromatic amine cured epoxy resin.

The integral, reinforced resin-rich liner shall consist of C-glass and a resin/hardener system identical to that of the structural wall, and shall have a 20 mil nominal thickness. Non-reinforced pure resin-type corrosion barriers (liners) shall not be allowed due to their potential for severe fracturing during transportation, installation and operation of the pipe.

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## Pipe Construction (cont)

Pipe in 2 through 40-inch sizes shall be rated for a minimum of 150 psig at 200°F. In 2 through 8-inch sizes the pipe shall have full vacuum capability at 70°F, when installed above ground with a safety factor of 1.3:1. This applies to Series 2410. For higher rated pressure, the dia range will increase for full vacuum capability.

Pipe shall be manufactured according to ASTM D2996 specification for filament-wound Reinforced Thermosetting Resin Pipe (RTRP). When classified under ASTM D2310, the pipe shall meet Type 1, Grade 1 and Class F (RTRP-11F) cell limits in 2 through 40-inch nominal pipe sizes.

Pipe in 2 through 8-inch sizes shall be furnished in 20 or 30-ft length to minimize the number of field-bonded joints for rapid installation. 40-ft lengths are available for sizes 8 through 40 inch.

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## Standard fittings Construction

Fittings in 2 through 40-inch sizes shall be filament wound with a reinforced resin-rich liner of 20 mil minimum thickness and of the same glass and resin type as the pipe. Pipe, filament-wound fittings and adhesive shall, as an assembly, provide a continuous liner throughout the system.

Contact-molded, spray-up or hand-layup fittings shall not be allowed. Pipe and fittings shall be joined using a Taper spigot socket adhesive joint.

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## Flanges

When classified in accordance with ASTM D4024, filament-wound epoxy-resin flanges shall meet or surpass Type 1, Grade 1 and Class C standards. Cell classification of S2400 flanges is in accordance with ASTM D4024 is RTRP-112.

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## Workmanship

The pipe and fittings shall be free from all defects, including delaminations, indentations, pinholes, foreign inclusions, bubbles and resin-starved areas which, due to their nature, degree or extent, detrimentally affect the strength and serviceability of the pipe or fittings. The pipe and fittings shall be as uniform as commercially practicable in color, density and other physical properties.

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## Testing

Samples of pipe and couplings shall be tested at random, based on standard quality control practices to determine conformance of the materials to American Society for Testing and Materials guidelines for testing fiberglass pipe products: ASTM D1599, D2105, D2925, D2992A or D2992B.

Pipe and fittings are hydrostatically tested by the manufacturer to 1.5 times the pressure rating for signs of leakage.

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## Installation

Installation procedures and techniques as well as system design criteria including burial, anchoring, guiding and supporting shall be in accordance with manufacturer's recommendation.

Piping system installers and fitters should be trained by a direct factory employee of the piping system manufacturer and certified by the trainer prior to system assembly in the field.

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## Important notice

This literature and the information and recommendations it contains are based on data reasonably believed to be reliable. However, such factors as variations in environment, application or installation, changes in operating procedures, or extrapolation of data may cause different results. Ameron makes no representation or warranty, express or implied, including warranties or merchantability or fitness for purpose, as to the accuracy, adequacy or completeness of the recommendations or information contained herein. Ameron assumes no liability whatsoever in connection with this literature or the information or recommendations it contains. Product specifications are subject to change.

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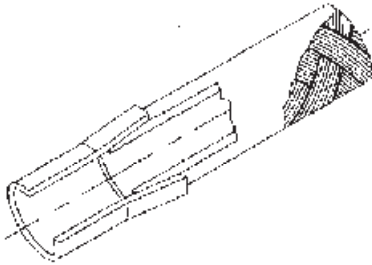
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## Fittings & Flanges for pipe series 2410 and 3410 using the Taper-Taper adhesive-bonded joint

### Description

Bondstrand Taper-Taper fittings & flanges are glassfiber reinforced filament-wound epoxy pipe fittings in diameters 50 through 1000 mm (2-40 inch) designed to be used with Bondstrand pipes. Pipe is standard with integral Taper-Taper spigot and socket ends for adhesive bonding or with integral Key-Lock male and female ends for mechanical joining. Fittings are filament-wound with integral taper socket ends. Pipes and fittings are available in several pressure classes from 10 bar upwards.

### Uses and Application

For intended services and performance capabilities refer to product data sheet FP 452 and FP 158 pertaining to Bondstrand Series 2400 and 3400 pipe data.

### Design and Installation

For recommendations pertaining to design, installation and use of Bondstrand Pipe, Fittings and Flanges reference is made to the following literature:

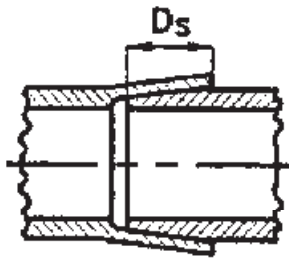
- FP 564 Assembly Instructions for Taper-Taper adhesive bonded joints.
- FP 161 Installation Instructions using the Key-Lock mechanical joint.
- FP 453 M86 Pipe Shaver operating instructions for Taper-Taper joints in sizes 50 to 150 mm (2-6 inch).
- FP 454 M87 Pipe Shaver operating instructions for Taper-Taper joints in sizes 150 to 400 mm (6-16 inch).
- FP 455 M87XL Pipe Shaver operating instructions for Taper-Taper joints in sizes 400 to 600 mm (16-24 inch).
- FP 204 M95 Pipe Shaver operating instructions for Taper-Taper joints in sizes 600 to 1000 mm (24-40 inch).
- FP 196 Flange Assembly Instructions.
- FP 132 Corrosion Guide.
- General Bondstrand engineering and installation guides.

### How to use this product data sheet

Dimensional data for Taper-Taper adhesive bonded fittings are contained in individual dimensional sheets per pressure class:

<i>FP No.</i>	<i>Fitting</i>	<i>Pipe System</i>	<i>Pressure</i>
<b>549-10</b>	<b>T-10</b>	<b>2410 and 3410</b>	<b>10 bar</b>
549-12	T-12	2412 and 3412	12 bar
549-14	T-14	2414 and 3414	14 bar
549-16	T-16	2416 and 3416	16 bar
549-20	T-20	2420 and 3420	20 bar
549-25	T-25	2425 and 3425	25 bar
549-32	T-32	2432 and 3432	32 bar
549-40	T-40	2440 and 3440	40 bar
549-50	T-50	2450 and 3450	50 bar

## Dimensions of the Taper-Taper joint



Nominal Pipe Size		Taper Angle	Insertion Depth	Spigot Nose Thickness	Spigot Diameter at Nose
mm	inch	$\alpha$ degrees	Ds mm	t mm	mm
50	2	1.75	50	1.0	55.2
80	3	1.75	50	1.0	83.8
100	4	1.75	50	1.0	107.2
150	6	2.50	50	1.0	161.0
200	8	2.50	80	1.0	210.8
250	10	2.50	80	1.0	264.9
300	12	2.50	80	1.0	315.7
350	14	2.50	80	1.5	347.4
400	16	2.50	110	1.5	396.7
450	18	2.50	110	1.5	436.8
500	20	2.50	110	2.0	486.1
600	24	2.50	110	2.0	582.6
700	28	1.75	140	4.0	708.0
750	30	1.75	140	4.0	758.0
800	32	1.75	170	4.0	808.0
900	36	1.75	200	4.0	908.0
1000	40	1.75	200	4.5	1009.0

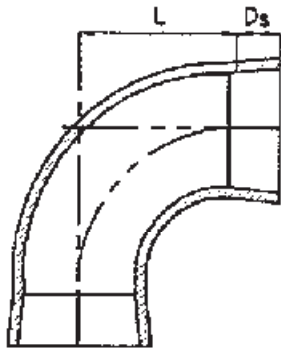
## Quantity of Adhesive

Nominal Pipe Size		Adhesive Kit Size	Minimum number of adhesive kits per joint
mm	inch	cm <sup>3</sup> fluid ounce	nr.
50	2	89 3	0.2
80	3	89 3	0.2
100	4	89 3	0.4
150	6	89 3	0.4
200	8	89 3	0.6
250	10	177 6	1.0
300	12	177 6	1.0
350	14	177 6	1.0
400	16	177 6	2.0
450	18	177 6	2.0
500	20	177 6	2.0
600	24	177 6	2.0
700	28	177 6	4.0
750	30	177 6	4.0
800	32	177 6	5.0
900	36	177 6	6.0
1000	40	177 6	7.0

### Note:

Adhesive kits should never be split. If remainder is not used for other joints made at the same time, the surplus must be discarded.

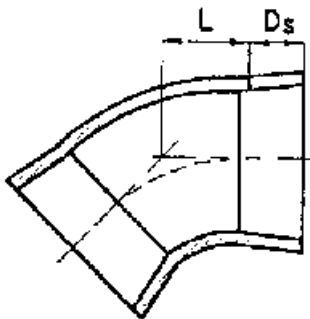
## Elbows 90°



### Filament-wound 90° elbows with integral Taper-Taper adhesive bonded socket ends

Nominal Pipe Size		Laying Length L	Overall Length OL	Insertion Depth Ds	Weight
mm	inch	mm	mm	mm	kg
50	2	87	137	50	0.6
80	3	126	176	50	1.1
100	4	155	205	50	2.1
150	6	240	290	50	4.2
200	8	315	395	80	8.6
250	10	391	471	80	14.2
300	12	463	543	80	21.0
350	14	364	444	80	30.0
400	16	402	512	110	35.0
450	18	472	582	110	49.0
500	20	523	633	110	72.0
600	24	625	735	110	112.0
700	28	726	866	140	123.0
750	30	777	917	140	196.0
800	32	828	998	170	252.0
900	36	929	1129	200	348.0
1000	40	1031	1231	200	480.0

## Elbows 45°

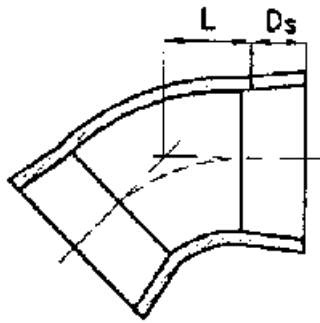


### Filament-wound 45° elbows with integral Taper-Taper adhesive bonded socket ends

Nominal Pipe Size		Laying Length L	Overall Length OL	Insertion Depth Ds	Weight
mm	inch	mm	mm	mm	kg
50	2	45	95	50	0.5
80	3	61	111	50	0.9
100	4	73	123	50	1.3
150	6	106	156	50	2.5
200	8	137	217	80	6.9
250	10	169	249	80	9.8
300	12	196	276	80	18.1
350	14	125	205	80	19.1
400	16	142	252	110	21.0
450	18	204	314	110	31.0
500	20	225	335	110	42.0
600	24	268	378	110	63.0
700	28	310	450	140	90.0
750	30	331	471	140	107.0
800	32	352	522	170	139.0
900	36	394	594	200	193.0
1000	40	436	636	200	257.0

## Elbows 22 1/2°

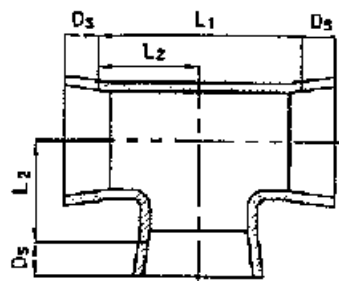
### Filament-wound 22 1/2° elbows with integral Taper-Taper adhesive bonded socket ends



Nominal Pipe Size		Laying Length L	Overall Length OL	Insertion Depth Ds	Weight
mm	inch	mm	mm	mm	kg
50	2	29	79	50	0.4
80	3	37	87	50	0.6
100	4	43	93	50	0.9
150	6	60	110	50	1.4
200	8	76	156	80	4.6
250	10	68	148	80	6.0
300	12	77	157	80	8.9
350	14	71	151	80	12.5
400	16	85	195	110	13.6
450	18	106	216	110	19.7
500	20	116	226	110	24.0
600	24	136	246	110	45.0
700	28	157	297	140	60.0
750	30	167	307	140	70.0
800	32	177	347	170	94.0
900	36	197	397	200	137.0
1000	40	217	417	200	153.0

## Tees

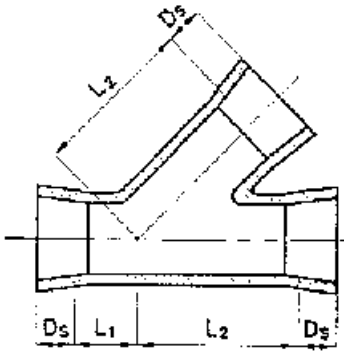
### Filament-wound tees with integral Taper-Taper adhesive bonded socket ends



Nominal Pipe Size		Laying Length total run L <sub>1</sub>	Overall Length total run OL <sub>1</sub>	Laying Length branch L <sub>2</sub>	Overall Length branch OL <sub>2</sub>	Insertion Depth Ds	Weight
mm	inch	mm	mm	mm	mm	mm	kg
50	2	148	248	74	124	50	1.3
80	3	192	292	96	146	50	2.9
100	4	230	330	115	165	50	4.0
150	6	306	406	153	203	50	8.7
200	8	376	536	188	268	80	17.5
250	10	452	612	226	306	80	25.0
300	12	528	688	264	344	80	44.0
350	14	544	704	272	352	80	47.0
400	16	590	810	295	405	110	56.0
450	18	678	898	339	449	110	67.0
500	20	740	960	370	480	110	99.0
600	24	868	1088	434	544	110	130.0
700	28	994	1274	497	637	140	240.0
750	30	1046	1326	523	663	140	285.0
800	32	1118	1458	559	729	170	363.0
900	36	1248	1648	624	824	200	518.0
1000	40	1382	1782	691	891	200	683.0

## Lateral 45°

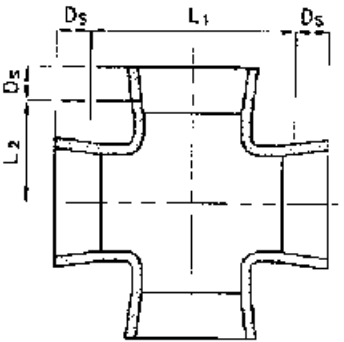
### Filament-wound 45° lateral with integral Taper-Taper adhesive bonded socket ends



Nominal Pipe Size		Laying Length	Overall Length	Laying Length	Overall Length	Insertion Depth	Weight
		L <sub>1</sub>	OL <sub>1</sub>	L <sub>2</sub>	OL <sub>2</sub>	D <sub>s</sub>	
mm	inch	mm	mm	mm	mm	mm	kg
50	2	74	124	209	259	50	2.3
80	3	86	136	264	314	50	4.1
100	4	86	136	315	365	50	6.3
150	6	99	149	378	428	50	12.3
200	8	124	204	455	535	80	27.0
250	10	137	217	531	611	80	43.0
300	12	150	230	632	712	80	52.0
350	14	150	230	632	712	80	69.0
400	16	150	260	632	742	110	95.0

## Cross

### Filament-wound cross with integral Taper-Taper adhesive bonded socket ends



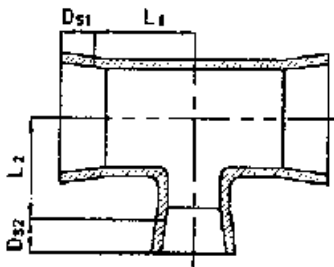
Nominal Pipe Size		Laying Length run	Overall Length run	Laying Length branch	Overall Length branch	Insertion Depth	Weight
		L <sub>1</sub>	OL <sub>1</sub>	L <sub>2</sub>	OL <sub>2</sub>	D <sub>s</sub>	
mm	inch	mm	mm	mm	mm	mm	kg
50	2	148	248	74	124	50	1.9
80	3	192	292	96	146	50	3.3
100	4	230	330	115	165	50	5.7
150	6	306	406	153	203	50	13.2
200	8	376	536	188	268	80	21.0
250	10	452	612	226	306	80	37.0
300	12	528	688	264	344	80	58.0
350	14	544	704	272	352	80	68.0
400	16	590	810	295	405	110	105.0

## Reducing Tees

### Filament-wound reducing tees with integral Taper-Taper adhesive bonded socket ends

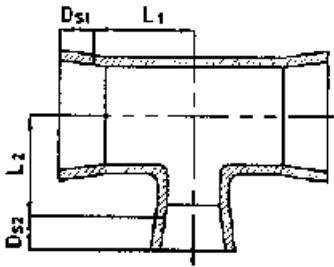
Nominal Pipe Size      Laying    Overall    Insertion    Laying    Overall    Insertion    Weight  
 Length    Length    Depth    Length    Length    Depth  
 half      half      run      branch    branch    branch

run x run x branch      run      run      run      L<sub>2</sub>      OL<sub>2</sub>      D<sub>s2</sub>



mm	inch	mm	mm	mm	mm	mm	mm	kg
80x80x50	3x3x2	96	146	50	86	136	50	2.7
100x100x50	4x4x2	115	165	50	99	149	50	3.8
100x100x80	4x4x3	115	165	50	108	158	50	4.0
150x150x50	6x6x2	153	203	50	124	174	50	8.0
150x150x80	6x6x3	153	203	50	134	184	50	9.6
150x150x100	6x6x4	153	203	50	140	190	50	9.6
200x200x80	8x8x3	188	268	80	159	209	50	15.6
200x200x100	8x8x4	188	268	80	172	222	50	16.2
200x200x150	8x8x6	188	268	80	178	228	50	17.0
250x250x100	10x10x4	226	306	80	194	244	50	23.0
250x250x150	10x10x6	226	306	80	204	254	50	24.0
250x250x200	10x10x8	226	306	80	213	293	80	26.0
300x300x100	12x12x4	264	344	80	216	266	50	32.0
300x300x150	12x12x6	264	344	80	229	279	50	32.0
300x300x200	12x12x8	264	344	80	239	319	80	33.0
300x300x250	12x12x10	264	344	80	251	331	80	34.0
350x350x150	14x14x6	272	352	80	254	304	50	34.0
350x350x200	14x14x8	272	352	80	264	344	80	35.0
350x350x250	14x14x10	272	352	80	277	357	80	38.0
350x350x300	14x14x12	272	352	80	289	369	80	39.0
400x400x150	16x16x6	295	405	110	274	324	50	47.0
400x400x200	16x16x8	295	405	110	283	363	80	51.0
400x400x250	16x16x10	295	405	110	293	373	80	47.0
400x400x300	16x16x12	295	405	110	305	385	80	53.0
400x400x350	16x16x14	295	405	110	315	395	80	54.0
450x450x200	18x18x10	339	449	110	316	396	80	66.0
450x450x250	18x18x12	339	449	110	329	409	80	66.0
450x450x300	18x18x12	339	449	110	329	409	80	71.0
450x450x350	18x18x14	339	449	110	330	410	80	72.0
450x450x400	18x18x16	339	449	110	330	440	110	75.0
500x500x250	20x20x10	370	480	110	355	435	80	93.0
500x500x300	20x20x12	370	480	110	355	435	80	96.0
500x500x350	20x20x14	370	480	110	356	436	80	97.0
500x500x400	20x20x16	370	480	110	356	466	110	107.0
500x500x450	20x20x18	370	480	110	365	475	110	102.0
600x600x300	24x24x12	434	544	110	405	485	80	112.0
600x600x350	24x24x14	434	544	110	406	486	80	123.0
600x600x400	24x24x16	434	544	110	406	516	110	126.0
600x600x450	24x24x18	434	544	110	428	538	110	130.0
600x600x500	24x24x20	434	544	110	428	540	110	137.0

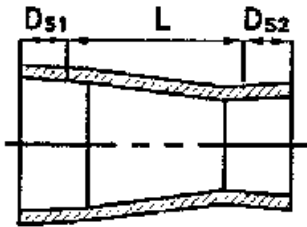
## Reducing Tees (cont.)



Nominal Pipe Size		Laying Length half run	Overall Length half run	Insertion Depth run	Laying Length branch	Overall Length branch	Insertion Depth branch	Weight
run x run x branch		L <sub>1</sub>	OL <sub>1</sub>	Ds <sub>1</sub>	L <sub>2</sub>	OL <sub>2</sub>	Ds <sub>2</sub>	
mm	inch	mm	mm	mm	mm	mm	mm	kg
700x700x350	28x28x14	497	637	140	475	555	80	202
700x700x400	28x28x16	497	637	140	483	593	110	207
700x700x450	28x28x18	497	637	140	483	593	110	209
700x700x500	28x28x20	497	637	140	491	601	110	212
700x700x600	28x28x24	497	637	140	491	601	110	217
750x750x400	30x30x16	523	663	140	501	611	110	245
750x750x450	30x30x18	523	663	140	509	619	110	247
750x750x500	30x30x20	523	663	140	509	619	110	250
750x750x600	30x30x24	523	663	140	517	627	110	256
750x750x700	30x30x28	523	663	140	517	657	140	268
800x800x400	32x32x16	559	729	170	537	647	110	303
800x800x450	32x32x18	559	729	170	537	647	110	306
800x800x500	32x32x20	559	729	170	545	655	110	309
800x800x600	32x32x24	559	729	170	545	655	110	315
800x800x700	32x32x28	559	729	170	553	693	140	329
800x800x750	32x32x30	559	729	170	553	693	140	332
900x900x450	36x36x18	624	824	200	603	713	110	427
900x900x500	36x36x20	624	824	200	603	713	110	430
900x900x600	36x36x24	624	824	200	611	721	110	437
900x900x700	36x36x28	624	824	200	611	751	140	452
900x900x750	36x36x30	624	824	200	618	758	140	458
900x900x800	36x36x32	624	824	200	618	788	170	468
1000x1000x500	40x40x20	691	891	200	669	779	110	570
1000x1000x600	40x40x24	691	891	200	669	779	110	578
1000x1000x700	40x40x28	691	891	200	677	817	140	596
1000x1000x750	40x40x30	691	891	200	677	817	140	601
1000x1000x800	40x40x32	691	891	200	685	855	170	614
1000x1000x900	40x40x36	691	891	200	685	885	200	632

## Concentric Reducers

### Filament-wound concentric reducers with integral Taper-Taper adhesive bonded socket ends

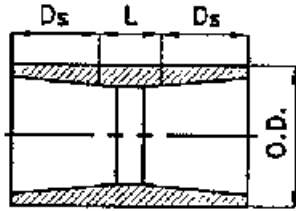


Nominal Pipe Size		Laying Length L	Overall Length OL	Overall Length Ds <sub>1</sub>	Insertion Depth Ds <sub>2</sub>	Weight
mm	inch	mm	mm	mm	mm	kg
80x50	3x2	74	174	50	50	0.8
100x50	4x2	96	196	50	50	1.1
100x80	4x3	94	194	50	50	1.3
150x80	6x3	117	217	50	50	1.5
150x100	6x4	124	224	50	50	1.8
200x100	8x4	163	293	80	50	3.3
200x150	8x6	129	259	80	50	3.7
250x150	10x6	148	278	80	50	6.2
250x200	10x8	135	295	80	80	6.2
300x200	12x8	180	340	80	80	7.8
300x250	12x10	167	327	80	80	8.5
350x250	14x10	214	374	80	80	10.2
350x300	14x12	208	368	80	80	11.0
400x300	16x12	195	385	110	80	13.7
400x350	16x14	183	373	110	80	12.8
450x400	18x16	128	348	110	110	20.0
500x400	20x16	249	469	110	110	21.0
500x450	20x18	151	371	110	110	23.0
600x400	24x16	486	706	110	110	27.0
600x450	24x18	388	608	110	110	26.0
600x500	24x20	267	487	110	110	24.0
700x400	28x16	796	1046	140	110	62.0
700x450	28x18	698	948	140	110	60.0
700x500	28x20	577	827	140	110	58.0
700x600	28x24	340	590	140	110	52.0
750x400	30x16	915	1165	140	110	74.0
750x450	30x18	817	1067	140	110	73.0
750x500	30x20	696	946	140	110	70.0
750x600	30x24	459	709	140	110	64.0
750x700	30x28	149	429	140	140	58.0
800x400	32x16	1038	1318	170	110	94.0
800x450	32x18	940	1212	170	110	92.0
800x500	32x20	819	1099	170	110	90.0
800x600	32x24	582	862	170	110	83.0
800x700	32x28	272	582	170	140	77.0
800x750	32x30	153	463	170	140	72.0
900x450	36x18	1186	1496	200	110	133.0
900x500	36x20	1065	1375	200	110	130.0
900x600	36x24	828	1138	200	110	122.0
900x700	36x28	518	858	200	140	116.0
900x750	36x30	399	739	200	140	111.0
900x800	36x32	276	646	200	170	111.0
1000x500	40x20	1313	1623	200	110	173.0
1000x600	40x24	1076	1386	200	110	165.0
1000x700	40x28	766	1106	200	140	157.0
1000x750	40x30	647	987	200	140	152.0
1000x800	40x32	524	894	200	170	152.0
1000x900	40x36	278	678	200	200	146.0

Note: Eccentric Reducers are available on request.

## Couplings

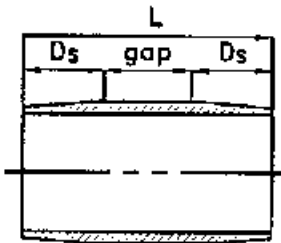
### Filament-wound couplings with integral Taper-Taper adhesive bonded socket ends



Nominal Pipe Size		Laying Length L	Overall Length OL	Insertion Depth Ds	Outside Diameter OD	Weight
mm	inch	mm	mm	mm	mm	kg
50	2	70	170	50	70	0.4
80	3	70	170	50	100	0.7
100	4	70	170	50	124	0.9
150	6	70	170	50	180	1.5
200	8	70	230	80	230	2.5
250	10	70	230	80	286	3.4
300	12	70	230	80	339	4.5
350	14	70	230	80	370	4.8
400	16	70	290	110	419	6.4
450	18	70	290	110	460	7.3
500	20	70	290	110	524	14.4
600	24	70	290	110	606	9.8
700	28	70	350	140	734	16.3
750	30	70	350	140	783	16.6
800	32	70	410	170	840	27.0
900	36	70	470	200	937	29.0
1000	40	70	470	200	1038	33.0

## Nipples

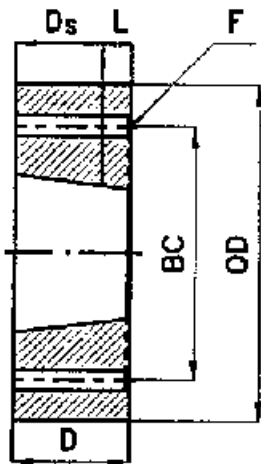
### Filament-wound pipe nipples with integral Taper-Taper adhesive bonded spigot ends



Nominal Pipe Size		Laying Length L	gap	Insertion Depth Ds	Weight
mm	inch	mm	mm	mm	kg
50	2	125	25	50	0.1
80	3	125	25	50	0.1
100	4	125	25	50	0.1
150	6	125	25	50	0.2
200	8	190	30	80	0.6
250	10	190	30	80	0.8
300	12	200	40	80	1.1
350	14	200	40	80	1.4
400	16	260	40	110	2.2
450	18	280	60	110	2.7
500	20	280	60	110	3.4
600	24	280	60	110	4.4
700	28	340	60	140	8.5
750	30	340	60	140	9.4
800	32	400	60	170	12.4
900	36	460	60	200	17.2
1000	40	460	60	200	21.0

## Heavy-Duty Flanges

### Heavy-Duty filament-wound flanges with Taper-Taper adhesive bonded socket ends



Nominal Pipe Size		Laying Length L	Overall Length D	Insertion Depth Ds <sup>1)</sup>	Weight <sup>2)</sup>
mm	inch	mm	mm	mm	kg
50	2	5	55	50	1.5
80	3	5	55	50	2.2
100	4	5	55	50	2.9
150	6	5	55	50	3.7
200	8	6	56	<b>50</b>	5.5
250	10	6	86	80	10.6
300	12	6	86	80	15.3
350	14	6	86	80	18.7
400	16	6	86	<b>80</b>	23.0
450	18	6	86	<b>80</b>	24.0
500	20	6	116	110	38.0
600	24	6	116	110	49.0
700	28	6	146	140	67.0
750	30	6	146	140	73.0
800	32	6	176	170	117.0

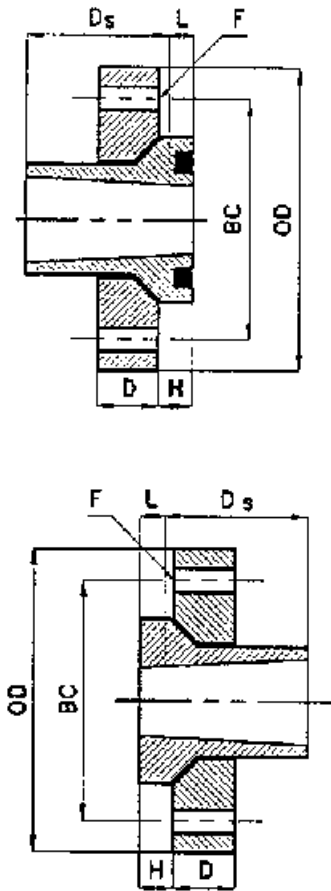
#### Notes:

- 1) Bold insertion depth for subsequent flanges deviates from other fittings.
- 2) The weights shown are for ANSI B16.5 Class 150 drilled flanges. Weights for other drilling classes may be different. For more detailed information reference is made to the appropriate product data.

- \* Heavy Duty Flanges are standard available in drillings according to ANSI and ISO (DIN).
- \*\* Full-face elastomeric gaskets may be used, suitable for the service pressure, service temperature and fluid. Shore A durometer hardness of  $60 \pm 5$  is recommended and a thickness of 3 mm.  
Compressed fibre gaskets, 3 mm thick, compatible with the pressure, temperature and medium, may also be used. The mechanical properties should be in accordance with DIN 3754 (IT 400) or equal.
- \*\*\* For maximum bolt torque refer to the appropriate Bondstrand literature. Please be aware that excessive torque may result in flange failure and, therefore a torque-wrench is required.

## Stub-end Flanges (Van Stone)

### Filament-wound Stub-end flanges with Taper-Taper adhesive bonded socket ends and steel backing rings

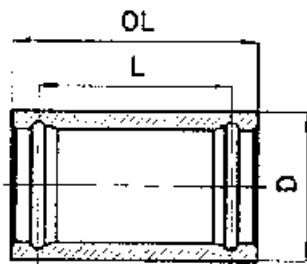
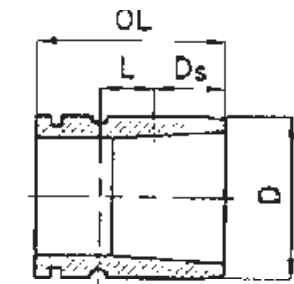


Nominal Pipe Size		Laying Length	Overall Length	Insertion Depth	Ring to Face	Weight GRE stub-end	Weight steel ring <sup>1)</sup>
mm	inch	L	OL	Ds	H	kg	kg
50	2	15	65	50	10	0.2	1.8
80	3	15	65	50	10	0.5	3.2
100	4	15	65	50	12	0.8	4.2
150	6	15	65	50	13	1.3	5.2
200	8	15	95	80	20	2.6	8.5
250	10	15	95	80	16	3.1	13.5
300	12	15	95	80	18	3.9	23.0
350	14	15	95	80	19	3.8	32.0
400	16	20	130	110	21	6.9	42.0
450	18	20	130	110	24	11.4	40.0
500	20	20	130	110	23	12.3	51.0
600	24	20	130	110	28	13.0	86.0
700	28	20	160	140	29	17.8	100.0
750	30	20	160	140	32	19.7	117.0
800	32	20	190	170	33	24.0	154.0
900	36	20	220	200	36	30.0	197.0
1000	40	20	220	200	46	35.0	303.0

#### Notes:

- 1) The weight shown is for ANSI B16.5 Class 150 drilled flanges. Weights for other drilling classes may be different. For more detailed information reference is made to the appropriate product data.
- \* Stub-End Flange Rings are standard available in drillings according to ANSI and ISO (DIN).
- \*\* Stub-End Flanges are available with and without O-ring groove in the face. Up to 10 bar stub-ends without grooves can be used with flat elastomeric or compressed fibre gaskets. For pressures 12 bar and above suitable O-ring seals should be used, available on request.
- \*\*\* Make sure that the O-ring grooved stub-end is compatible with its counter flange, e.g. use a stub-end without groove or another flat surface flange as counter flange.
- \*\*\*\* Maximum bolt-torque for use with O-rings seals may be calculated based on pressure, size and number of bolts. If using flat face gaskets (maximum pressure 10 bar) refer to the appropriate Bondstrand literature for hubbed flanges.

## Key-lock Adapters & Couplings



### Filament wound adapters and couplings with Key-lock ends.

Nominal Pipe Size		Qty of Keys	Laying Length L	Overall Length OL	Insertion Depth Ds	Weight	Laying Length L	Overall Length OL	Weight	
mm	inch									mm
<b>adapter KLM x TBF</b>							<b>coupling KLF x KLF</b>			
50	2	1	5	100	50	0.3	100	140	0.8	
80	3	1	5	100	50	0.5	100	140	1.0	
100	4	1	5	100	50	0.7	100	140	2.2	
150	6	1	4	110	50	1.0	127	181	4.3	
200	8	1	2	150	80	1.9	152	225	6.3	
250	10	1	3	155	80	2.7	163	242	9.6	
300	12	1	5	170	80	4.0	186	278	11.6	
350	14	1	13	180	80	6.4	191	289	15.8	
400	16	1	15	215	110	8.2	197	302	21.0	
450	18	1	16	220	110	11.5	204	296	17.8	
500	20	1	33	240	110	13.9	210	308	22.0	
600	24	1	34	250	110	16.9	229	340	31.0	
700	28	2	119	385	140	34.0	277	547	65.0	
750	30	2	118	385	140	34.0	279	558	83.0	
800	32	2	130	445	170	49.0	315	629	105.0	
900	36	2	147	515	200	67.0	356	737	154.0	
1000	40	2	122	475	200	68.0	330	724	103.0	

## Field Testing

Pipe system is designed for field testing with water at 150% of rated pressure.

## Surge Pressure

Maximum allowable surge pressure is 150% of rated pressure.

## Conversions

1 psi	= 6895 Pa	= 0.07031 kg/cm <sup>2</sup>	
1 bar	= 105Pa	= 14.5 psi	= 1.02 kg/cm <sup>2</sup>
1 MPa	= 1 N/mm <sup>2</sup>	= 145 psi	= 10.2 kg/cm <sup>2</sup>
1 inch	= 25.4 mm		
1 Btu.in/ft <sup>2</sup> h°F	= 0.1442 W/mK		
C	= 5/9 (°F-32)		

## Important Notice

This product literature and the recommendations for usage it contains are based on test data reasonably believed to be reliable. It is intended that this literature be used by personnel having specialised training in accordance with currently accepted industry practice and normal operating conditions. Variation in environment, changes in operating procedures, or extrapolation of data may cause unsatisfactory results. We recommend that your engineers verify the suitability of this product for your intended application. Since we have no control over the conditions of service, we expressly disclaim responsibility for the results obtained or for any consequential or incidental damages of any kind incurred.



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