

Fabco GR-KOR® Pressure Pipe

FABCO's Fiberglass Reinforced Plastic (FRP) laminates are manufactured with thermosetting polyester or vinylester resins and various types of glass fibre reinforcing. Materials are carefully selected for each specific application. The fiberglass reinforcement is thoroughly saturated with catalyzed resin to form a dense laminate with the required physical and chemical resistant properties. In general, the glass reinforcing provides the strength to the laminate and the resin binder provides the chemical resistance. All laminates are designed to meet the specific application requirements.



LAMINATE CONSTRUCTION

FABCO manufactures FRP pipe and fitting laminates with a variety of liner and structural wall constructions. In order to achieve optimum chemical resistance, all laminates are composed of an **Inner Surface**, an **Interior Layer**, a **Structural Layer** and an **Outer Surface Layer**. The combination of Inner Surface and Interior Layer is often referred to as the **Liner** or **Corrosion Barrier** and is generally considered to contribute structural strength as well as corrosion resistance to the laminate.

Inner Surface - This surface is exposed to the corrosive environment and is composed of resin reinforced with "C" glass veil or a synthetic veil such as Nexus®. This layer is 10 to 20 mils thick and has approximate 90/10 resin to glass ratio by weight for maximum corrosion resistance.

Interior Layer - This portion of the laminate is composed of multiple layers of chopped strand fiberglass reinforcement. Standard construction utilizes two layers of 1-1/2 ounce per square foot chopped strand fiberglass saturated with resin and produces a thickness of 85 to 95 mils with 22% to 32% glass content. Aggressive environments may dictate the use of more than the standard two layers. Liner thicknesses of 180 to 250 mils are often used in bleach towers, chlorine headers and other environments where chemical attack is anticipated. In these situations, a portion of the liner should be considered sacrificial and non-structural.

Structural Layer - This layer is the primary structural portion of the laminate and is designed to withstand the loads caused by pressure, wind, seismic and other conditions. It consists of alternating layers of chopped strand and 24 ounce per square yard woven roving to the required thickness. The glass content in these layers will be 30-45% depending on the amount of woven roving used. This layer may also be composed of filament

wound continuous strand fiberglass reinforcement which is typically helically wound onto the mandrel and has a glass content of 55-70% by weight.

Outer Surface Layer - This surface is a resin coating formulated to be non air-inhibited and fully cured. When exposed to the environment, this coating contains ultraviolet absorbers or pigments to minimize ultraviolet degradation. If the outer surface of a laminate is to be exposed to a corrosive environment, a veil layer or a chopped strand layer may be added over the structural layer for exterior protection. The outer surface can be pigmented for colour designation if required.

MANUFACTURING METHODS FRP PIPING

FABCO offers two standard types of FRP laminate construction for piping systems. **Filament Wound**, and **Contact Molded** (hand lay up).



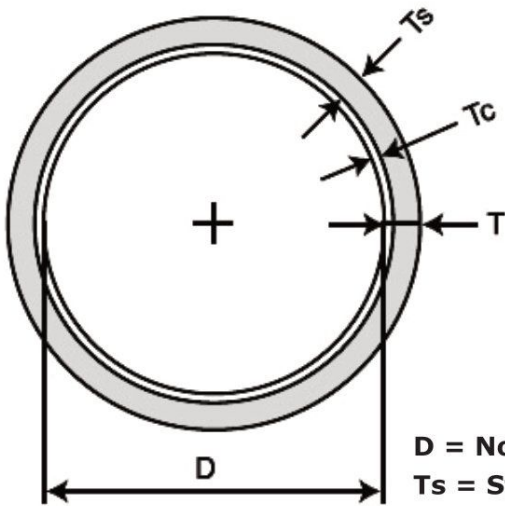
Filament Wound Construction - This process utilizes continuous glass strand roving that is pre-saturated in a resin bath and is then helically wound around a rotating mandrel at a specified winding angle. The winding process is continued in bi-directional layers until the desired wall thickness is achieved. FABCO's pressure piping is made with a 54 3/4° winding angle, which provides the theoretical optimum 2 to 1 hoop to axial strength ratio required for pressure piping. Vacuum piping will normally be wound at greater winding angles, such as 65°, to increase the hoop strength.



Contact Molded Construction - This method of laminate construction uses multiple layers of fiberglass chopped strand, woven roving and non-woven glass fabrics saturated with resin and built up to the desired thickness. Each glass layer is layed on the mold and resin is applied. Hand pressure rolling saturates the glass and removes entrapped air to provide a strong, dense laminate. Physical properties will vary with the amount of woven roving, unidirectional roving and/or fabric used.

FRP Pressure Pipe

Technical Information

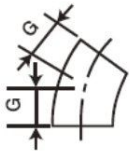


Fabco GR-Kor® FRP Spooled Piping Components

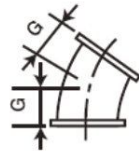
D = Nominal Inside Diameter
Ts = Structural Wall Thickness
Tc = Corrosion Liner
T (Total) = Tc + Ts

NOMINAL PIPE SIZE		LINER THICKNESS		HAND LAY UP						FILAMENT WOUND					
				T (TOTAL)				T (TOTAL)							
D		Tc		75 PSI		100 PSI		150 PSI		75 PSI		100 PSI		150 PSI	
IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM
1/2	15	0.1	2.54	0.187	4.75	0.187	4.75	0.187	4.75						
3/4	20	0.1	2.54	0.187	4.75	0.187	4.75	0.187	4.75						
1	25	0.1	2.54	0.187	4.75	0.187	4.75	0.187	4.75						
1-1/4	32	0.1	2.54	0.187	4.75	0.187	4.75	0.187	4.75						
1-1/2	40	0.1	2.54	0.187	4.75	0.187	4.75	0.187	4.75						
2	50	0.1	2.54	0.187	4.75	0.187	4.75	0.187	4.75						
2-1/2	65	0.1	2.54	0.187	4.75	0.187	4.75	0.25	6.35						
3	90	0.1	2.54	0.187	4.75	0.187	4.75	0.25	6.35						
4	100	0.1	2.54	0.187	4.75	0.25	6.35	0.25	6.35	0.19	4.83	0.19	4.83	0.19	4.83
5	125	0.1	2.54	0.25	6.35	0.25	6.35	0.375	9.53	0.19	4.83	0.19	4.83	0.19	4.83
6	150	0.1	2.54	0.25	6.35	0.25	6.35	0.375	9.53	0.19	4.83	0.19	4.83	0.19	4.83
8	200	0.1	2.54	0.25	6.35	0.313	7.95	0.438	11.13	0.19	4.83	0.24	6.1	0.28	7.11
10	250	0.1	2.54	0.313	7.95	0.375	9.53	0.5	12.7	0.24	6.1	0.24	6.1	0.28	7.11
12	315	0.1	2.54	0.375	9.53	0.438	11.13	0.625	15.88	0.24	6.1	0.28	7.11	0.33	8.38
14	355	0.1	2.54	0.375	9.53	0.5	12.7	0.75	19.05	0.24	6.1	0.28	7.11	0.37	9.4
16	400	0.1	2.54	0.438	11.13	0.563	14.3	0.813	20.65	0.28	7.11	0.28	7.11	0.42	10.67
18	450	0.1	2.54	0.5	12.7	0.625	15.88	0.938	23.83	0.28	7.11	0.33	8.38	0.46	11.68
20	500	0.1	2.54	0.5	12.7	0.688	17.48	1	25.4	0.28	7.11	0.33	8.38	0.46	11.68
24	600	0.1	2.54	0.625	15.88	0.813	20.65	1.25	31.75	0.33	8.38	0.42	10.67	0.55	13.97
26	650	0.1	2.54	0.688	17.48	0.875	22.22	1.313	33.35	0.33	8.38	0.42	10.67	0.6	15.24
28	700	0.1	2.54	0.75	19.05	0.938	23.83	1.438	36.51	0.37	9.4	0.46	11.68	0.64	16.25
30	755	0.1	2.54	0.75	19.05	1	25.4	1.5	38.1	0.42	10.67	0.46	11.68	0.64	16.25
32	810	0.1	2.54	0.813	20.65	1.063	27	1.625	41.27	0.42	10.67	0.5	12.7	0.68	17.27
34	860	0.1	2.54	0.875	22.22	1.125	28.58	1.75	44.45	0.42	10.67	0.5	12.7	0.73	18.54
36	910	0.1	2.54	0.938	23.83	1.25	31.75	1.813	46.05	0.46	11.68	0.55	13.97	0.78	19.81
38	960	0.1	2.54	1	25.4	1.313	33.35	1.937	49.2	0.46	11.68	0.55	13.97	0.78	19.81
42	1050	0.1	2.54	1.063	27	1.438	36.51	2.125	53.97	0.5	12.7	0.6	15.24	0.86	21.84

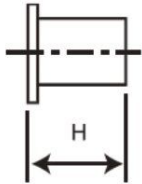
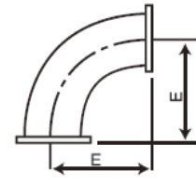
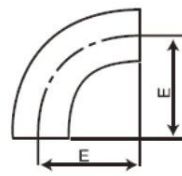
Fabco GR-KOR® FRP Piping Components



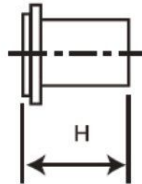
45° ELBOW



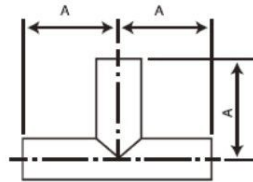
90° ELBOW



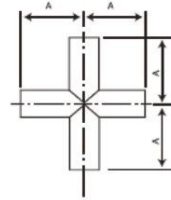
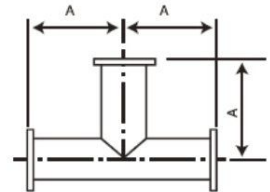
STUB FLG.



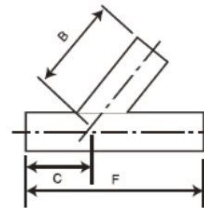
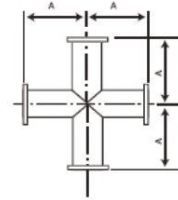
VANSTONE FLG.



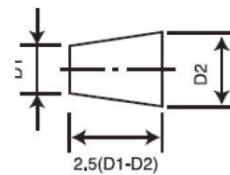
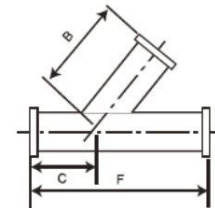
TEE



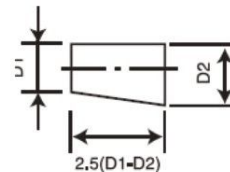
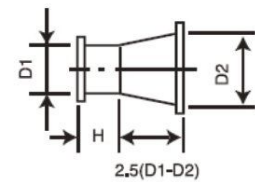
CROSS



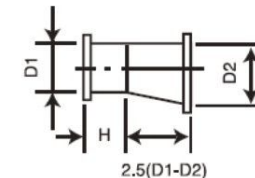
45° LATERAL



CONCENTRIC REDUCERS



ECCENTRIC REDUCERS



DIMENSIONS (INCHES)

D	A	B	C	E	F	G	H
1	3	8	6	1-3/4	14	3/4	6
1-1/2	4	10	6	2-1/2	16	1	6
2	6	10	6	4	16	1-5/8	6
3	7	12	6	6	18	2-1/2	6
4	8	14	6	6	20	2-1/2	6
6	10	16	8	9	24	3-3/4	8
8	12	20	10	12	30	5	8
10	14	24	10	15	34	6-1/4	10
12	16	26	12	18	33	7-1/2	10
14	18	30	12	21	42	8-3/4	12
16	20	32	14	24	46	10	12
18	21	36	14	27	50	11-1/4	12
20	22	38	16	30	54	12-1/2	12
24	24	42	18	36	60	15	12
26	26	46	18	39	64	16-1/4	15
28	28	48	20	42	68	17-1/2	15
30	30	52	20	45	72	18-5/8	15
32	31	54	20	48	76	20	15
34	32	58	22	51	80	21-1/4	15
36	33	62	22	54	84	22-1/2	15
38	34	64	22	57	88	23-1/4	15
42	36	72	24	63	96	26	15

STUB FLANGES

Adapted from American Standard for Stub Ends, B-16.9-1958

ELBOWS

Adapted from American Standard Steel Butt Weld Fittings B-16.9-1958. (Long Radius Elbows)

Exceptions are 2", & 3" Elbows where E=2XD

45° ELBOWS

1 1/2", 2", 3", 4" Sizes cannot be Flanged

* FLANGE DRILLING PATTERNS AVAILABLE

- ANSI B16.5 150 LBS.
- JIS 10K
- DIN 2051 PN10

