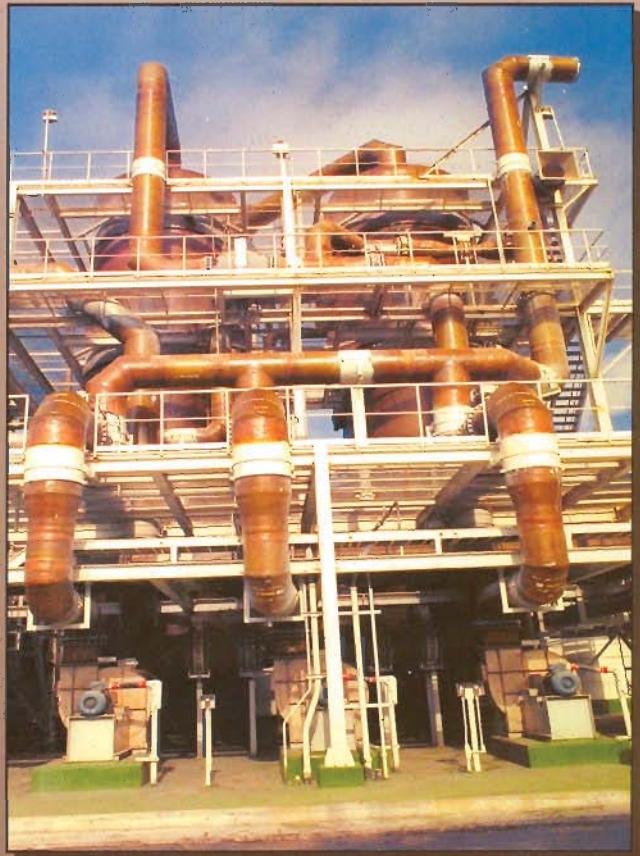


www.serviceprocess.net
Service Process Equipment, Inc.
PO Box 850908
Mobile AL 36685-0908
251.342.1313 Fax 251.342.1377
Email msellers@serviceprocess.net

High Quality Plastic **PIPING SYSTEMS**



**FABRICATED
PLASTICS** LIMITED

FABRICATED PLASTICS LIMITED

QUALITY ENGINEERED CORROSION & ABRASION RESISTANT PIPING SYSTEMS
FOR AGGRESSIVE CHEMICAL SERVICE

Only FABRICATED PLASTICS LIMITED offers industry a full spectrum of corrosion & abrasion resistant Plastic Piping Systems, specifically designed for a wide range of aggressive chemical service conditions. We offer a variety of materials of construction, from Solid FRP, to dual laminate Thermoplastic-Lined FRP (which we call ARMOURPLASTICS®).

Since no two applications are ever identical, the FABCO approach is to design and fabricate the Pipe System to suit the unique operating conditions specified, selecting the material of construction and establishing the design criteria, accordingly. Other aspects of the Piping System Design can also be provided by FABCO's System Designers, such as full-vacuum design, support locations, anchor locations, expansion and contraction, high pressure, earth loading, among others, on a case by case basis.

FABCO Piping Systems can be supplied as Spooled Piping, or as Loose Pipe & Fittings, to be assembled in the field.

FABCO's "Engineered" approach, combined with our "Shop-Spooling" capabilities, provides the end-user with a Piping System, supplied as either pre-assembled sections, minimizing flanged, or other types of mechanical connections and their inherent maintenance problems, or as piping components, produced for field assembly.

As well as the variety of Thermoplastic Liner Options, FABCO offers a special "Abrasion-Resistant" FRP Piping System, employing special fillers added to the resin matrix used in the corrosion barrier, which enables the pipe and fittings to withstand the effects of slurries, or other solid-laden service conditions, while still providing exceptional corrosion resistance. In the presence of plastic pipe assembly capabilities each of the FABCO Piping Systems can be designed to allow the end-user, or their chosen contractor, to perform the assembly of components themselves. FABCO offers a complete training service for such circumstances, and can supplement this with on-site supervision of the field assembly process.

MATERIALS OF CONSTRUCTION

GR-KOR®

FABRICATED PLASTICS LIMITED's Fiberglass Reinforced Plastic (FRP) Process Piping Systems incorporate the use of High Quality Polyester and Vinylester Resins, specifically selected and employed for Your Particular Service Conditions. Fabricated in pressure ratings from 25 to 150 psi.

GRAYKOR®

Our PVC-Lined FRP Piping System utilizes a PVC Liner externally armoured with an FRP Structural Laminate. FABRICATED PLASTICS LIMITED has developed a System to ensure the FRP Laminate is Bonded to the PVC Liner. Joining of the Liner can be by Solvent Cementing, or Butt-Fusion. Fabricated in pressure ratings from 25 to 150 psi.

ORANGEKOR®

Our CPVC-Lined FRP Piping System utilizes a CPVC Liner externally armoured with an FRP Structural Laminate. FABRICATED PLASTICS LIMITED has developed a System to ensure the FRP Laminate is Bonded to the CPVC Liner. Joining of the Liner can be by Solvent Cementing. Fabricated in pressure ratings from 25 to 150 psi.

KEMKOR®

Our PVDF-Lined FRP Piping System utilizes a PVDF Liner externally armoured with an FRP Structural Laminate. The PVDF Liner is externally treated to ensure the FRP Laminate is Bonded to the Liner. Joining of the Liner is performed by Butt-Fusion. Fabricated in pressure ratings from 25 to 150 psi.

BLUEKOR®

Our Polypropylene-Lined FRP Piping System utilizes a Polypropylene Liner externally armoured with an FRP Structural Laminate. The Polypropylene Liner has a Glass Fabric embedded into its exterior surface to ensure the FRP Laminate is Bonded to the Liner. Joining of the Liner is performed by Butt-Fusion. Fabricated in pressure ratings from 25 to 150 psi.

HALINE®

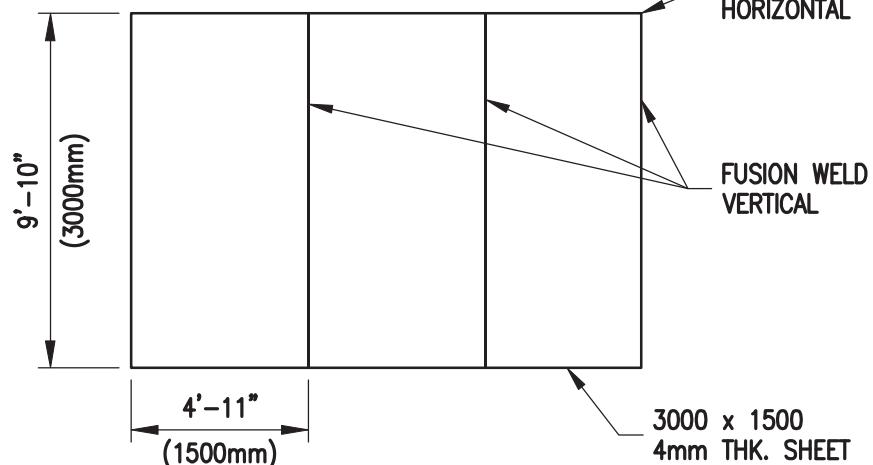
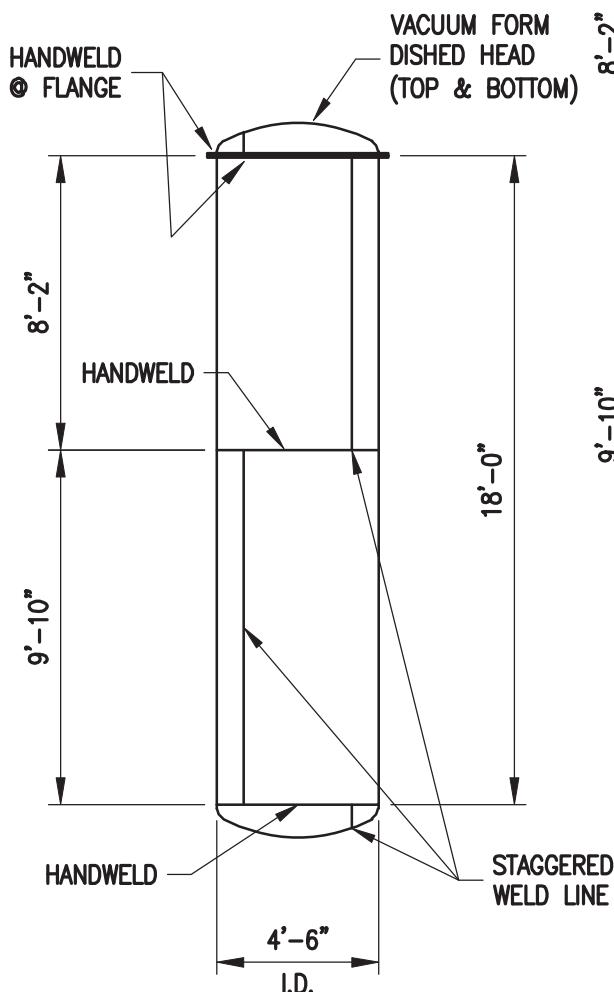
Our Fluoropolymer-Lined FRP Piping System utilizes a Fluoropolymer Liner externally wrapped with an FRP Structural Laminate. The Fluoropolymer Liner has a Glass Fabric embedded into its exterior surface to ensure the FRP Laminate is Bonded to the Liner. Fabricated in pressure ratings from 25 to 150 psi.

TEFLINE®

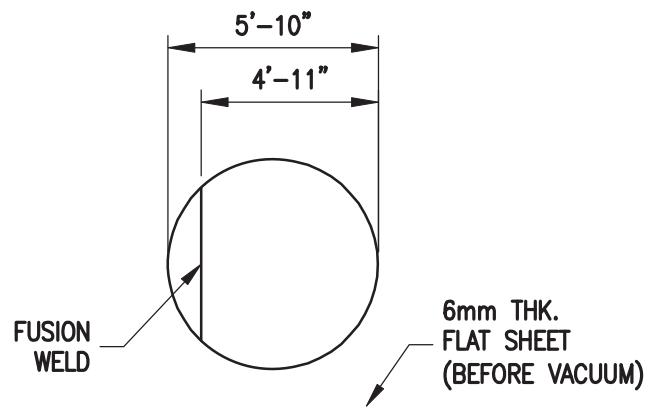


14'-1⁵" (4'-6"Ø)

CIRCUMFERENCE



TANK SHELL



4'-6" DIA. VACUUM FORMED DISHED TOP

DRAWN BY	LR
CHECKED BY	
APPROVED BY	
DATE	28 APRIL 2010
SCALE	3/18" : 1'-0"
REFERENCE	P.O. No. QUOTE NO. 10-0163



FABRICATED PLASTICS LIMITED

2175 Teston Road, Maple (Toronto), Ontario, CANADA L6A-1T3

TITLE

WELD MAP FOR FUSION AND HAND WELD

DWG. No.

SK-701-A

REV.
0

GR-KOR FRP PRESSURE PIPE

FABCO's Fiberglass Reinforced Plastic (FRP) laminates are manufactured with thermosetting polyester or vinyl ester 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 laid 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.

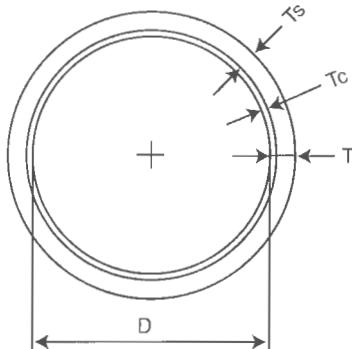


FABCO GR-KOR® FRP PRESSURE PIPE

GR-KOR® FRP PRESSURE PIPE / TECHNICAL INFORMATION



Fabco GR-Kor® FRP Spooled Piping Components



D = Nominal Inside Diameter

Ts = Structural Wall Thickness

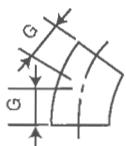
Tc = Corrosion Liner

T (Total) = Tc + Ts

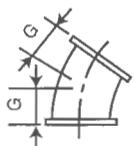
NOMINAL		LINER		HAND LAY UP								FILAMENT WOUND							
PIPE		Tc		T (Total)								T (Total)							
SIZE D1		THICKNESS		75 PSI		100 PSI		150 PSI		75 PSI		100 PSI		150 PSI					
IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM
1/2	15	0.100	2.54	0.187	4.75	0.187	4.75	0.187	4.75										
3/4	20	0.100	2.54	0.187	4.75	0.187	4.75	0.187	4.75										
1	25	0.100	2.54	0.187	4.75	0.187	4.75	0.187	4.75										
1 1/4	32	0.100	2.54	0.187	4.75	0.187	4.75	0.187	4.75										
1 1/2	40	0.100	2.54	0.187	4.75	0.187	4.75	0.187	4.75										
2	50	0.100	2.54	0.187	4.75	0.187	4.75	0.187	4.75										
2 1/2	65	0.100	2.54	0.187	4.75	0.187	4.75	0.250	6.35										
3	90	0.100	2.54	0.187	4.75	0.187	4.75	0.250	6.35										
4	100	0.100	2.54	0.187	4.75	0.250	6.35	0.250	6.35	0.19	4.83	0.19	4.83	0.19	4.83				
5	125	0.100	2.54	0.250	6.35	0.250	6.35	0.375	9.53	0.19	4.83	0.19	4.83	0.19	4.83				
6	150	0.100	2.54	0.250	6.35	0.250	6.35	0.375	9.53	0.19	4.83	0.19	4.83	0.19	4.83				
8	200	0.100	2.54	0.250	6.35	0.313	7.95	0.438	11.13	0.19	4.83	0.24	6.10	0.24	6.10	0.28	7.11		
10	250	0.100	2.54	0.313	7.95	0.375	9.53	0.500	12.70	0.24	6.10	0.24	6.10	0.28	6.10	0.28	7.11		
12	315	0.100	2.54	0.375	9.53	0.438	11.13	0.625	15.88	0.24	6.10	0.26	7.11	0.33	8.38	0.46	11.68		
14	355	0.100	2.54	0.375	9.53	0.500	12.70	0.750	19.05	0.24	6.10	0.28	7.11	0.37	9.40				
16	400	0.100	2.54	0.438	11.13	0.563	14.30	0.813	20.65	0.28	7.11	0.28	7.11	0.42	10.67				
18	450	0.100	2.54	0.500	12.70	0.625	15.88	0.938	23.83	0.28	7.11	0.33	8.38	0.46	11.68				
20	500	0.100	2.54	0.500	12.70	0.688	17.48	1.125	22.22	1.313	33.35	0.33	8.38	0.42	10.67	0.55	13.97		
24	600	0.100	2.54	0.625	15.88	0.813	20.65	1.250	31.75	0.33	8.38	0.42	10.67	0.60	15.24				
26	650	0.100	2.54	0.688	17.48	0.875	22.22	1.313	33.35	0.33	8.38	0.42	10.67	0.60	15.24				
28	700	0.100	2.54	0.750	19.05	0.938	23.83	1.438	36.51	0.37	9.40	0.46	11.68	0.64	16.25				
30	755	0.100	2.54	0.750	19.05	1.000	25.40	1.500	38.10	0.42	10.67	0.46	11.68	0.64	16.25				
32	810	0.100	2.54	0.813	20.65	1.063	27.00	1.625	41.27	0.42	10.67	0.50	12.70	0.68	17.27				
34	860	0.100	2.54	0.875	22.22	1.125	28.58	1.750	44.45	0.42	10.67	0.50	12.70	0.73	18.54				
36	910	0.100	2.54	0.938	23.83	1.250	31.75	1.813	46.05	0.46	11.68	0.55	13.97	0.78	19.81				
38	960	0.100	2.54	1.000	25.40	1.313	33.35	1.937	49.20	0.46	11.68	0.55	13.97	0.78	19.81				
42	1050	0.100	2.54	1.063	27.00	1.438	36.51	2.125	53.97	0.50	12.70	0.60	15.24	0.86	21.84				



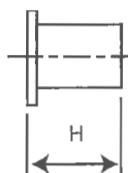
FABCO GR-KOR®, FRP PIPING COMPONENTS



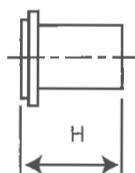
45° ELBOW



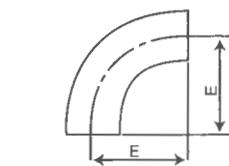
90° ELBOW



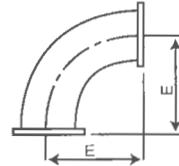
STUB FLG.



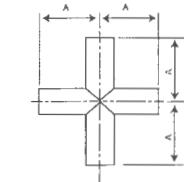
VANSTONE FLG.



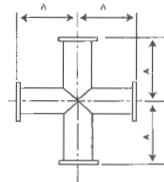
TEE



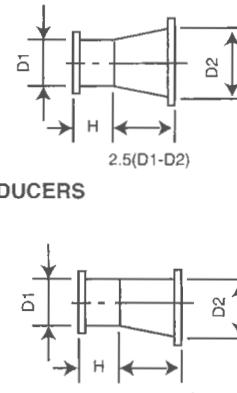
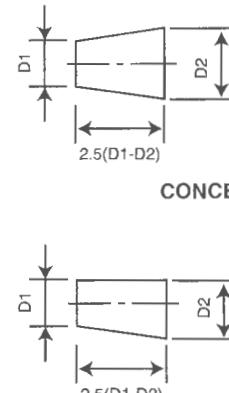
CROSS



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



ARMOURPLASTICS® - THERMOPLASTIC LINED FRP PIPING

Fabricated Plastic's Armourplastics® are manufactured with machine made thermoplastic liners which are chemically / mechanically bonded to structural over wrap. Liner materials are carefully selected for each specific application.

Thermoplastic liner materials are machine made, offering a corrosion liner that is homogeneous, uniform in thickness and having proven mechanical properties. The thermoplastic liner when properly bonded to the FRP armouring creates a dual laminate that exhibits the best properties of both materials combined in the Armourplastic®.

ARMOURPLASTIC® CONSTRUCTION

Fabricated Plastics manufactures **Armourplastics®** pipe and fittings with a variety of liner and structural wall construction.

Inner Liner Surface – The liner most suitable for the chemical service is selected, **Fabricated Plastics** offers:

GrayKor®	- PVC-U	(Unplasticized Polyvinyl Chloride)
GrayKor®-L	- PVC-U-L	(Unplasticized low calcium Polyvinyl Chloride)
GrayKor®-R	- PVC-U	(Unplasticized Polyvinyl Chloride)
OrangeKor®	- CPVC/PVC-C	(Chlorinated Polyvinyl Chloride)
BlueKor®	- PP	(Polypropylene)
KemKor®	- PVDF	(Polyvinylidene-Fluoride)
Haline®	- ECTFE	(Ethylene Chlorotrifluoroethylene)
Tefline®-E	- ETFE	(Ethylene Tetrafluoroethylene)
Tefline®-F	- FEP	(Fluorinated Ethylene Propylene)
Tefline®-P	- PFA	(Perfluoralkoxy)
Tefline®-M	- MFA	(Tetrafluoroethylene – Perfluoro Methyl Vinylether)

as liner materials. Each liner is specifically treated chemically or mechanically prior to FRP armouring. Liner thickness is **not** taken into consideration for structural requirements of the Armourplastic® system.

Structural Layers – 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

Fabricated Plastics offers two standard types of FRP laminate construction as over wrap for thermoplastic piping systems. **Filament Wound**, and **Contact Molded** (hand lay up).

Liner Preparation – The Thermoplastic liner undergoes various surface preparations dependent on the liner material.

- i) **GrayKor® PVC, GrayKor®-L PVC-L, GrayKor®-R PVC and OrangeKor® CPVC** liner is cleaned, abraded and a proprietary bonding resin is applied to achieve a chemical bond between the thermoplastic (PVC /CPVC) and the FRP.
- ii) **BlueKor® Polypropylene** liner is cleaned and a bonding cloth is mechanically embedded into the surface under controlled heat conditions. Proprietary bonding resin is applied to achieve a mechanical bond between the thermoplastic and the FRP.
- iii) **KemKor® PVDF** liner is chemically etched, cleaned and proprietary bonding resin is applied to achieve a chemical bond between the PVDF and the FRP.
- iv) **Haline® ECTFE, Tefline®-P PFA, Tefline®-F FEP, Tefline®-M MFA, Tefline®-E ETFE** liner is cleaned and a bonding cloth is mechanically embedded into the surface under controlled heat conditions. Proprietary bonding resin is applied to achieve a mechanical bond between the thermoplastic and FRP.

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. Fabricated Plastics' 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.



PHYSICAL PROPERTIES OF THERMOPLASTICS PIPING

TYPICAL THERMOPLASTIC PROPERTIES

	BLUEKOR® PP		GRAYKOR® PVC-U	ORANGEKOR® CPVC	KEMKOR® PVDF		HALINE® ECTFE	TEFLINE®-E ETFE	TEFLINE®-F FEP	TEFLINE®-M MFA	TEFLINE®-P PFA	
	Homopolymer	Copolymer (Unfilled)			PVC-U	CPVC						
	Density, g/cm³	0.91	0.88-0.91	1.38	1.5	1.75-1.79	1.76-1.79	1.68	1.7	2.12-2.17	2.12-2.17	2.12-2.17
Mechanical Properties												
Tensile break strength (ASTM D638), MPa	31 - 41	27.6-38.0	41-52	47-62	31-48	24-41	46-54	45	19-21	28-36	28-31	
Tensile break strength (ASTM D638), ksi	4.5-6.0	4.0-5.5	6.0-7.5	...	4.5-7.0	3.5-6.0	6.6-7.8	6.5	2.7-3.1	3.5-4.42	4.0-4.5	
Tensile modulus (ASTM D638), MPa	1139-1553	897-1242	2415-4140	2353-3278	1380-5520	...	1656	828	345	440	483	
Tensile modulus (ASTM D638), ksi	165-225	130-180	350-600	341-475	200-800	...	240	120	50	64	70	
Elongation (ASTM D638), %	100-600	200-500	40-80	4-100	12-600	...	200-300	100-400	250-330	300-600	300	
Yield strength (ASTM D638), MPa	31-37	20.7-29.7	41-45	41-55	20-57	20-38	31-34	49	14	
Yield strength (ASTM D638), ksi	4.5-5.4	3.0-4.3	5.9-6.5	6-8	2.9-8.3	2.9-5.5	4.5-4.9	7.1	2.1	
Thermal Properties												
HDT at 0.46 MPa (ASTM D648), °C	107-121	54-60	57	102-119	132-150	93-110	90	104	70	63	75	
HDT at 66 psi (ASTM D648), °F	225-250	130-140	158	215-247	270-300	200-230	194	220	158	145	166	
Linear coefficient of expansion (ASTM D696) per °C x10-5	14.6-18.0	12.2-17.1	5.0-10.0	11.2-14.0	12.6-25.6	...	14.4	10.6	8-11	12-16	25-38	
Linear coefficient of expansion (ASTM D696) per °F x10-5	8.1-10	6.8-9.5	2.7-5.6	6.2-7.8	7.0-14.2	...	8	5.9	14-21	
Thermal Conductivity (ASTM C177), W/m-K	0.1	0.16	0.16-0.18	0.12	0.09-0.11	0.16	0.14	0.2	0.21	0.2	0.21	
Thermal Conductivity (ASTM C177), BTU/ft²-hr°F/in.	0.7	1.1	1.1-1.23	0.81	0.59-0.76	1.11	0.97	1.4	1.48	1.41	1.48	

* GENERAL NOTE: Properties are at room temperature unless otherwise stated. Properties are typical values and are not to be used for design purposes.

PIPE LINER MATERIALS AND SERVICE CONDITIONS

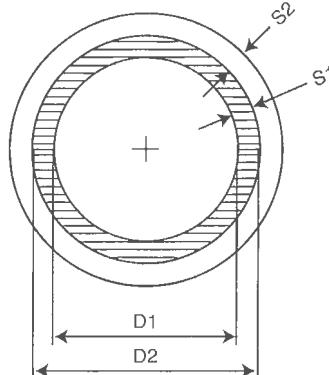
Liner Material Designation	ASTM Material Specifications	Liner Colour	Backing Material	Installation Method	Liner Joining Methods	Maximum Operating Temperature* °F	Maximum Operating Temperature* °C
GreyKor® PVC-U PVC-I. PVC-R	D 1784 Cell 12454, D 1593, D 1927, D 2241, and D 1785	Dark Grey Dark Grey Red	None	Chemical Bond	Solvent cement or Butt Fusion	170°F	77°C
OrangeKor® CPVC PVC-C	D 1784 Cell 23447B	Dark Grey Light Grey	None	Chemical Bond	Solvent cement or Butt Fusion	210°F	99°C
BlueKor® PP	D 4101 Group 1, Class 1, Grade 1 or Group 2, Class 1, Grade 1	Tan /Grey	Glass	Mechanical Bond	Butt Fusion	220°F	105°C
KemKor® PVDF	D 3222	Natural White	None/Glass	Chemical/ Mechanical Bond	Butt Fusion	220°F	105°C
Haline® ECTFE	D 3275	Natural Beige	Glass	Mechanical Bond	Butt Fusion	250°F	121°C
Tefline®-E ETFE	D 3159	Clear (Translucent)	Glass	Mechanical Bond	Butt Fusion	250°F	121°C
Tefline®-F FEP	D 3368	Clear (Translucent)	Glass	Mechanical Bond	Butt Fusion	250°F	121°C
Tefline®-F FEP	D 3368	Clear (Translucent)	None	Loose /Unbonded	Butt Fusion	250°F	121°C
Tefline®-P PFA	F 3307	Clear (Translucent)	Glass	Mechanical Bond	Butt Fusion	250°F	121°C
Tefline®-M MFA	None	Clear (Translucent)	Glass	Mechanical Bond	Butt Fusion	250°F	121°C

*OPERATING TEMPERATURE IS USUALLY DICTATED BY THE FRP RESIN'S MAXIMUM SERVICE.



FABCO ARMOURPLASTICS® PIPE (THERMOPLASTIC LINED FRP PIPE)

FABCO ARMOURPLASTICS® PIPE (THERMOPLASTIC LINED FRP PIPE)



S1 - Liner Wall Thickness

S2 - FRP Wall Thickness

D1 - Pipe Nominal Inside Diameter

D2 - Outside Diamater of Liner

Nominal Pipe Size	GRAYKOR PVC LINED								ORANGEKOR CPVC LINED									
	D2		S1		D1		D2		S1		D1		D2		S1		D1	
	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM
1/2	15	0.84	21.34	0.147	3.73	0.55	13.87	0.84	21.34	0.147	3.73	0.55	13.87	0.84	21.34	0.147	3.73	0.55
3/4	20	1.05	26.67	0.154	3.91	0.74	18.85	1.05	26.67	0.154	3.91	0.74	18.85	1.05	26.67	0.154	3.91	0.74
1	25	1.32	33.40	0.179	4.55	0.96	24.31	1.32	33.40	0.179	4.55	0.96	24.31	1.32	33.40	0.179	4.55	0.96
1 1/4	32	1.66	42.16	0.191	4.85	1.28	32.46	1.66	42.16	0.191	4.85	1.28	32.46	1.66	42.16	0.191	4.85	1.28
1 1/2	40	1.90	48.26	0.200	5.08	1.50	38.10	1.90	48.26	0.200	5.08	1.50	38.10	1.90	48.26	0.200	5.08	1.50
2	50	2.38	60.33	0.218	5.54	1.94	49.25	2.38	60.33	0.218	5.54	1.94	49.25	2.38	60.33	0.218	5.54	1.94
2 1/2	65	2.88	73.03	0.276	7.01	2.32	59.00	2.88	73.03	0.276	7.01	2.32	59.00	2.88	73.03	0.276	7.01	2.32
3	90	3.50	88.90	0.216	5.49	3.07	77.93	3.50	88.90	0.216	5.49	3.07	77.93	3.50	88.90	0.216	5.49	3.07
4	100	4.50	114.30	0.237	6.02	4.03	102.26	4.50	114.30	0.237	6.02	4.03	102.26	4.50	114.30	0.237	6.02	4.03
5	125	5.56	141.30	0.273	6.93	5.02	127.43	5.56	141.30	0.273	6.93	5.02	127.43	5.56	141.30	0.273	6.93	5.02
6	150	6.63	168.28	0.297	7.54	6.03	153.19	6.63	168.28	0.297	7.54	6.03	153.19	6.63	168.28	0.297	7.54	6.03
8	200	8.63	219.08	0.341	8.66	7.94	201.75	8.63	219.08	0.341	8.66	7.94	201.75	8.63	219.08	0.341	8.66	7.94
10	250	10.75	273.05	0.387	9.83	9.98	253.39	10.75	273.05	0.387	9.83	9.98	253.39	10.75	273.05	0.387	9.83	9.98
12	315	12.75	323.85	0.187	4.75	12.38	314.35	12.75	323.85	0.187	4.75	12.38	314.35	12.75	323.85	0.187	4.75	12.38
14	355	14.00	355.60	0.187	4.75	13.63	346.10	14.00	355.60	0.187	4.75	13.63	346.10	14.00	355.60	0.187	4.75	13.63
16	400	16.00	406.40	0.187	4.75	15.63	396.90	16.00	406.40	0.187	4.75	15.63	396.90	16.00	406.40	0.187	4.75	15.63
18	450	18.00	457.20	0.187	4.75	17.63	447.70	18.00	457.20	0.187	4.75	17.63	447.70	18.00	457.20	0.187	4.75	17.63
20	500	20.00	508.00	0.219	5.56	19.56	496.87	20.00	508.00	0.219	5.56	19.56	496.87	20.00	508.00	0.219	5.56	19.56
24	600	24.00	609.60	0.250	6.35	23.50	596.90	24.00	609.60	0.250	6.35	23.50	596.90	24.00	609.60	0.250	6.35	23.50
28	700	27.95	710.00	0.472	12.00	27.01	686.00											

ON
REQUEST

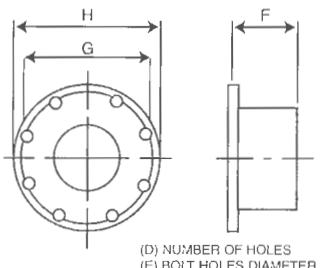
Nominal Pipe Size	HAND LAY UP S2						FILAMENT WOUND S2					
	75 PSI		100 PSI		150 PSI		75 PSI		100 PSI		150 PSI	
IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN
1/2	15	0.187	4.75	0.187	4.75	0.187	4.75					
3/4	20	0.187	4.75	0.187	4.75	0.187	4.75					
1	25	0.187	4.75	0.187	4.75	0.187	4.75					
1 1/4	32	0.187	4.75	0.187	4.75	0.187	4.75					
1 1/2	40	0.187	4.75	0.187	4.75	0.187	4.75					
2	50	0.187	4.75	0.187	4.75	0.187	4.75					
2 1/2	65	0.187	4.75	0.187	4.75	0.250	6.35					
3	90	0.187	4.75	0.187	4.75	0.250	6.35					
4	100	0.187	4.75	0.250	6.35	0.250	6.35	0.19	4.83	0.19	4.83	0.19
5	125	0.250	6.35	0.250	6.35	0.375	9.53	0.19	4.83	0.19	4.83	0.19
6	150	0.250	6.35	0.250	6.35	0.375	9.53	0.19	4.83	0.19	4.83	0.19
8	200	0.250	6.35	0.313	7.95	0.438	11.13	0.19	4.83	0.24	6.10	0.28
10	250	0.313	7.95	0.375	9.53	0.500	12.70	0.24	6.10	0.24	6.10	0.28
12	315	0.375	9.53	0.438	11.13	0.625	15.88	0.24	6.10	0.28	7.11	0.33
14	355	0.375	9.53	0.500	12.70	0.750	19.05	0.24	6.10	0.28	7.11	0.37
16	400	0.438	11.13	0.563	14.30	0.813	20.05	0.28	7.11	0.28	7.22	0.42
18	450	0.500	12.70	0.625	15.88	0.938	23.83	0.28	7.11	0.33	8.38	0.46
20	500	0.500	12.70	0.688	17.48	1.000	25.40	0.28	7.11	0.33	8.38	0.46
24	600	0.625	15.88	0.813	20.65	1.250	31.75	0.33	8.38	0.42	10.67	0.55
28	700	0.750	19.05	0.937	23.81	1.438	36.51	0.37	9.40	0.46	11.68	0.64

ON
REQUEST

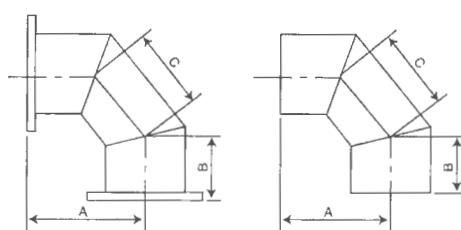


ARMOURPLASTICS®

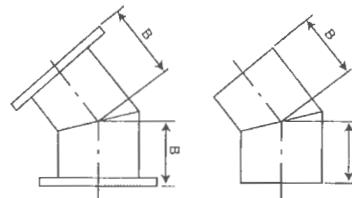
(THERMOPLASTIC LINED FRP) PIPING COMPONENTS



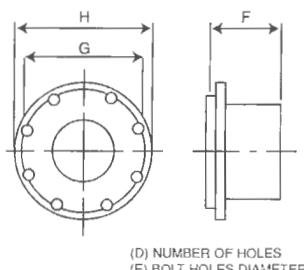
FLANGE*



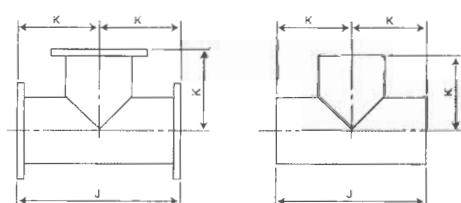
90° ELBOW



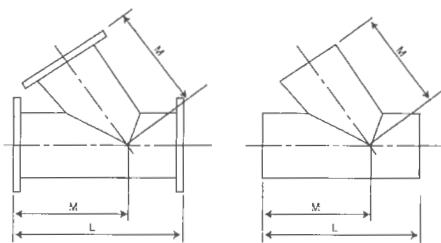
45° ELBOW



VANSTONE FLANGE*
WITH C.S. BACKUP RING



TEE



45° LATERAL

* FLANGE DRILLING PATTERNS AVAILABLE

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

Socket / Solvent
Cemented Joining
System also available

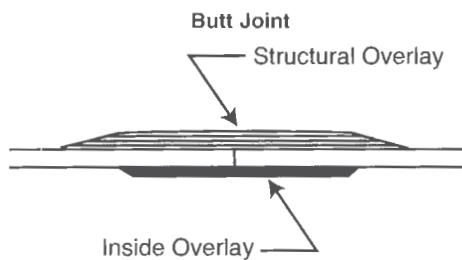
		NOMINAL PIPE SIZE																		
DIM/DIA	1/2"Ø	3/4"Ø	1"Ø	1 1/4"Ø	1 1/2"Ø	2"Ø	2 1/2"Ø	3"Ø	4"Ø	5"Ø	6"Ø	8"Ø	10"Ø	12"Ø	14"Ø	16"Ø	18"Ø	20"Ø	24"Ø	28"Ø
A	5"	5 3/4"	6"	6 1/2"	7 1/4"	8"	8 1/2"	9"	10"	12"	14 3/8"	13 1/4"	15 1/2"	24 1/2"	26"	28 1/4"	31 3/8"	33 5/8"	38 1/16"	45"
B	4"	4 1/2"	4 3/4"	5 1/16"	5 1/8"	5 5/8"	5 5/8"	5 3/4"	6 1/2"	7"	6 7/8"	8 1/4"	9 3/4"	15 5/8"	16 7/8"	18 1/4"	20 3/4"	22 1/8"	25 1/2"	29 1/2"
C	1 3/8"	1 3/4"	1 3/4"	2"	3"	3 3/8"	4"	4 1/2"	5"	7"	6 3/8"	7 1/16"	8 1/4"	12 1/4"	12 3/4"	14"	15"	16 1/4"	18 1/2"	23 3/16"
D	4"	4"	4"	4"	4"	4"	4"	4"	8"	8"	8"	8"	12"	12"	12"	12"	16"	20"	20"	28"
E	5 1/8"	5 5/8"	5 5/8"	5 5/8"	5 5/8"	3 3/4"	3 3/4"	3 3/4"	3 3/4"	7/8"	7/8"	7/8"	1"	1"	1 1/8"	1 1/8"	1 1/4"	1 3/8"	1 3/8"	
F	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	8"	8"	10"	10"	12"	12"	12"	12"	14"	14"
G	2 3/8"	2 3/4"	3 1/8"	3 1/2"	3 7/8"	4 3/4"	5 1/2"	6"	7 1/2"	8 1/2"	9 1/2"	11 3/4"	14 1/4"	17"	18 3/4"	18 3/4"	22 3/4"	25"	29 1/2"	31 5/8"
H	3 1/2"	3 7/8"	4 1/4"	4 5/8"	5"	6"	7"	7 1/2"	9"	10"	11"	13 1/2"	16"	19"	21"	12"	25"	27 1/2"	32"	38 1/2"
J	10"	11"	12"	12"	12"	13"	14"	16"	19"	17"	20 5/8"	25 3/4"	29 3/4"	33"	33"	42"	48"	58"	66"	
K	5"	5 1/2"	6"	6"	6"	6"	6 1/2"	7"	8"	9 1/2"	8 1/2"	10 5/16"	12 7/8"	14 7/8"	16 1/2"	16 1/2"	21"	24"	28"	33"
L	7 7/8"	9 3/4"	10 1/4"	11 1/4"	11 7/8"	12 7/8"	14 3/4"	16 1/8"	18 5/8"	21 1/2"	22 7/8"	28 3/4"	34 1/2"	41 1/2"	46 3/4"	54 3/4"	61 1/2"	68 3/4"	79 1/2"	86 1/2"
M	4 7/8"	5 3/4"	6 1/4"	6 7/8"	7 3/8"	8 1/8"	8 3/8"	10 3/8"	12 7/8"	14"	15 1/4"	15 1/4"	23 1/2"	28 7/8"	31 3/8"	36 7/8"	41 1/4"	48 1/4"	53 1/2"	60 3/4"



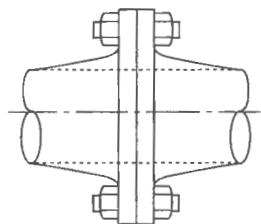
FABCO JOINING SYSTEMS

FABCO's piping systems may be assembled with a variety of joint types. Rigid connections such as bolted flanges and butt joints as well as more flexible bell and spigot joints and mechanical couplings may be used to suit most installation requirements.

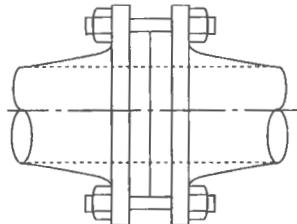
GR-KOR® FRP PIPE SYSTEMS



Flat Face Drilled Flange
150 lb. ANSI Standard Drilling
Light Weight Duct Flange



Stub End with Steel Backing Flange
150 lb. ANSI Standard Drilling



28" Diameter Bluekor® (Polypropylene FRP)
Pipe sections being joined by butt-fusion

ARMOURPLASTIC® PIPE SYSTEMS

Handweld Butt Joint



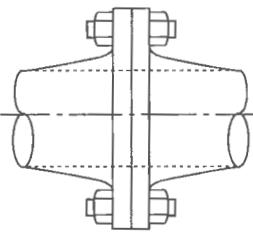
Machine Butt-Fusion Joint



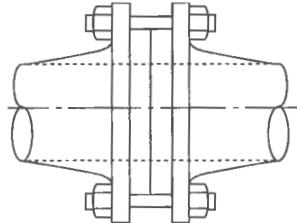
Interference Fit Solvent Weld Socket with Backwelding



Flat Face Drilled Flange
150 lb. ANSI Standard Drilling
Light Weight Duct Flange



Stub End with Steel Backing Flange
150 lb. ANSI Standard Drilling



PIPE HANGER DETAILS

MAXIMUM SPACING OF PIPE HANGERS FOR REINFORCED-POLYESTER PRESSURE PIPE ARMOURPLASTICS® (THERMOPLASTIC LINED FRP PIPING)

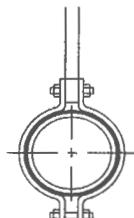
PIPE I.D. INCHES	MAXIMUM PIPE HANGER SPACING (FT.) AT PRESSURE RATINGS					
	H/LU			F/W		
	75 PSI	100 PSI	150 PSI	75 PSI	100 PSI	150 PSI
2	6.0	6.0	6.0			
3	6.5	6.5	8.0			
4	7.0	8.5	8.5	9.0	9.0	9.0
6	9.0	9.0	10.0	9.0	9.0	9.0
8	10.0	10.0	11.0	10.0	11.0	12.0
10	12.0	13.0	14.0	12.0	12.0	14.0
12	14.0	15.0	16.0	12.0	13.0	14.0
14	15.0	17.0	18.0	14.0	15.0	16.0
16	16.0	18.0	19.0	14.0	14.0	16.0
18	18.0	19.0	20.0	16.0	17.0	18.0
20	19.0	20.0	22.0	18.0	19.0	20.0
24	21.0	22.0	24.0	18.0	19.0	20.0
26	21.0	22.0	24.0	19.0	20.0	20.0
28	22.0	23.0	25.0	20.0	20.0	20.0
30	22.0	24.0	26.0	20.0	20.0	20.0
32	23.0	25.0	27.0	20.0	20.0	21.0
34	24.0	26.0	27.0	20.0	20.0	21.0
36	26.0	27.0	27.0	20.0	21.0	22.0
38	26.0	27.0	27.0	20.0	21.0	22.0
42	26.0	27.0	27.0	20.0	21.0	22.0

*This table is based on uninsulated pipe containing liquids having a specific gravity of 1.3 and at a maximum temperature of 180°F (82.2°C). For different specific gravities consult FABCO relative to hanger spacing.

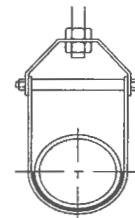
TYPICAL PIPE HANGERS FOR PLASTIC PIPES



Elastometric Pad,
Typical on all hangers

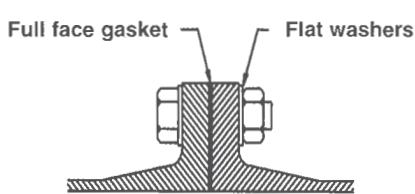


Clamp

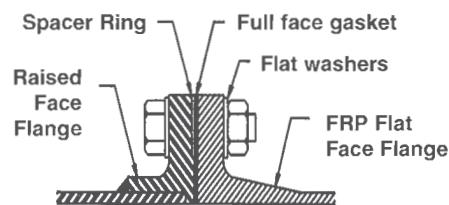


Clevis

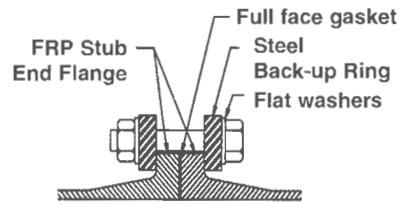
FLANGE CONNECTION DETAILS



Flat Face Flange Connection



Raised Face to Flat
Flange Connection



Stub Ends with Backing Flange





FABRICATED PLASTICS LIMITED

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E-mail: info@fabricatedplastics.com
Web Page: http://www.fabricatedplastics.com



The largest Plastic Process Piping Project ever produced for a Chlor-Alkali Plant Expansion



GR-KOR® (FRP) pipe spools connected to Chlorine Drying Towers

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