LONGER LASTING QUALITY FRP TANKS SINCE 1964

PRECISIONEERING LTD

303 NANTUCKET BOULEVARD, SCARBOROUGH, ON, CANADA M1P 2P2
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PRECISIONEERING LTD

has the experience to supply Multi-Tank projects on time

MAGNESIUM REFINERY: ▶
9 Tanks
various sizes and designs

◀ NICKEL CHLORIDE SLURRY:
12′ Diameter / 33′ High
20 Tanks
for high sp. gr. slurries

FOOD INDUSTRY: ▶
12′ Diameter / 35′ High
14 Tanks
Insulated – Steam treated

◀ SYNTHETIC RUBBER PLANT:
13′6″ Diameter / 30′ High
3 Tanks
Sulphuric acid service

ALUM WATER TREATMENT: ▶
13′6″ Diameter / 30′ Long
4 Tanks
Heat traced – Insulated –Horizontal

◀ GAS DRYING TOWER:
4′ Diameter / 42′ High.
Several towers – Many tanks
1965 Dow Chemical project.

FOOD INDUSTRY: ▶
12′ Diameter/various heights
12 Tanks
Steam treated – Cone bottom

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PRECISIONEERING LTD Seamless Wall FRP Tanks

Save up to 25% or more by using this table to select the most economical size for the capacity required.

PRECISIONEERING'S proprietary computer program inputs current material and labour costs and alternative manufacturing methods to cost FRP Tanks manufactured to industry standards. Our program develops costs for up to 10 different variations for a given volume. The most economical size for liquids with specific gravity between 1 and 1.2 are highlighted in the table below.

CAPACITY FOR STANDARD DIAMETER PRECISIONEERNG SEAMLESS WALL TANKS

US GALLON	LITERS	IMPERIAL GALLON	DIAMETER – D Feet										
			3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'6"
500			**9'6"**	5'4"									
	2000		**10'**	5'7"									
		500	**11'5"**	6'5"	4'1"								
1000			18'11"	**10'8"**	6'10"	4'9"							
	4000		20'	**11'3"**	7'3"	5'	3'8"						
		1000	22'8"	**12'9"**	8'3"	5'9"	4'3"						
2000				21'4"	**13'7"**	9'6"	7'0"	5'4"					
	8000			22'6"	**14'5"**	10'	7'5"	5'7"					
		2000		25'6"	**16'5"**	11'5"	8'5"	6'5"					
3000				31'11"	20'5"	**14'3"**	10'6"	8'0"	6'4"				
	12000					**15'**	11'1"	8'5"	6'8"				
		3000				**17'0"**	12'8"	9'7"	7'7"				
4000						18'11"	**14'0"**	10'8"	8'5"				
	16000					20'	**14'10"**	11'3"	8'10"				
		4000					**16'10"**	12'10"	10'1"	8'3"			
5000							17'6"	**13'4"**	10'6"	8'6"			
	20000						18'6"	**14'**	11'1"	9'			
		5000						**16'0**	12'8"	10'3"			
6000								**16'0"**	12'8"	10'3"			
	25000							17'7"	**13'10"**	11'3"	9'4"		
		6000						19'1"	**15'2"**	12'4"	10'1"	8'6"	
8000								21'3"	16'10"	**13'8"**	11'3"	9'6"	7'6"
	30000							21'	16'8"	**13'6"**	11'2"	10'	7'3"
		8000						25'6"	20'2"	16'5"	**13'6"**	11'5"	9'0"
10000								26'7'		**17'1"**	14'1"	11'10"	9'4"
	40000							28'1"		**18'**	14'10"	12'6"	9'10"
		10000						31'10"		**20'6"**	16'11"	14'3"	11'3"
12000								31'10"		**20'5"**	16'11"	14'3"	11'2"
	50000									22'6"	**18'7"**	15'7"	12'4"
		12000								24'6"	**20'3"**	17'1"	13'6"
14000										23'10"	**19'8"**	16'7"	13'1
	55000									24'9"	**20'5"**	17'2"	13'10"
		14000								28'7"	**23'8"**	19'11"	15'9"
15000										25'7"	**21'1"**	17'9"	14'1"
	60000									27'	**22'4"**	18'9"	14'6"
		15000								30'7"	**25'4"**	21'4"	16'10"
18000										30'7"	**25'4"**	21'4"	16'10"
	75000										**27'11"**	23'5"	17'9"
		18000										**25'7"**	20'3"
20000											28'1"	**23'8"**	18'9"
	80000										29'9"	**25'**	19'9"
		20000										**28'5"**	22'5"
25000												**29'7"**	23'5"
	100000											**31'3"**	24'8"
		25000										**35'6"**	28'1"
30000												**35'6"**	28'1"
	120000												**29'7"**
		26000											**29'2"**

HEIGHT OF SEAMLESS WALL TO PROVIDE CAPACITY, H FEET

DISHED TANK HEAD DIMENSIONS

D Inside Diameter (feet)	3	4	5	6	7	8	9	10	11	12	13'6
A Height (inches) Tan line to inside	5	9	9½	11 7/8	14 7/8	16	17	20½	25¼	23	26

OVERALL HEIGHT (OH)

Flat Bottom-Dished Head Tank

OH = t+H+O+F+A+N

t = bottom thickness 3/16" to 3/8"

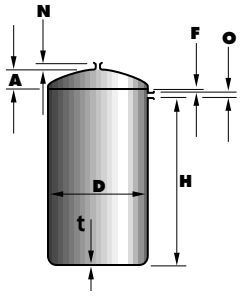
H = from table

O = diameter of overflow nozzle

F = freeboard, if required

A = from table

N = height of highest nozzle face above head



A PRECISIONE

LASTS LONGER • PERFORMS BETTER • INCORPORATES CONTINUOUS

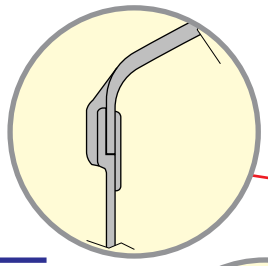
LOOK! AT THESE FEA

HIGH STRENGTH TENSION RING

The outside perimeter of our FRP dished head is machined to a close tolerance and then dropped into a bell built at the top of the tank wall. The head and the bell are bonded together creating a solid integral tension ring.

BENEFIT:

- Tank heads are able to carry higher loads. An important feature if snow loads are involved.

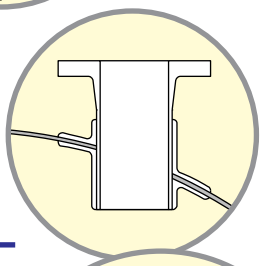


HEAD NOZZLES EXTEND THROUGH TOP

The nozzle neck is FRP welded to both sides of the head.

BENEFITS:

- Much stronger attachment than flush mounted method
- Incoming liquids fall free-important when controlling pH with concentrated acid.
- Nozzle opening not restricted by secondary layup.

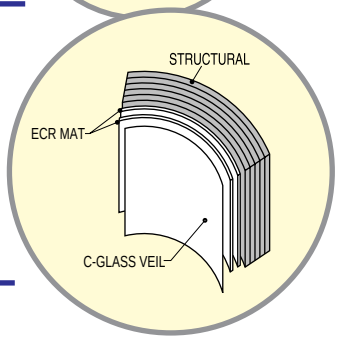


BETTER CORROSION RESISTANT LINER THAN E GLASS

C glass veil and ECR chopped strand mat are the only glass products used to build the corrosion resistant liner.

BENEFITS:

- C glass was developed to provide better chemical resistance.
- Extensive research over a 5 year period has shown ECR glass lasts significantly longer than E glass in hot aggressive chemical environments.
- Using C glass veil and ECR chopped strand mat adds a comforting safety factor.

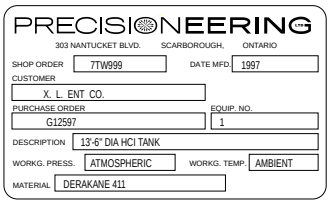


NAMEPLATE

SHOWS: Reference number, Design conditions, Resin used and Date manufactured.

BENEFIT:

- Permanent record readily available at all times.

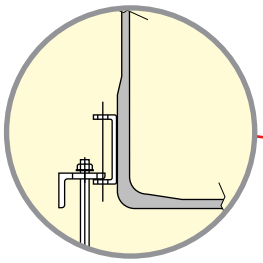


CONTINUOUS CORNERS

Our one-piece tank molds include both the wall and the bottom. This allows these two areas to be molded continuously and seamlessly at the same time. The mold is designed to allow for extra bottom corner build-up while maintaining a flat bottom. The thickness of the bottom extends 12" up the side wall for additional strength and stiffness.

BENEFITS:

- Even distribution of discontinuity stresses produced by corner shear forces and bending moments prevents early fatigue failure.
- Easy to clean.
- No secondary bond in the most critical area of a vertical tank.



GALVANIZED HOLD DOWN LUGS

Lugs are "U" shaped, have a bolt-hole in each leg and are made from galvanized 3/8" steel.

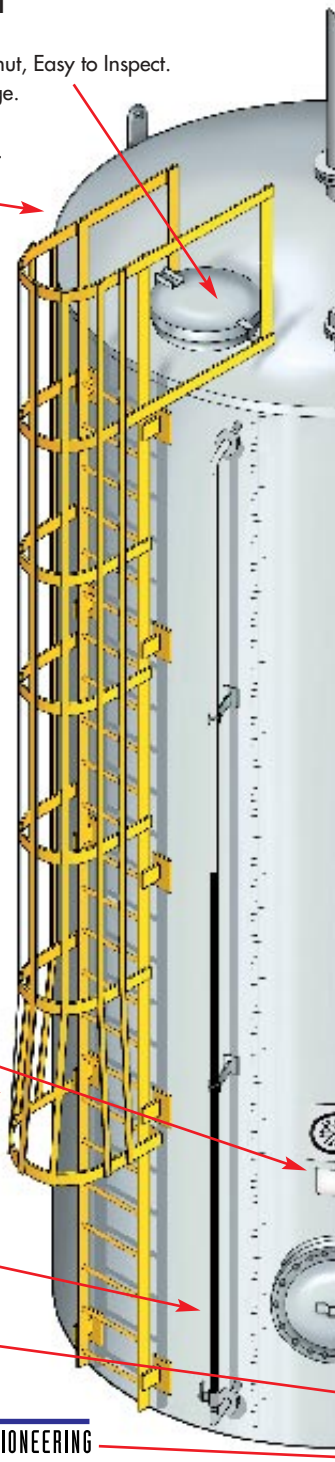
BENEFITS:

- Hold-down bolts are installed after the tank has been installed. No misalignment problems.
- Can be used as a third lift lug by inserting a bolt through the bolt holes.
- Galvanized finish ensures long rust free life.

HINGED MANWAY

BENEFITS:

- Only one wing nut, Easy to Inspect.
- Built in drip ledge.
- Gasket seal
- See Accessories.



FRP LADDER WITH FRP CAGE
see accessories

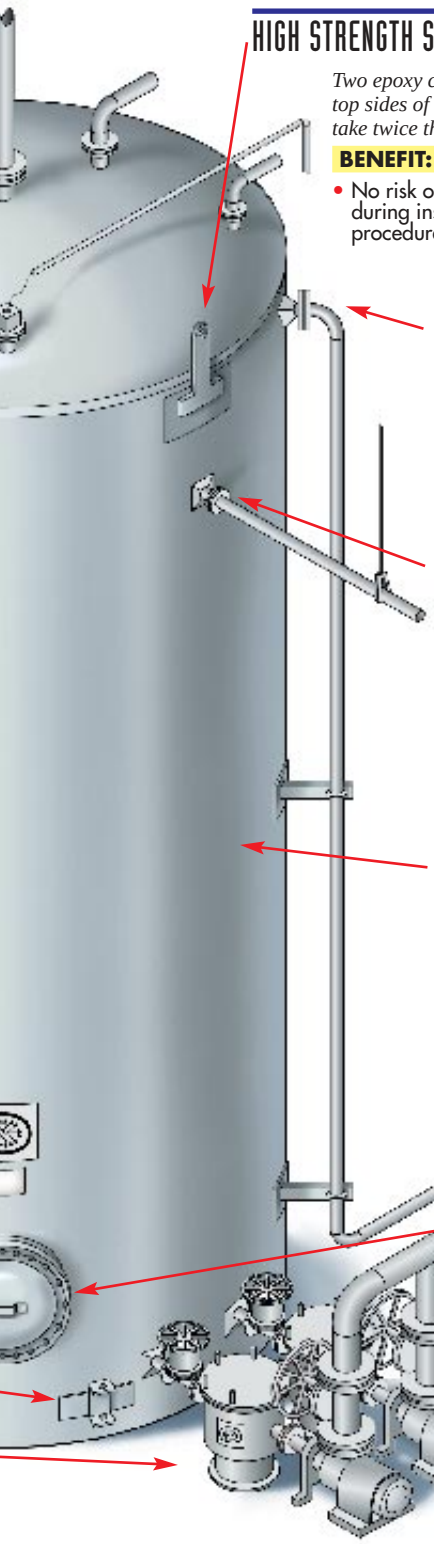
SIGHTGLASS WITH CALIBRATION STRIP
see accessories

QUICK OPENING PRECISIONEERING 600 GPM STRAINER
ask for details

EERING LTD FRP TANK

IMPROVEMENTS SINCE 1964 • IS A BEAUTIFUL SIGHT TO BEHOLD

TURES AND BENEFITS



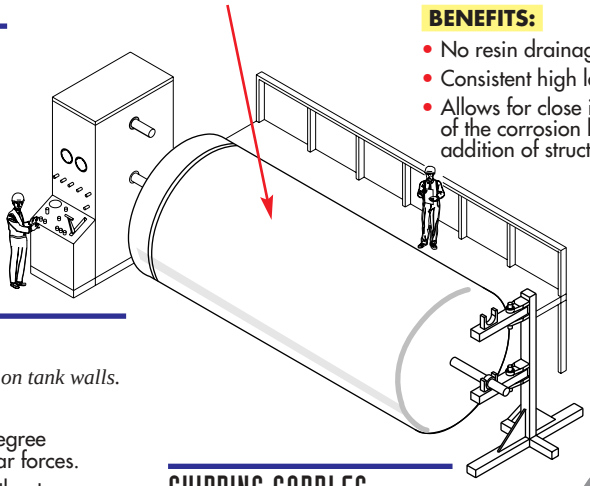
HIGH STRENGTH STEEL LIFT LUGS

Two epoxy coated steel lift lugs are bonded to the top sides of each tank. Lift lugs are designed to take twice the weight of the tank.

BENEFIT:

- No risk of a lift lug shearing off or breaking during installation when using recommended procedure shown on approval drawing.

TANKS MANUFACTURED ON ROTATING HORIZONTAL MOLDS



BENEFITS:

- No resin drainage.
- Consistent high laminate quality.
- Allows for close inspection of 100% of the corrosion liner prior to addition of structural layers.

PYRAMID GUSSETS

Are used on process nozzles under 6" on tank walls.

BENEFITS:

- A pyramid gusset provides 360 degree protection against torque and shear forces.
- Flange face is allowed to move without breaking gusset away from tank wall.

150 PSI RATED SPUNCAST FLANGES

Precisioneering's proprietary SPUNCAST flanges are rated at 150 p.s.i. and have a molded surface on the back side. They are used on all liquid process nozzles.

BENEFITS:

- Much stronger than minimum requirement. Provides better gasket seal.
- Washers always sit flat on the flange.

SEAMLESS WALLS

All tank diameters have permanent one piece molds providing seamless, uninterrupted, glass smooth walls for all heights shown in the table.

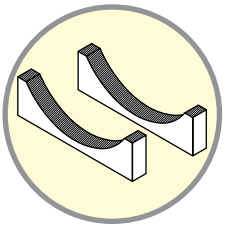
BENEFITS:

- Highest quality possible
- No secondary bonds.
- Easy to clean.
- Efficient manufacturing.

SIDE ENTRY MANWAYS ARE 10 PSI MINIMUM

see accessories

SHIPPING SADDLES



Saddles are ruggedly built from wooden 2 x 4 frames, heavy plywood walls and a light plywood top surface covered with carpet or other soft material.

BENEFITS:

- Tanks arrive at jobsite in factory condition without saddle scratches.
- Saddles can be used at jobsite to store tanks until required for installation.

ENGINEERING REVIEW

Drawings and application are reviewed, stamped and signed by a Professional Engineer.

BENEFITS:

- We verify the tank construction meets Industry Specifications and special requirements are shown on the drawings
- We make sure there is a vent in each atmospheric tank and will recommend the vent be one size larger than the outlet or inlet.

PROFESSIONAL DRAWINGS

CAD produced shop drawings are sent out for customer approval for each tank. Drawings are very explicit, showing nozzle orientation, all thickness', laminate construction, resin to be used, nameplate details, and quality control events to be made.

BENEFITS:

- Customer knows what is being provided in minute detail.
- Easy to read repetitive format eliminates manufacturing misinterpretations.

DO NOT SCALE THIS DWG. USE DIMENSIONS ONLY.	BY	DATE	REVISION	△ NO
THE INFORMATION AND KNOW HOW ON THIS DRAWING ARE CONFIDENTIAL AND MAY NOT BE USED OR REPRODUCED WITHOUT WRITTEN PERMISSION OF PRECISIONEERING LIMITED	DRAWN WVI		PRECISIONEERING LTD 303 NANTUCKET BLVD. SCARBOROUGH, ONTARIO	
	CHECKED			
	DATE 1997		X . L . ENT CO. 13'-6" DIA HCI TANK	
CAD FILE NO: TANKISO2 SIZE D	SCALE 1/2" = 1'-0"			
CUSTOMER REFERENCE DWG. D-2250-213	PURCHASE ORDER NO. G12597	SHOP ORDER NO. 7TW999	DRAWING NO. D-7999-1	REV 0

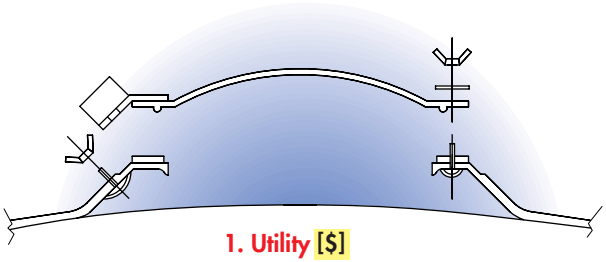
ACCESSORIES Use value-engineering to select

PRECISIONEERING has developed many efficient lower cost designs than the few limited designs, based on steel fabrication techniques, that were commonplace when FRP tank manufacturing began in the 1960s. Where PRECISIONEERING has proven, field-tested designs, $ signs are used to indicate the relative cost of accomplishing the same function with different designs. For example, if a costly 10 psi pressure tight manway with 20 bolt sets is not required, great savings can be realized by using a Utility Manway with only 2 wing nuts.

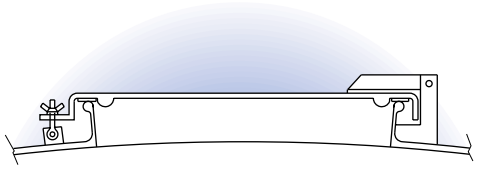
TOP ENTRY MANWAYS

Utility and Hinged manways are designed for atmospheric pressure and tanks that have a few inches W. G. negative ventilation pressure. If manway covers are required to contain gas pressure developed during filling, additional fasteners are required.

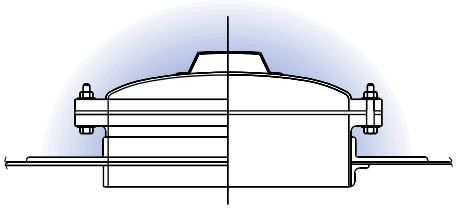
PRECISIONEERING has several 24" manway designs. The three used most often are shown here.



1. Utility [$]



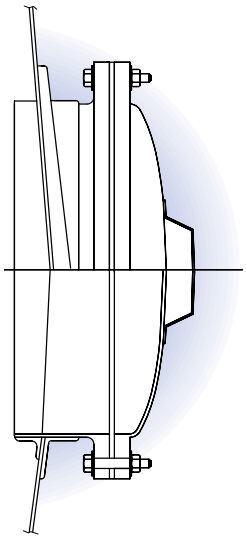
2. Hinged [$$]



3. Bolted 10 PSI Pressure Tight [$$$]

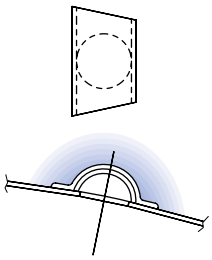
SIDE ENTRY MANWAY [$$$$]

Side entry manways are considerably more expensive than top entry. They are a good investment if the tank must be entered on a regular basis. PRECISIONEERING'S design approach treats the installation of a manway similar to the installation of a large nozzle under Section Eight of The Boiler Code, wherein, all material removed is replaced around the hole in a manner that all stresses are carried around the manway. Manways are rated at 10 psi minimum.

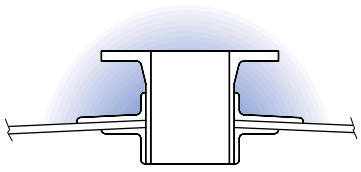


VENTS

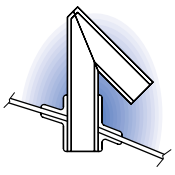
Vent openings are required for all atmospheric tanks. The most widely used are:



1. Utility Half Round [$]



2. Duct Flanged Nozzle [$$]



3. Mitered [$$$]

4.Gooseneck [$$$$]

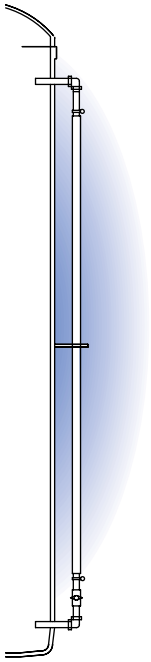
PRECISIONEERING Toll-Free: 1-800-465-1800 • Fax: 1-416-751-9382 • Tel: 1-416-751-9200 • E-mail: info@precisioneering.com

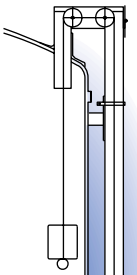
the accessory design that meets your criteria

LEVEL GAUGES

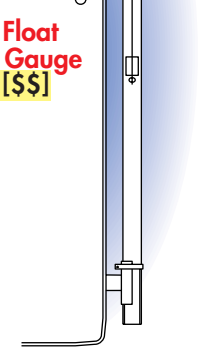
There are many ways to see how much liquid is in a tank. All methods can incorporate a scale stenciled on the side of the tank.

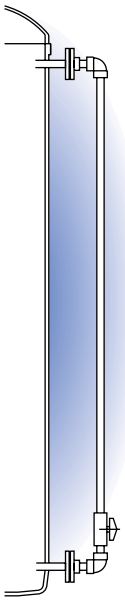
1. Flexible Reinforced Clear PVC [$]





2. Float Gauge [$$]



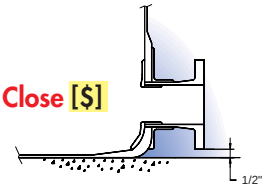


3. Sight "Glass" (Clear Rigid PVC) [$$$]

BOTTOM DRAIN

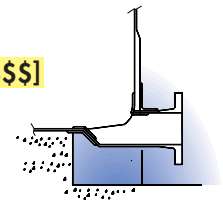
The most common and least costly method of draining is to loacate a flanged nozzle as close to the bottom as possible. This results in the flange face being located 1/2" above floor, or base level. When a pump is connected in line with an elevated drain a siphon can be used. If full drainage is required a base with cutout must be provided.

1. Close [$]



2. Siphon [$$]

3. Full [$$$]



O.S.H.A. LADDERS AND CAGES

Epoxy painted steel construction is standard [$]

Precisioneering's proprietary FRP ladder and cage is available for very corrosive environments. [$$]

AGITATOR SUPPORT & BAFFLES

Precisioneering's proprietary design will provide for localized tank wall stiffening for heavy mixers and extra baffle reinforcement for very high torque loads.

INSULATION AND HEAT TRACING

Precisioneering's heat-traced and insulated alum tanks for the water treatment industry continue to perform well outdoors in Canadian winters after 25 years. The FRP protective cover over urethane insulation contains expansion joints and additional reinforcement to handle the very high thermal stresses generated outdoors in the winter.

OTHER ACCESSORIES

Anything added to a steel tank can be added to a Precisioneering FRP tank. Where dip pipes are used we will recommend installing a wear-plate. Designs are on file for:

- insulation clips for field installed glass fiber insulation,
- pipe supports,
- ladder clips,
- abrasion resistant linings,
- seal pots,
- sectional tanks for cramped locations,
- still-wells,
- metal-free slide manways,
- explosion hatches, etc.

Call us if you have a special requirement.

OTHER DESIGNS

Precisioneering's vertical, flat bottom, dished top, design is the most economical FRP closed tank style design for containing a corossive liquid or a food product that must be protected from contamination. Precisioneering has built every other type of tank or vessel possible.

The list includes:

- horizontal tanks with steel saddles,
- horizontal tanks supported on concrete saddles by others,
- flat top tanks with stiffening ribs outside [or inside],
- tanks on legs,
- sloped bottom tanks to fit on a sloped base,
- internal sloped bottom tanks,
- large diameter vessels designed for full vacuum,
- sand filters designed for 100 psi,
- patucha and slurry tanks with abrasion-resistant lining for heavy slurries,
- pulp bleach retention towers 10.5 ft. diameter x 110 ft. high,
- steam cured FDA approved tanks for the food industry,
- packed towers,
- process vessels for the chemical industry [read Dow, DuPont, etc.].

Checklist for a FRP Tank Data Sheet

- Contents and concentration _____
- Specific gravity _____
- Temperature: Design ___ Working_____
- Pressure: Atmospheric ❑ Other _____
- Indoors ❑ Outdoors ❑
- Jobsite location _____
- Volume US gal. ❑ Liters ❑ Imp gal. ❑

_____

- Diameter {from page 3} _____
- Overall height of _____ OH {see page 3}

- Top: Dished ❑ Open ❑ Flat ❑
- Bottom: Flat ❑ Sloped 1/8″/ft. ❑

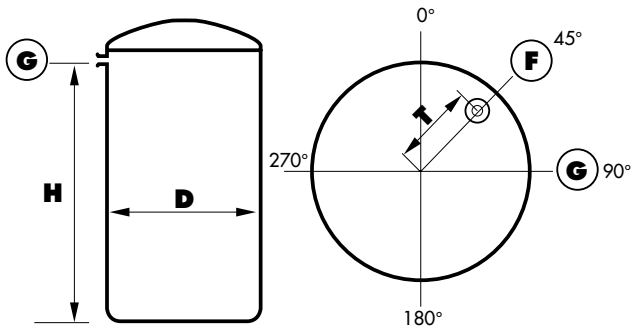
_____

- Bottom drain Close: ❑ Siphon ❑ Full ❑
- Lift lugs ❑ Hold down lugs ❑
- 24″ Manways: Side ❑ Top utility ❑ Top hinged ❑ Top flanged and bolted ❑
- Insulation ❑ Heat tracing ❑
- Agitator weight _____ Baffles ❑
- Level gauge: Flexible ❑ Float ❑ Rigid tube ❑
- Ladder ❑ Cage ❑ Steel ❑ FRP ❑

Nozzle Schedule

MARK	SIZE	LOCATION Top/Height	ORIENTATION 0 to 360*	CONNECTION
A				Vent
B				Inlet
C				Outlet
D				Drain
E	24			Manway
F*	4	36	45°	Spare
G*	3	144	90°	Overflow
H				

*Example



For A Longer FRP Tank Life — Use These Specifications:

- Tank walls shall be seamless with no joints.
- Tank shall be made on a one piece horizontal rotating mandrel with integral knuckle and bottom mold.
- The bottom knuckle of a vertical tank shall be continuous and smooth with no joints.
- The minimum thickness of the bottom knuckle and 12" of the adjacent vertical tank wall shall be equal to the combined thickness of the shell wall and the tank bottom.
- The inner corrosion resistant liner shall be hand contact molded by a trained certified molder with a layer of 0.010" C glass surface veil and two layers of 1.5 oz./sq. ft. ECR chopped strand mat using a vinylester resin with a minimum elongation of 5% with a suitable performance record for the service. Glass is not to be applied with a chopper-gun.
- The inner corrosion resistant liner shall be clear and not pigmented. Before proceeding with the structural layers, the liner shall be inspected in accordance with ASTM Specification C582 and modified if required.
- The structural portion of the laminate may be pigmented to improve resistance to ultra violet light degradation.
- Contact molded tanks shall be made in accordance with ASTM Specification D4097.
- Filament wound tanks shall be made in accordance with ASTM Specification D3299.

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