ASME Pressure Vessels

Engineering Data & Specification Guide

- *Hot Water Storage*
- *Fire Protection Water Storage*
- *Hydropneumatic*
- *Chlorine Contact*

Highland Tank

INTRODUCTION

This specification guide contains information on various styles of A.S.M.E. Section VIII Division I pressure vessels available from Highland Tank.

Highland Tank has been manufacturing the highest quality pressure vessels since 1980.

Highland pressure vessels meet all the specifications of the A.S.M.E. Pressure Vessel Code and are registered with the National Board of Boiler and Pressure Vessel Inspectors.

The manufacturing process is monitored by an authorized inspection agency.

Standard vessels receive a coat of shop primer on the exterior, optional finish coatings are available providing the coatings meet acceptable VOC levels. The Steel Tank Institute STI-P3® Cathodic Protection System is available on underground vessels

Vessels are available in **Carbon Steel** or **Stainless Steel.**

Vessel legs, saddles, ring bases and hold down straps are available - see page 5 of this guide for details.

Typical Actual Volume (Gallons)

The chart below shows actual volumes of vessels with specified dimensions. To achieve a specified volume at the pressure you need, some profiles will be more economical to produce than others.

Sizes other than those listed are readily available, up to 12'-0" diameter.

TANK DIAMETER	LENGTH OF STRAIGHT SHELL (INCHES)										
	36	48	60	72	84	96	108	120	132	144	240
24	85	110	130	155	180	200	225	250	275	300	—
30	140	175	215	250	290	325	360	400	435	470	—
36	210	265	315	370	420	475	530	580	635	690	—
42	300	370	445	515	590	660	730	800	875	950	—
48	400	500	595	690	785	880	970	1065	1160	1255	—
54	—	655	775	890	1010	1130	1250	1370	1490	1610	—
60	—	830	980	1125	1275	1420	1570	1715	1860	2010	3210
66	—	—	1215	1395	1570	1750	1930	2105	2280	2460	3900
72	—	—	1480	1695	1905	2120	2330	2540	2755	2965	4645
84	—	—	—	—	2679	2966	3253	3540	3827	4114	6410
96	—	—	—	—	—	4008	4384	4760	5136	5512	8520
120	—	—	—	—	—	—	—	7828	8415	9002	13698

For other capacities please call our engineering staff.

PRESSURE VESSEL THICKNESS GUIDE

Calculated per A.S.M.E. Section VIII Division I - UG 27

INTERNAL PRESSURE

TANK DIAMETER	50	75	100	125	150
24	3/16	3/16	3/16	3/16	3/16
30	3/16	3/16	3/16	3/16	3/16
36	3/16	3/16	3/16	3/16	1/4
42	3/16	3/16	1/4	1/4	1/4
48	3/16	3/16	1/4	1/4	5/16
54	3/16	3/16	1/4	5/16	3/8
60	3/16	3/16	1/4	5/16	3/8
66	3/16	1/4	5/16	3/8	7/16
72	3/16	1/4	5/16	3/8	1/2
84	3/16	5/16	3/8	7/16	9/16
96	1/4	5/16	7/16	1/2	5/8
120	1/4	3/8	1/2	5/8	3/4

HOT WATER STORAGE TANKS

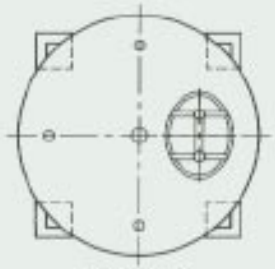
Hot Water Storage Tanks provide additional water storage for domestic hot water systems.

Operating pressures range from 60 to 75 psi.

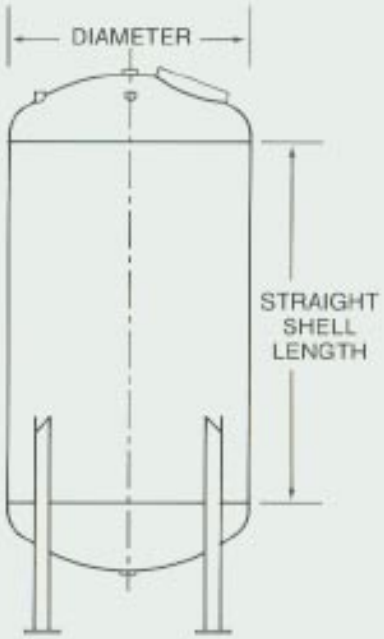
Design pressure should be 100 to 125 psi.

Most jurisdictions require an A.S.M.E. stamped vessel.

The vessel should be lined with an epoxy potable water lining.



TOP VIEW



SAMPLE SPECIFICATION FOR A

690 GALLON HOT WATER STORAGE TANK

1.1 Provide one 690 gallon, 4'-0" diameter x 6'-0" (straight shell) Vertical Pressure Vessel.

1.2 The tank is to be constructed of 1/4" thick SA516 GR70 carbon steel.

1.3 The tank is to be designed, constructed and stamped in strict accordance with Section VIII Division I of the A.S.M.E. Boiler And Pressure Vessel Code for a maximum allowable working pressure of 100 psig at 250° F. The vessel shall be double butt welded and shall include (1) 12" x 16" elliptical manway, (2) 2" and (3) 1" x 3000# half couplings.

1.4 The tank is to have (4) angle legs - 18" bottom clearance - and the A.S.M.E. code stamp.

1.5 After hydrostatic testing at 150 psig, the tank shall be internally lined with an NSF listed potable water lining and externally coated with red oxide primer. Internal and external coatings shall be applied in accordance with the manufacturer's specifications.

1.6 Tank shall be manufactured by Highland Tank and Manufacturing Company, Manheim, Pennsylvania.

FIRE PROTECTION WATER STORAGE TANKS

Fire Protection Tanks are used for the storage of water .

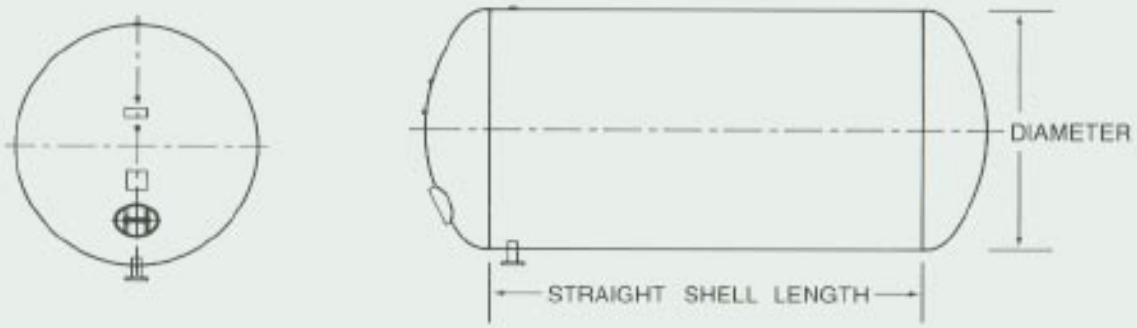
Common design pressure is 125 psi.

During normal operation the vessel would be 2/3 filled with water and then pressurized with air to 125 psi. Fittings are supplied for a gauge glass and the 2/3 filled position is marked on the exterior of the tank.

The outlet flange is located at the bottom of the tank and projects a minimum of 4 inches into the tank.

Vessels are most often located underground with one head protruding into a vault and all of the fittings are located on that head. If the tank is to be placed underground the exterior must have a cathodic protection system per NFPA 22 SECTION 3-1.104. Highland Tank offers the Steel Tank Institute sti-P_3® Cathodic Protection System.

The tank must be lined per NFPA 22 SECTION 2-7.11.1.



SAMPLE SPECIFICATION FOR A 10,000 GALLON UNDERGROUND FIRE PROTECTION WATER STORAGE TANK

See chart on page 1 for complete size availability

1.1 Provide one 10,000 gallon, 8'-0'' diameter x 24'-0 (straight shell) Fire Protection Water Storage Tank.

1.2 The tank is to be constructed of 1/2'' thick SA516 GR70 carbon steel.

1.3 The tank is to be designed, constructed and stamped in strict accordance with Section VIII Division I of the A.S.M.E. Boiler and Pressure Vessel Code for a maximum allowable working pressure of 125 psig at 140° F. The vessel shall be double butt welded and shall include (1) 8'' x 150# flanged opening - this opening shall protrude through the shell a minimum of 4'', (1) 12'' x 16'' elliptical manway, (1) 4'', (1) 2'' and (3) 1'' x 3000# half couplings. All fittings to be electrically isolated from the piping.

1.4 The tank is to have (3) hold down straps with liners and the A.S.M.E. code stamp.

1.5 After hydrostatic testing at 188 psig, the tank shall be internally lined, as required by NFPA 22, and the exterior shall have the Steel Tank Institute's sti-P_3® Corrosion Protection System. The tank shall have a 30 year warranty against failure due to external corrosion.

1.6 Tank shall be manufactured by Highland Tank and Manufacturing Company, Manheim, Pennsylvania.

HYDROPNEUMATIC AND CHLORINE CONTACT TANKS

Hydropneumatic Tanks are used to store water under pressure.

Normal operating line pressure for a water system is 60 to 75 psi.

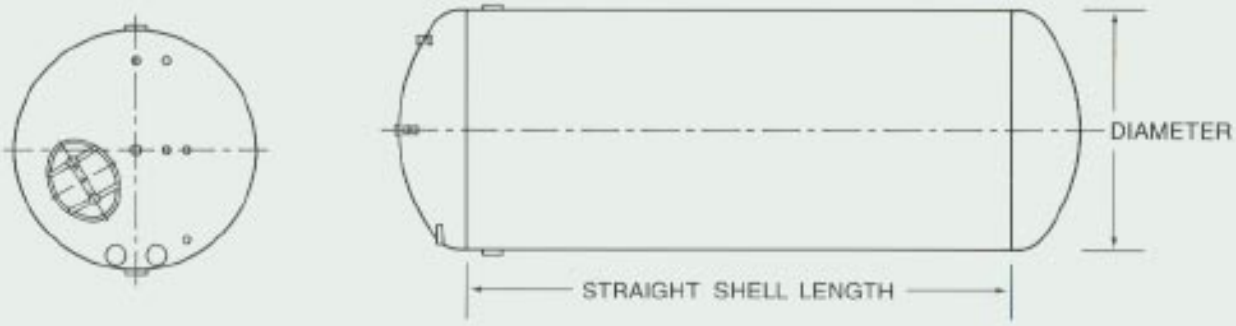
Common design pressure is 100 psi.

Vessels are often located underground with one head protruding into a vault and all of the fittings are located on that head. Tanks located underground can be furnished with the Steel Tank Institute sti-P_3® Cathodic Protection System.

A.S.M.E. stamped vessels are required in most states.

Chlorine Contact Tanks are also available. Chlorine Contact Tanks have an inlet on one end and an outlet on the other end. Chlorine Contact Tanks also have internal baffles for full chlorine/water mixing.

These vessels are lined with epoxy or urethane potable water linings.



SAMPLE SPECIFICATION FOR A 5,000 GALLON ABOVEGROUND HYDROPNEUMATIC WATER STORAGE TANK

See chart on page 1 for complete size availability

1.1 Provide one 5,000 gallon, 6'-0'' diameter x 22'-0'' (straight shell) Hydropneumatic Water Storage Tank.

1.2 The tank is to be constructed of 3/8'' thick SA516 GR70 carbon steel.

1.3 The tank is to be designed, constructed and stamped in strict accordance with Section VIII Division I of the A.S.M.E. Boiler and Pressure Vessel Code for a maximum allowable working pressure of 100 psig at 140° F. The vessel shall be double butt welded and shall include (1) 12'' x 16'' elliptical manway, (2) 4'', (3) 2'', (1) 1-1/4'' and (4) 1'' x 3000# half couplings.

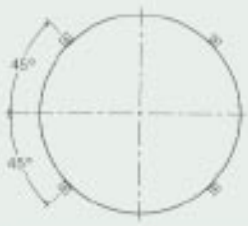
1.4 The tank is to have (2) 6'' high steel saddles and the A.S.M.E. code stamp. The saddles are to ship loose.

1.5 After hydrostatic testing at 150 psig, the tank shall be internally lined with an NSF listed potable water lining and externally coated with red oxide primer. Internal and external coatings shall be applied in accordance with the manufacturer's specifications.

1.6 Tank shall be manufactured by Highland Tank and Manufacturing Company, Manheim, Pennsylvania.

RING BASES

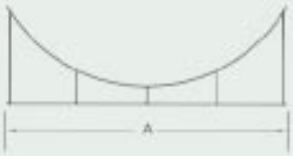
Ring bases are used to stabilize vertical tanks. The thickness of the ring base is determined by the total weight of the tank and contents. Bolt down pads are provided to secure the tank to a support base.

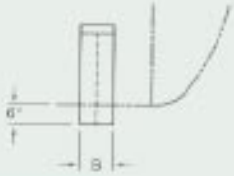


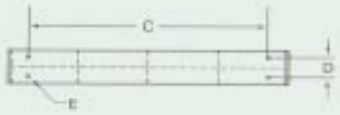
TANK DIA	24"	30"	36"	42"	48"	54"	60"	66"	72"	96"	120"
A	20"	24"	30"	30"	36"	42"	48"	54"	60"	84"	108"

SADDLES

Two saddles are required for most pressure vessel applications. Because of the varience of stresses due to expansion and contraction of the vessel to the mounting pad, Highland ships the saddles loose.



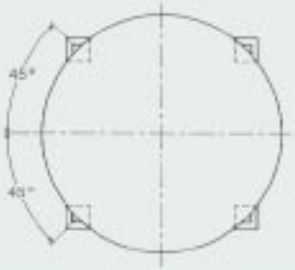


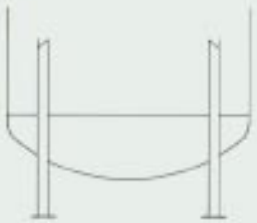


TANK DIA	24"	30"	36"	42"	48"	54"	60"	66"	72"	96"	120"
A	18"	24"	30"	36"	42"	48"	54"	56"	60"	84"	96"
B	5"	6"	6"	6"	6"	6"	6"	6"	6"	10"	10"
C	12"	18"	24"	30"	30"	36"	42"	44"	48"	54"	66"
D	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	6"	6"
E	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	1-1/8"	1-1/8"

ANGLE LEGS

Angle legs elevate and stabilize vertical tanks. The legs are sized by Highland Tank based on the weight of the contents per gallon. Bolt holes are provided in the leg pads.

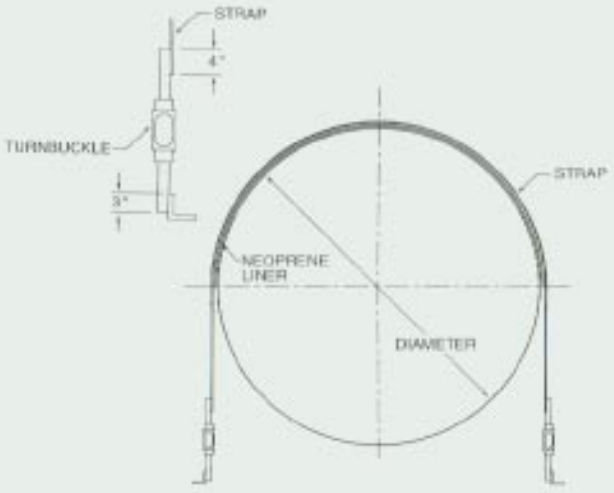




HOLD DOWN STRAPS

Highland Tank's hold down straps are designed to secure underground tanks in areas having ground water. The straps must be used in a system that has an adequately sized concrete pad to counteract the tank's buoyant force. For the size and number of straps refer to Highland Tank's Literature No. HT-1011.

TANK DIA	STRAP	TURN BUCKLE	HOLE SIZE	ANGLE ENDS
42"	2" x 1/4"	3/4"	1-1/8"	4" x 4" x 1/2" L
48"	3" x 1/4"	3/4"	1-1/8"	4" x 4" x 1/2" L
60"	3" x 1/4"	3/4"	1-1/8"	4" x 4" x 1/2" L
66"	3" x 1/4"	3/4"	1-1/8"	4" x 4" x 1/2" L
72"	3" x 3/8"	1"	1-1/8"	4" x 4" x 3/4" L
96"	3" x 3/8"	1-1/4"	1-1/8"	4" x 4" x 3/4" L
120"	4" x 1/2"	1-1/2"	1-1/2"	4" x 4" x 3/4" L



COATINGS AND LININGS

For applications requiring special coatings or linings, Highland Tank can provide environmentally low impact blasting and painting services.

Water Storage Tanks are commonly coated with an epoxy or urethane potable water lining. Other coatings can be used for the storage of many petroleum products such as gasoline, diesel fuel, aviation fuel and motor oils.

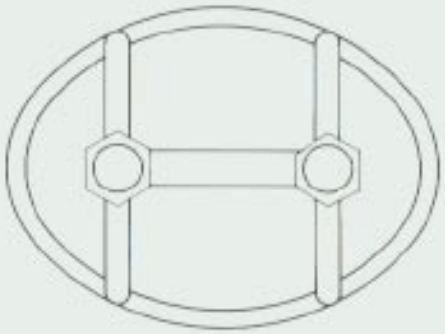
For applications where stored chemicals are extremely corrosive to the steel vessel, Highland Tank can line tanks with an appropriate rubber or PVC lining.

STAINLESS STEEL

Highland Tank can manufacture your pressure vessel from 304, 304L, 316, or 316L stainless steel for corrosion resistance to many chemicals. All Highland's stainless steel tanks are treated with a stainless steel cleaner and a passivation solution to remove any embedded carbon steel contaminants and restore the oxidized surface to protect the stainless.

MANHOLES

Each vessel 36" I.D. and greater in diameter is supplied with an 11" x 15" elliptical manway as a minimum size for an inspection opening. If a tank is to be lined, a 12" x 16" is the minimum size required. Other "round" manways are available in 16", 20", 24" diameters.

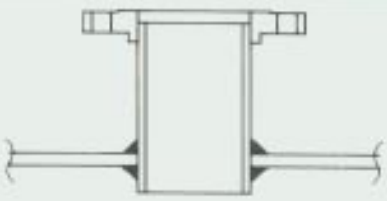


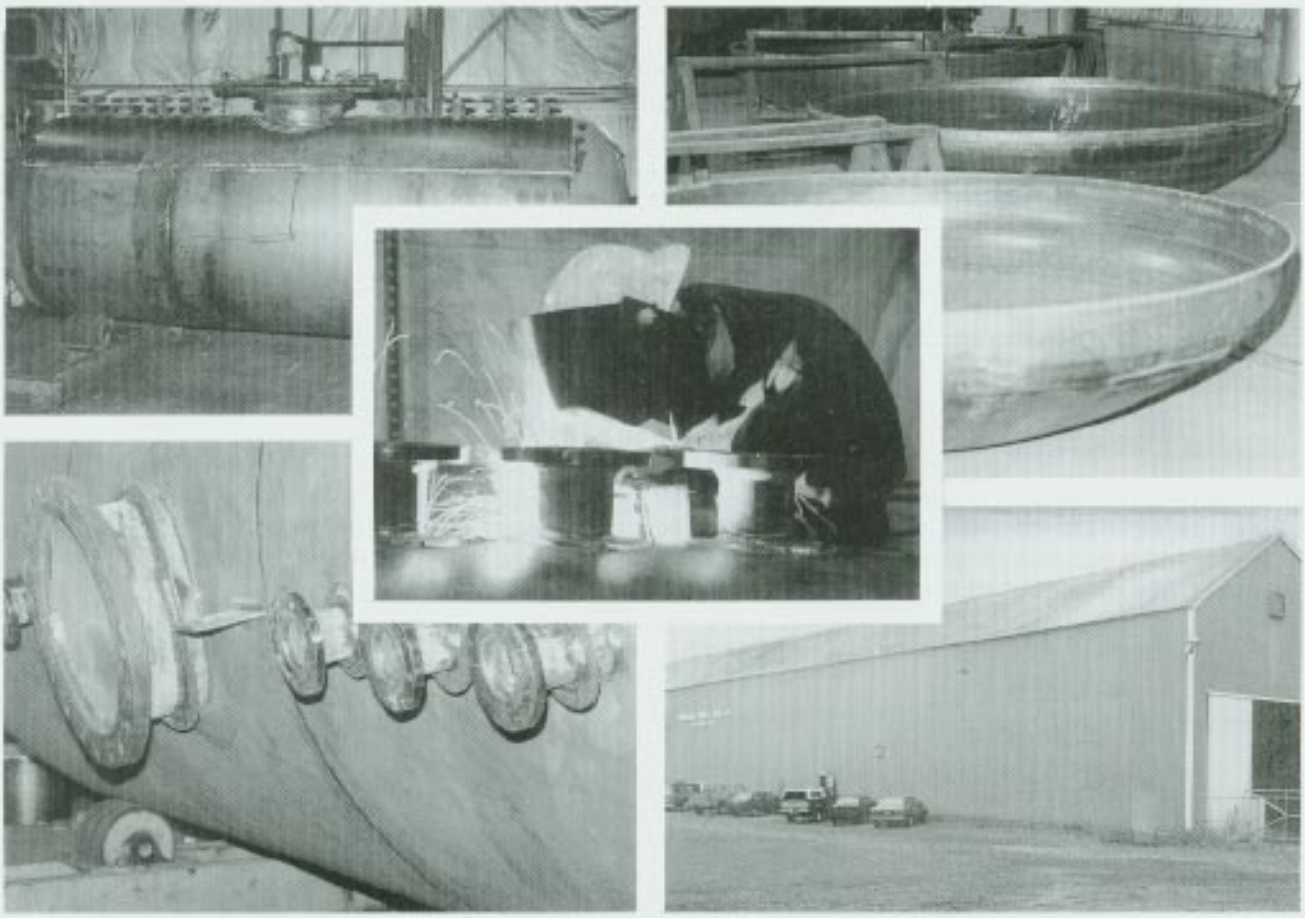
THREADED FITTINGS

Threaded fittings up to 4" NPT are the most common means of piping to a pressure vessel. They are normally female threaded as shown. They should conform to A.S.T.M. A105, 3000# rating. Connections larger than 4" must be flanged.

FLANGES

Flanged openings conform to A.S.T.M. A105 and A.N.S.I. B16.5 ranging in standard pipe sizes from 1/2" to 24".





Highland Tank

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