



3616 Harden Blvd.
Number 110
Lakeland, FL 33803

July 21, 2009

Richard Lott, PE, PG
Drinking Water Permitting Manager
FDEP - Central District
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803-3767

Re: **SODIUM HYPOCHLORITE 'POST' FEED SYSTEM FOR
ORLANDO UTILITIES COMMISSION STANTON ENERGY
POWER CENTER WATER TREATMENT PLANT**

Dear Richard,

Enclosed are two (2) certified submittal packages consisting of the appropriate application form (enclosure 1) and supporting documentation (remaining enclosures) for requesting a Modification to the Orlando Utilities Commission's Stanton Energy Power Center Water Treatment Plant to install a 'post' sodium hypochlorite feed system. Orlando Utilities Commission has secured the services of Odyssey Manufacturing, a licensed general and plumbing contractor, to permit and install the system. We are submitting this permit modification request with a check in the amount of \$1,000.00.

DESCRIPTION OF CURRENT SYSTEM

The Stanton Energy Center uses 150 lb chlorine gas cylinders for disinfection at its lime softening Water Treatment Plant (WTP). The raw water comes from two 1,200 gpm wells which operate in a lead/lag basis. The raw water is pumped to an air stripper to remove hydrogen sulfide gases and then goes to a reactor/softener. The water then gravity flows to a dual filter before dropping to a clearwell. Water is pumped from the clearwell via two transfer pumps to a 500,000 gallon Ground Storage Tank for distribution out in the plant. The plant currently uses about 500,000 gpd and is permitted for 2 MGD. Chlorine gas in a water solution is added at three injection points through 1" Schedule 80 PVC lines: (1) The piping leading to the Reactor/Softener (15 ppd rate); (2) The piping leading to each of the filters (the 1" line is split near the injection point and goes to each filter) (20 - 40 ppd rate); and (3) Clearwell (20 - 50 ppd rate). The finished water is sent to a 500,000 gallon Ground Storage Tank where it is pumped out through two High Service Pumps (one is constantly running at all times) rated for about 1,200 gpm through an 8" line. One High Service Pump runs at a constant speed and if system pressure gets too high it "kicks back" to the Ground Storage Tank. There is a Hach Cl-17 chlorine analyzer on the discharge of the High Service pumps which is monitored at the WTP (which is manned 14 - 16 hours per day) and a remote reading also goes to the Power Plant Control Room. The analyzer takes a reading before the "kickback" line.

The plant desires to shift some of its chlorine feed to a 'Post' injection point out of the Ground Storage Tank to cut down on the contact time and thus lower potential THM formation. The 'Post'

system will require a separate chlorination system because of the long distance from the existing chlorine gas system (the 'Post' system will be located at least 500' from the existing chlorine gas system in a separate building to the west of the existing Water Treatment plant). The purpose of this project is to furnish and install this 'Post' Chlorination System.

GENERAL DESCRIPTION OF THE PROPOSED 'POST' CHLORINATION SYSTEM

[Design Basis]: The expected usage at the new 'Post' feed point would be between 20 to 60 gpd based on shifting the chlorine demand from the treatment process to the new 'Post' injection point (the extra 20 gpd would be in the event the re-use system goes down and the extra chlorination is needed for the increased pumping). The expected feed rate would be based on the capacity of the High Service pumps but assuming 1,200 gpm then the maximum feed rate of the pumps would be 120 gpd (under worst case conditions).

[Description of Permanent System]: The existing building which houses the High Service Pumps by the Ground Storage Tank is not large enough to put the sodium hypochlorite system and because it also houses the motor control center for the High Service Pumps it would not be advisable to put chlorine equipment in the same room. As such, Odyssey proposes to install a new 12' x 20' x 8" concrete pad behind this building to house the system. A single bulk storage tank with containment would be placed on the pad. A vinyl garden shed would be placed on the pad and the chemical feed pumps (on pump skid) would be placed inside the vinyl shed. New chlorine injection piping would be run from the discharge of the pumps to a new injection point on the suction of the High Service Pumps. The injection point would have two 90-degree bends before it goes through the High Service pump impeller so there would be adequate mixing before it hit the impeller (i.e., there would be no corrosion concerns on the impeller). The sodium hypochlorite would be fed "neat" to the injection point (i.e., without solution water). The Post feed would be regulated by the output of the chlorine analyzer. An eyewash and safety shower would have to be installed on the concrete pad adjacent to the bulk storage tank.

CONSTRUCTION SEQUENCE AND SCHEDULE

The 'Post' feed system will be installed without interfering with any existing plant operations. Once the FDEP permit is approved, Odyssey will furnish and install the system. The proposed installation work would be expected to take about one week. Additionally, Odyssey will supply all necessary startup and training services for the constructed works.

EQUIPMENT DETAILS

Concrete Pad

Odyssey will pour a 20' x 12' x 8" concrete pad using 3,000 psi concrete with fiber adjacent to the north side of the High Service Pump Building beginning approximately 7 feet east of the northwest building corner. Odyssey will remove the existing grass and rake the area level and construct the formwork prior to pad construction.

Vinyl Garden Shed

The chemical feed equipment will be located in an 8' x 10' x 7' vinyl garden shed which will be tacked down along the base on 12" centers and also tied down to the concrete pad with straps. Odyssey has used these sheds at numerous locations across Florida. The sheds work extremely well

in a corrosive environment, look very professional and have withstood past hurricanes. The shed is screwed to the concrete pad and tied down with stainless steel straps. Odyssey's work includes installation of the shed, tie downs, exhaust fan, fluorescent lighting and 120 VAC power to the lights through a breaker panel. Orlando Utility Commission (OUC) would run 120 VAC to the breaker panel in the shed from the High Service Pump Building. All wiring shall be in conduit. The shed shall be located on the east end of the concrete pad.

Chemical Storage Equipment

Bulk Storage Tank

Odyssey will furnish and install one 1,100 gallon Snyder "Captor" HDLPE tank with built-in containment rated for 1.9 specific gravity and for use with sodium hypochlorite (see attached "cut" sheet). The tank measures approximately 76" diameter and is 104" in height. The containment for each tank is provided by a separate outside wall that is part of the tank itself (see attached "cut" sheets). This tank size would provide about 27 days of on-site storage (using the well known thumb rule that one pound of chlorine gas is equivalent to one gallon of Odyssey 12.5 Trace Percent Ultrachlor sodium hypochlorite). The tank will have a 3" vent and a 2" fill line at the top of the tank. The fill line will have a 2" isolation valve on the tank. The bottom fitting will be a titanium bolted double flanged connection. Odyssey will install a 1" isolation valve at the bottom UFO fitting on the tank and connect it to a 1" flexible PVC piping which would be tied to a 1" isolation ball valve. This valve will connect to 1" feed piping which will run to the pump skid. All piping will be Schedule 80 PVC. All valves will be true union ball valves with viton o-rings. All gaskets (e.g., bulkhead fitting) will be viton. Tank level readings will be available visually on the outside of the tank via a Schedule 40 clear PVC sightglass. A measuring strip will be placed behind the sightglass for measuring the precise amount of use. The tank will be installed in compliance with the manufacturer's directions (attached).

The 2" tank fill line will be extended from the tank to the north outside wall of the High Service Pump Building and then down around the west end of the Building. The end of the line will terminate down with a 45-degree fitting with a male chemlock fitting on the end. Just prior to the end of the line before it angles down, Odyssey will install a 2" Asahi Type 21 ball valve.

Chemical Feed Equipment

Chemical Pump Skid

A chemical pump skid will be installed along the southwest wall of the vinyl garden shed. The duplex pump skid will contain two Prominent Delta diaphragm pumps (solenoid-type) rated for up to 7.3 gph @102 psi (new style digital pump which has an extremely smooth stroke because solenoid field only partially collapses). One pump will be dedicated to the feed point and one as an installed spare. The pump skid will measure about 2'8" by 4'6" and there is plenty of space for the pump skid inside the vinyl garden shed. The pumps will be powered from 120 VAC. With regard to the pump skid, a backpressure regulator, pump discharge pressure gage, pulsation dampener, isolation valves, flush out connections, Y-strainer and pressure relief will be provided for each pump. The pressure relief will be piped back to the suction of the pumps. A common calibration tube will be provided for the pumps the top of which will be tied to the stack vent. All piping on the pump skid is 1/2" Schedule 80 PVC. All valves will be true union ball valves with viton o-rings. The pumps can be operated in a manual mode or an automatic mode using a 4/20-ma signal from a flowmeter, chlorine analyzer or controller (e.g., computer). Additionally, each pump has a 4/20-ma signal in capability as well as two dry contact signals in that could be connected to a SCADA system for remote control. The pumps

have a built-in SCR and thus do not require a separate DC motor and drive. Odyssey will be responsible for the internal electrical wiring to the NEMA 4X panel on the pump skid from the breaker panel inside the NEMA 4X panel. The skid will be installed in compliance with the manufacturer's instructions.

Injection Piping

Odyssey will run the permanent ½" chlorination line out the west end of the vinyl Garden Shed and around the High Service Pump Building and penetrate the Building just over the double door on the west side of the Building. The piping will be in double walled pipe anywhere over the doorway and anywhere else there is a chance of personnel exposure. The end of the pipe will be terminated into the existing 8" carbon steel piping with a new 8" steel saddle tap installed by Odyssey. The saddle tap will have a 1" carbon steel valve. Odyssey will install a teflon-lined ½" quill assembly into the 8" pipe through the 1" valve and saddle tap. The end of this line will have one ½" Plastomatic diaphragm check valve and two ½" Asahi Type 21 isolation ball valves for a calcification cleanout. The quill assembly will have a safety chain. All valves, piping and pipe supports will be as previously specified. All exposed chlorine line will be painted yellow. All piping and valves are Schedule 80 PVC. All valves will be Asahi Type 21 with viton o-rings

Emergency Eyewash Station

Odyssey will install a 1" Schedule 80 PVC line on the drain on the kickback line bypass and run this line out the west end of the High Service Pump Building (following the same path as the ½" injection piping) back to the east side of the concrete pad to an eyewash station and safety shower. Odyssey will ensure the tap-in drain is still useable. Odyssey will furnish and install the eyewash and safety shower in accordance with the manufacturer's directions adjacent to the bulk storage tank between the bulk storage tank and the vinyl garden shed.

UTILITIES

Electrical Work

Odyssey will provide a 120 VAC electrical service breaker panel with one incoming 20 Amp breaker and three 15 Amp breakers feeding: (1) The NEMA 4X panel on the pump skid; (2) The exhaust fan; and (3) The fluorescent light and a duplex convenience outlet. Each of the three loads is predicted to draw less than 2.5 Amps. All wiring shall be in conduit and at least #12 AWG. OUC will run 120 VAC service to the breaker panel.

Control Wiring

Odyssey will hookup the existing chlorine residual signal in the High Service Pump Room to the NEMA 4X panel for the chemical feed equipment.

Odyssey will ensure the NEMA 4X panel will be capable of interfacing with OUC's SCADA system in the future should OUC desire to do so by providing the NEMA 4X panel with the following I/O (all of the analog signals shall be hooked up to EDCO DRS surge suppression units in the pump skid NEMA 4X panel) for each pump: (1) Remote On/Off; (2) Pump Failure Alarm; (3) 4/20 ma output; and (4) 4/20 ma input.

FINISHED WATER QUALITY

Once the conversion is complete, the finished water leaving the plant will continue meet all current regulations for potable water.

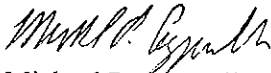
Thank you for your consideration. Please call me if you have any questions at (407) 489-6882, facsimile (863) 701-9096 or email mazzarella@hydrosc.com if I can be of further assistance.

Sincerely,



Michael P. Azzarella, P.E.

Cc: Patrick H. Allman, Odyssey Manufacturing
Alan Planeta, OUC



Michael P. Azzarella, P.E.

PE #52427

July 21, 2009



APPLICATION FOR A SPECIFIC PERMIT TO CONSTRUCT PWS COMPONENTS

See page 4 for instructions.

I. General Project Information

A. Name of Project: Orlando Utility Commission Stanton Energy Power Center Water Treatment Plant "Post" Sodium Hypochlorite System

B. Description of Project and Its Purpose: This project will provide a sodium hypochlorite "post" feed system to the existing water treatment plant. There are currently three chlorine solution feed locations. This project will provide a fourth 'post' location at the suction side of the plant's high service pumps to provide greater flexibility, and have greater control over chlorine feed rates and the ability to minimize potential THM formation.

C. Does project create a "new system" as described under subsection 62-555.525(1), F.A.C.? ☐ Yes, and a completed copy of Form 62-555.900(20), New Water System Capacity Development Financial and Managerial Operations Plan, is attached. ☒ No.

D. Location of Project

1. County Where Project Located: Orange

2. Description of Project Location: Orlando utilities Commission, Curtis H. Stanton Energy Center, 5100 South Alafaya Trail, Orlando, FL 32831

3. Latitude and Longitude of Each New Treatment Plant and Each New Raw Water Source (attach additional sheets if necessary):

Name of New Treatment Plant or Raw Water Source	Latitude	Longitude
N/A	° ' "N	° ' "W
	° ' "N	° ' "W
	° ' "N	° ' "W
	° ' "N	° ' "W
	° ' "N	° ' "W

E. Estimate of Cost to Construct Project: \$40,000

F. Estimate of Dates for Starting and Completing Construction of Project: Estimated Start Date: August 31, 2009; Estimated Completion Date: September 13, 2009

G. Applicant

PWS/Company Name: <u>Orlando Utilities Commission</u>		PWS Identification No.: <u>* 3480962</u>
PWS Type: *	☒ Community ☐ Non-Transient Non-Community ☐ Transient Non-Community ☐ Consecutive	
Contact Person: <u>Alan Planeta</u>	Contact Person's Title: <u>Chemical Engineer</u>	
Contact Person's Mailing Address: <u>500 South Orange Avenue, Po Box 3193</u>		
City: <u>Orlando</u>	State: <u>FL</u>	Zip Code: <u>32802</u>
Contact Person's Telephone Number: <u>407-658-6444</u>	Contact Person's Fax Number: <u>407-244-8794</u>	
Contact Person's E-Mail Address: <u>aplaneta@ouc.com</u>		

* This information is required only if the applicant is a public water system (PWS).

H. Public Water System (PWS) Supplying Water to Project

PWS Name: <u>Orlando Utilities Commission</u>		PWS Identification No.: <u>3480962</u>
PWS Type: *	☒ Community ☐ Non-Transient Non-Community ☐ Transient Non-Community ☐ Consecutive	
PWS Owner: <u>Orlando Utilities Commission</u>		
Contact Person: <u>Alan Planeta</u>	Contact Person's Title: <u>Chemical Engineer</u>	
Contact Person's Mailing Address: <u>500 South Orange Avenue, Po Box 3193</u>		
City: <u>Orlando</u>	State: <u>FL</u>	Zip Code: <u>32802</u>
Contact Person's Telephone Number: <u>407-658-6444</u>	Contact Person's Fax Number: <u>407-244-8794</u>	
Contact Person's E-Mail Address: <u>aplaneta@ouc.com</u>		

APPLICATION FOR A SPECIFIC PERMIT TO CONSTRUCT PWS COMPONENTS

Project Name: Orlando Utility Commission Stanton Energy

Applicant: Orlando Utilities Commission

C. Certification by PWS that Will Own Project After It Is Placed into Permanent Operation

I am duly authorized to sign this application on behalf of the PWS identified in Part I.I of this application. I certify that said PWS will own this project after it is placed into permanent operation. I also certify that said PWS has reviewed the preliminary design report or drawings, specifications, and design data for this project and that said PWS considers this project acceptable as designed.

Signature and Date

Alan Planeta.
Printed or Typed Name

Chemical Engineer
Title

D. Certification by Professional Engineer(s) in Responsible Charge of Designing Project*

I, the undersigned professional engineer licensed in Florida, am in responsible charge of preparing the preliminary design report or drawings, specifications, and design data for this project. I certify that, to the best of my knowledge and belief, the design of this project complies with Chapter 62-555, F.A.C., and provides assurance of compliance with Chapter 62-550, F.A.C.

Signature, Seal, and Date:

Michael P. Azzarella
7/21/09

Printed/Typed Name: Michael P. Azzarella

License Number: 52427

Portion of Engineering Document(s) for Which Responsible:
All

Signature, Seal, and Date:

Printed/Typed Name:

License Number:

Portion of Engineering Document(s) for Which Responsible:

Signature, Seal, and Date:

Printed/Typed Name:

License Number:

Portion of Engineering Document(s) for Which Responsible:

Signature, Seal, and Date:

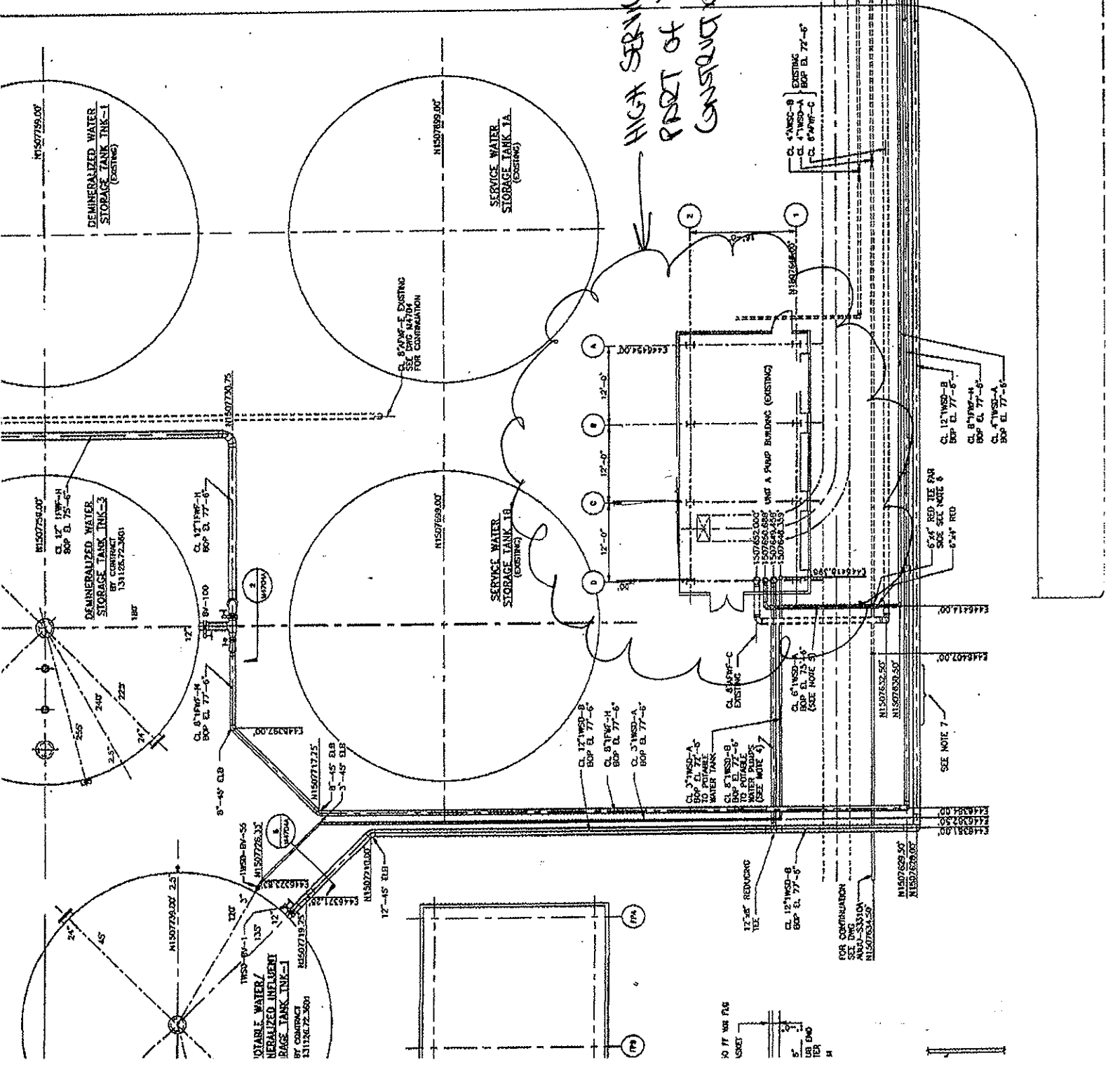
Printed/Typed Name:

License Number:

Portion of Engineering Document(s) for Which Responsible:

* Except as noted in paragraphs 62-555.520(3)(a) and (b), F.A.C., projects shall be designed under the responsible charge of one or more professional engineers (PEs) licensed in Florida. If this project is being designed under the responsible charge of one or more PEs licensed in Florida, Part II.D of this application shall be completed by the PE(s) in responsible charge. If this project is not being designed under the responsible charge of one or more PEs licensed in Florida, Part II.D does not have to be completed.

EXISTING-SITE PLAN
FOR INFORMATION ONLY
NOT TO SCALE



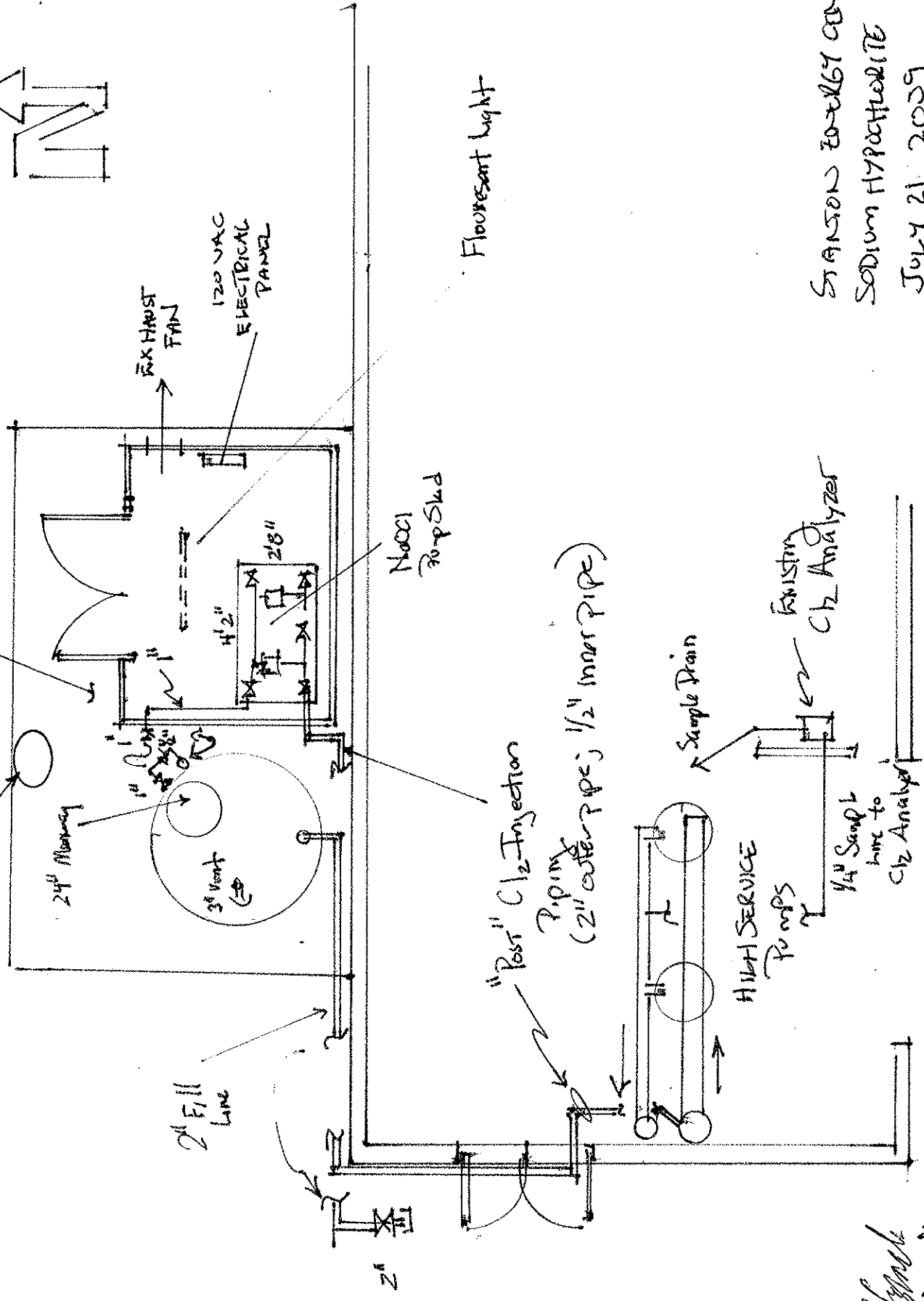
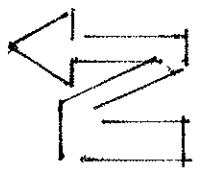
DEMINERALIZED WATER
STORAGE TANK TNR-1
(EXISTING)

DEMINERALIZED WATER
STORAGE TANK TNR-3
(EXISTING)

DEMINERALIZED WATER
STORAGE TANK TNR-1
(EXISTING)

EXISTING-SITE PLAN
FOR INFORMATION ONLY
NOT TO SCALE

Shower Expansion Station 1/2" NPS



Flouresant light

No. 1
Stop Stand

2" Post Cl₂ Injection
Piping
(2" outer pipe; 1/2" inner pipe)

HIGH SERVICE
Pumps

Sample Drain

Existing
Cl₂ Analyzer

1/4" Sample
line to
Cl₂ Analyzer

STANSON TOOL & EQUIPMENT
SODIUM HYPOCHLORITE

JULY 21, 2009

NOT TO SCALE

PLAN VIEW

Michael P. Accordino
FL PE # 53427
JULY 21, 2009

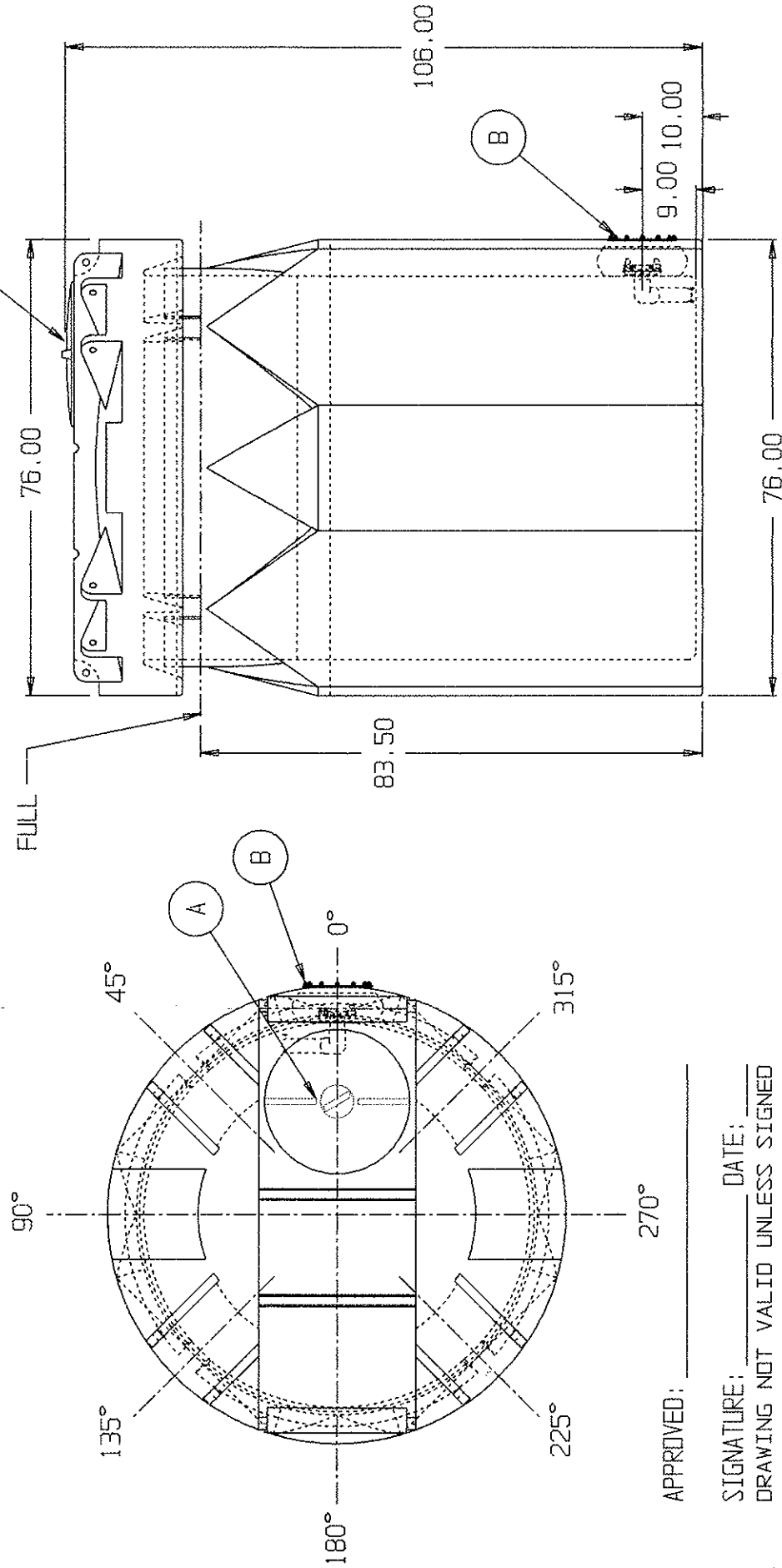
ORLANDO UTILITIES COMMISSION
STANTON ENERGY CENTER WTP
SODIUM HYPOCHLORITE 'POST' FEED SYSTEM

STORAGE TANK INFORMATION

HARRINGTON - ORLANDO
P.D.

DDY, J.EY.

SNYDER INDUSTRIES INC.



APPROVED: _____

SIGNATURE: _____ DATE: _____
DRAWING NOT VALID UNLESS SIGNED

NOTE:

ALL EXTERNAL PIPING MUST BE INDEPENDENTLY SUPPORTED.

A. 24" PE THREADED-VENTED MANWAY W/22" ACCESS [P/N 34700352]

B. 2" HD/NAT UFD TRANSITION FTG W/VITON GASKETS & SS BOLTS [P/N 1070000N95802]

B. 2" PVC DBL FLANGED BOLTED FTG W/VITON GASKETS & ENCAP. TITANIUM LONG BOLTS [P/N 34700687]

B. 2" PVC SCH. 40 SLIP-FIT SIPHON TUBE ASSY [P/N 34701257]

BASE FITTINGS TO BE LEFT INSTALLED AT TIME OF SHIPMENT PER SII PROCEDURE

Consult Snyder's Guidelines for Use and Installation prior to delivery.

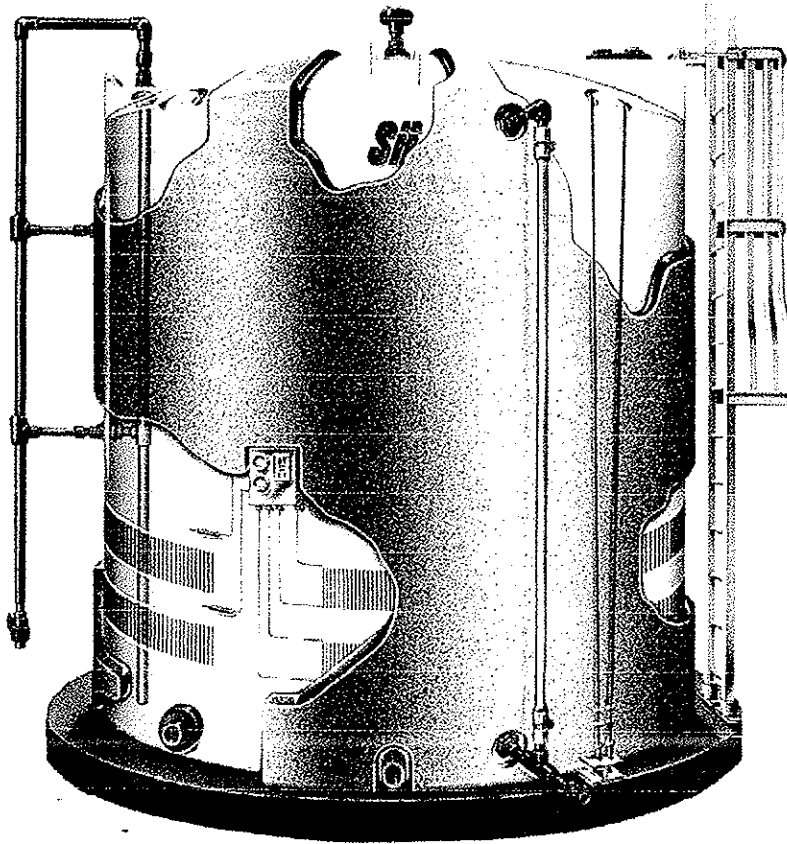
Available on-line at www.snyder.net.com

(all dimensions in inches)

PART # PRIMARY: 5470000N97202 (L)
HDLPE/NAT/1.9 SPGR
CONTAINMENT: 5450000N97201 (L)
HDLPE/NAT/1.9 SPGR
REF#: 15461a 02/09/06

1,100 GALLON CAPTOR CONTAINMENT SYSTEM

GUIDELINES FOR USE AND INSTALLATION



PROVIDING INDUSTRY WITH TANK SOLUTIONS

Protect your warranty – Read these instructions!

SNI SNYDER
INDUSTRIES, INC.

P.O. Box 4583 • Lincoln, Nebraska • 68504 • Phone: 402-467-5221
Fax: 402-465-1220 • www.snydernet.com

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1. SAFETY CHECKLIST

- 1.1 Confirm that the product to be stored is compatible with the tank and fittings.
- 1.2 Do not rigidly pipe tanks. Refer to section 5.3.2 for additional information.
- 1.3 All tanks must be properly vented. These tanks are not pressure vessels and must be vented to atmosphere. Venting equipment should be sized to limit pressure or vacuum in the tank to a maximum of ½" of water. Review the chemical to see if it can be vented to atmosphere or if it needs treatment prior to venting. Your application may need a sealed tank with a vent line going to a scrubber system for proper chemical safety.
- 1.4 **WARNING:** It is the installer's responsibility to follow all appropriate NFPA, OSHA, and governmental safety precautions. The following information has been provided as guidelines for tank use and installation. It does not address safety issues which may be present at specific tank installation sites. Use appropriate safety practices when handling any tank and/or using heavy equipment.
- 1.5 Prevent excessive heat near or inside the tank. Standard polyethylene tanks are designed for a maximum continuous temperature of 100°F. Consult factory for applications above 100°F.
- 1.6 Consider tank entry as a confined space entry. Follow proper entry procedures.
- 1.7 Do not stand or work on top of a tank. Remember – Safety First!
- 1.8 Read all warning labels on the tank prior to use and installation.
- 1.9 Record all warranty information as per section 2 while all information is available at time of tank receipt. Please refer to section 10 for warranty and policy statements.

2. WARRANTY INFORMATION

2.1 Record all required warranty information detailed below. Fax or mail this information to Snyder Industries at the number or address shown above. Retain a copy of this information for use in the advent of a warranty question.

2.1.1 Tank Part Number: _____

2.1.2 Tank Serial Number: _____

2.1.3 Tank Description/Size: _____

2.1.4 Date of Original Factory Invoice: _____

2.1.5 Snyder Customer Order Number: _____

2.1.6 Distributor Supplying Tank (name, address, and phone number): _____

2.1.7 Date of Water Pre-Test: _____

2.1.8 Water Pre-Test Observations: _____

2.1.9 Type of Chemical Stored: _____

2.1.10 Concentration of Chemical: _____

2.1.11 Tank Use Temperature: _____

3. RECEIVING AND INSPECTING YOUR TANK

3.1 Upon arrival at the destination, the purchaser and/or his agent shall be responsible for inspection for damage in transit. If damage has occurred or parts are missing, the purchaser should document this on the bill of lading, file a claim with the carrier, and notify the manufacturer prior to putting the tank into service.

3.2 Verify that the tank part number on the packing slip matches the tank bar code being delivered.

3.3 Do not drop a tank off a truck onto the ground. Please see section 4 for proper unloading instructions.

3.4 Please match tank components to bill of lading. Some tank components may be shipped inside the tank. Please review before putting the tank into a vertical position.

4. TANK LOADING, UNLOADING, AND POSITIONING

4.1 HORIZONTAL TANKS

4.1.1 Tanks shall be wrapped if ordered by the customer.

4.1.2 Tanks should be hand carried, moved with a handling cart, or moved with a forklift with protected or rounded fork extensions (to prevent sharp forks from damaging tanks and to provide adequate support for the tank as it is being moved).

4.1.3 Tanks should be loaded and unloaded from a horizontal position in the truck with a minimal amount of sliding. The tank shall be hand carried, moved with a handling cart, or moved with a forklift with protected or rounded fork extensions to minimize sliding.

4.1.4 Tanks should be loaded or unloaded from a dock of proper height or with a forklift with protected or rounded fork extensions. **NEVER drop a tank off of a truck onto the ground since this may damage the tank and void the warranty.**

4.2 SMALL VERTICAL and CONE BOTTOM TANKS (LESS THAN 2000 GALLON CAPACITY)

4.2.1 Tanks shall be wrapped if ordered by the customer.

4.2.2 Tanks should be hand carried, moved with a handling cart, or moved with a forklift with protected or rounded fork extensions (to prevent sharp forks from damaging tanks and to provide adequate support for the tank as it is being moved).

4.2.3 Tanks should be loaded and unloaded from a horizontal or vertical position in the truck with a minimal amount of sliding. The tank shall be hand carried, moved with a handling cart, or moved with a forklift with protected or rounded fork extensions to minimize sliding.

4.2.4 Tanks should be loaded or unloaded from a dock of proper height or with a forklift with protected or rounded fork extensions. **NEVER drop a tank off of a truck onto the ground since this may damage the tank and void the warranty.**

4.3 LARGE VERTICAL and CONE BOTTOM TANKS (GREATER THAN OR EQUAL TO 2000 GALLONS)

4.3.1 Tanks shall be wrapped if ordered by the customer.

4.3.2 Tanks should be moved, loaded, and unloaded in a horizontal position with a forklift with protected or rounded fork extensions, or with a crane with a spreader bar and 2 slings of appropriate size positioned on each tank as shown in Figure 4.1. NEVER drop a tank off of a truck onto the ground since this may damage the tank and void the tank warranty.

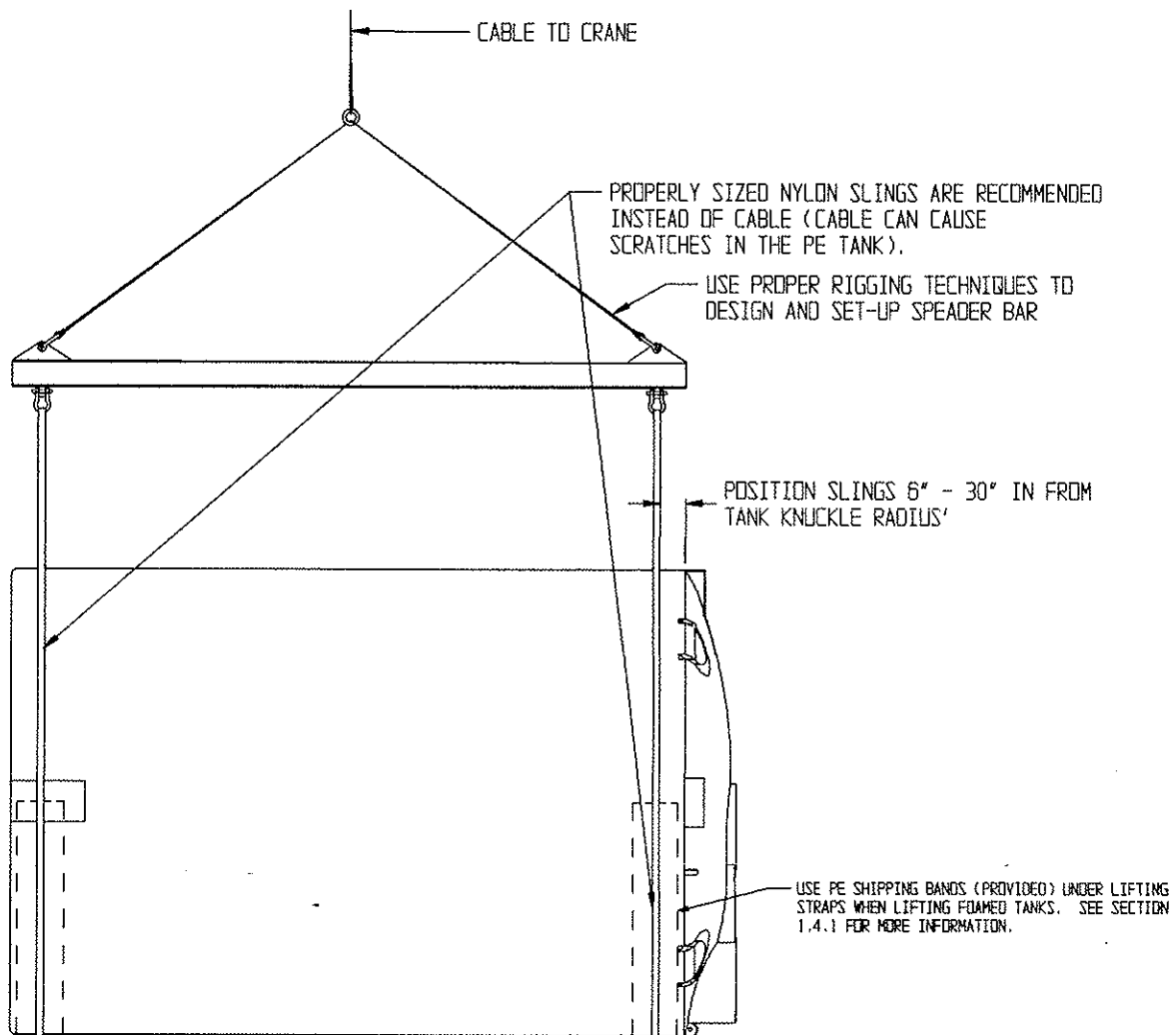


Figure 4.1

4.3.3 Tank lifting lugs are intended for moving the tank from a horizontal position to a vertical position from a firm surface. **Lifting lugs should not be used to load or unload tanks from trailers. This is a dangerous situation since the tank could roll off of the shifting trailer surface as the load is being moved.**

4.3.4 After the tank has been placed on a firm, level surface in a horizontal position, the lifting lugs may be used to erect the tank in a vertical position on an appropriate support pad. The tank should be lifted using a symmetrical arrangement of lugs to disperse the load evenly throughout the tank. To properly attach to the lifting lugs a straight clevis should be used with a minimum open throat distance of 1-1/2" and 1" diameter pins. A minimum of 4 lugs should be attached with equal length cables on all large vertical tank sizes except 142" diameter tanks. 142" diameter tanks require 3 lugs to be attached. All tanks should be positioned with 2 lugs closest to the ground prior to lifting the tank to the vertical position. Refer to Figure 4.2 for additional in-

formation. If the tank does not have lifting lugs, it may be necessary to rig the tank with slings or use a pipe and chain through the tank manway to upright the tank. Please contact the factory for additional information as necessary.

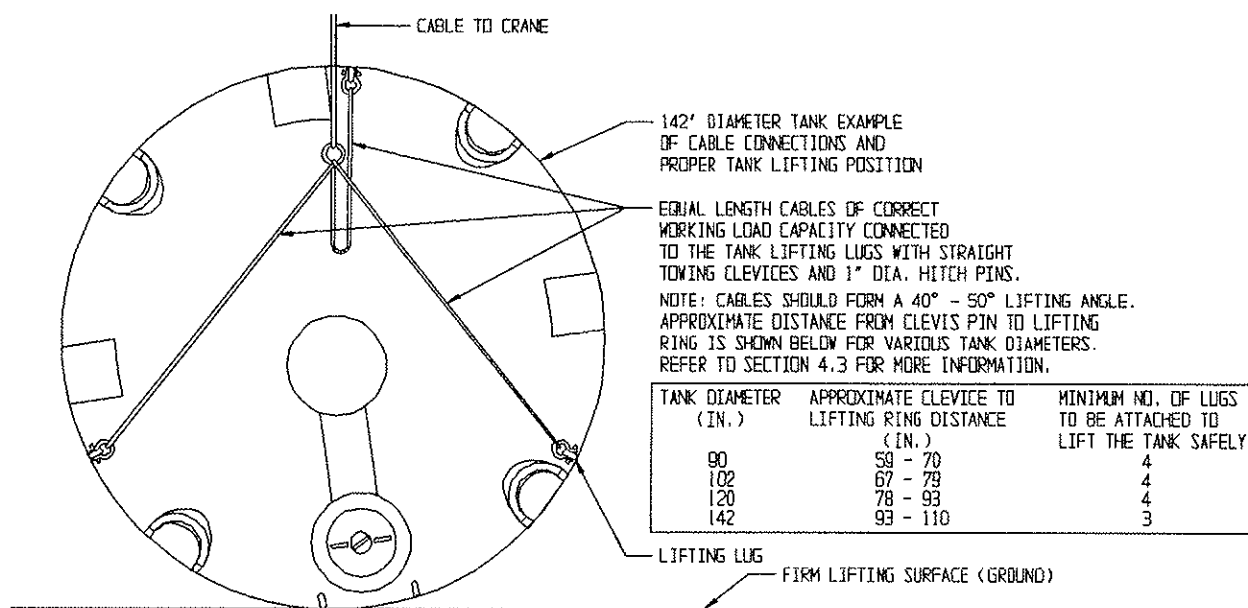


Figure 4.2

4.4 INSULATED TANKS (ADDITIONAL INSTRUCTIONS)

4.4.1 Insulated tanks must be moved with devices that have large padded contact surfaces to prevent damage to the foam insulation. **NEVER allow the tank to drop or roll on rough surfaces as this may damage the foam insulation.** When transporting foam insulated tanks, use a 30" wide PE sheet 1/4" or more thick conforming to the curvature of the insulated tank as banding supports. This will assist in decreasing the stress on the foam caused by the banding straps.

4.5 CAPTOR CONTAINMENT TANKS (ADDITIONAL INSTRUCTIONS)

4.5.1 Captor containment tanks are shipped assembled (primary tank inside of containment tank) with a shipping cable assembly holding the two tanks together. Lift and position the tank as per previous instructions. Once the tank is in position, remove the shipping cables from the tank. Do not leave the shipping cables under the tank. Follow standard vertical tank restraining methods shown in section 8.2 to restrain the tank assembly for wind or seismic conditions.

5. PRE-INSTALLATION NOTES

5.1 TANK OPERATING CRITERIA

5.1.1 **TEMPERATURE** - All standard SII tanks are designed for a maximum continuous service temperature of 100° F. Service temperatures greater than 100° F reduce the strength of the tank. Applications with temperatures greater than 100° F require greater wall thickness to accommodate this reduction in strength. Please consult factory for applications with service temperatures greater than 100° F.

5.1.2 **PRESSURE** - All standard SII tanks are designed for use at atmospheric pressure. **Pressure or vacuum situations can cause excessive deformation or damage to the tanks and void warranty.** Please consult factory for applications which may develop pressure or vacuum situations.

5.1.3 **CHEMICAL COMPATIBILITY** - Suitability of the tank assembly (tank, fittings, gaskets, etc.) for storing a particular chemical must be confirmed by chemical data (this should have been done by the tank distributor

or the end user prior to placing the tank order). However, changes to the tank (i.e. tank accessories, or the service of the tank) can occur. Please consult the factory with any questions.

5.1.4 LOCATION REQUIREMENTS - There may be location requirements which should be considered prior to placing the tank into service. Some items to consider are: secondary containment; locating the tank in a flood plain; locating the tank so it is easy to install and access for service; locating a tank in an area where seismic or wind forces may be experienced; and heat from surrounding equipment. **It is the responsibility of the end user to ensure that all location requirements have been taken into consideration.** Check for all federal, state, and local regulations that may apply to the tank installation. A thorough evaluation of the proposed tank location prior to tank installation is recommended.

5.1.5 TANK ENTRY PRECAUTIONS - If entry into the tank is necessary, be sure to take all necessary precautions and follow all applicable regulations. Entry into a tank should be considered a "CONFINED SPACE ENTRY" with appropriate OSHA safety precautions required. There are many safety practices which should be considered depending on the specific conditions at the site. Please follow all local, state, and Federal rules and regulations.

5.2 FOUNDATIONS AND SUPPORTS

5.2.1 Vertical flat bottom tanks should be positioned on a concrete pad providing adequate support and a method to attach a tank restraint system (see Section 8 for restraint system pad placement criteria). The pad should be clean, smooth, and level so it fully supports the entire tank bottom with no deflection. The construction site engineer must design an appropriate concrete pad based on the specific application. A sand mound support can be placed under the tank bottom to promote tank drainage and extend tank life in certain applications. This is recommended for all tanks 10,000 gallons and larger. The sand should be a construction grade utility sand or finer. The tank and pad placement must be done to prevent any erosion of the sand from under the tank. Please refer to Figure 5.1. The sand mound must be very uniform without lumps or foreign objects. Per the chart in Figure 5.1, draw a circle on the tank pad and rake the sand uniformly with zero elevation at the circle perimeter and an elevation in the center per the chart in Figure 5.1. The chart recommendations are nominal dimensions. The best support is a sand mound that follows the normally convex shape of the tank bottom. If the tank bottom is not as convex as the dimensions shown for the sand mound in Figure 5.1, then follow the tank bottom. Adjust the sand mound shape/size so the tank has minimal contact with the sand when properly centered on the mound.

5.2.2 Vertical flat bottom tanks with SUMO fittings may require a notch in the concrete support pad just in front of the SUMO fitting for piping and piping accessories. The SUMO fitting has a $\pm 5^\circ$ tolerance for fitting projection off horizontal. Since the SUMO fitting comes out from the tank very near ground level, concrete support pads which project past the SUMO fitting may interfere with the SUMO and/or its piping accessories. SII recommends that the support pad be notched to provide adequate clearance for piping and tank expansion/contraction movement. Please refer to Figure 5.2.

5.2.3 Cone bottom or horizontal tanks require specifically designed support structures. Inadequate or improperly designed support structures may cause premature tank failure. **Therefore, any support structure that is not of SII manufacture must be approved by SII in writing or ALL WARRANTIES WILL BE VOIDED.**

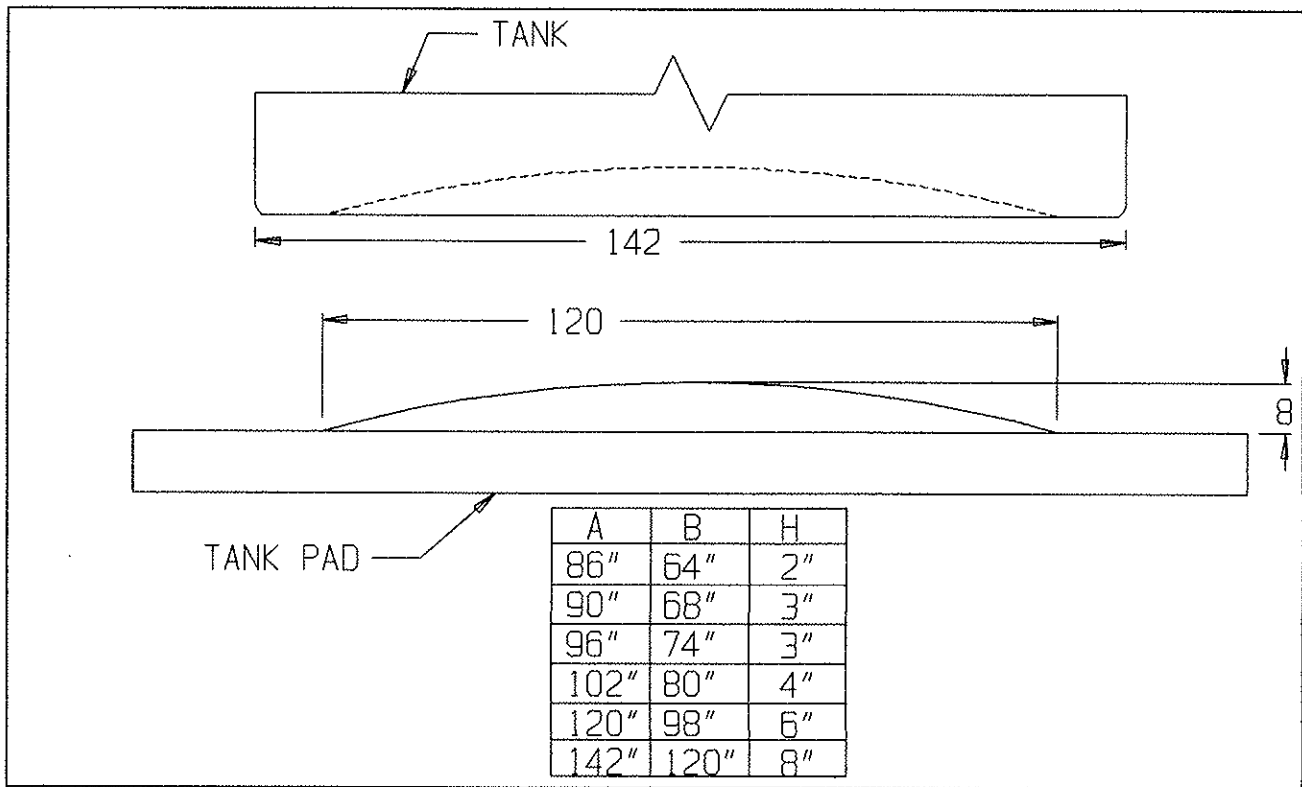
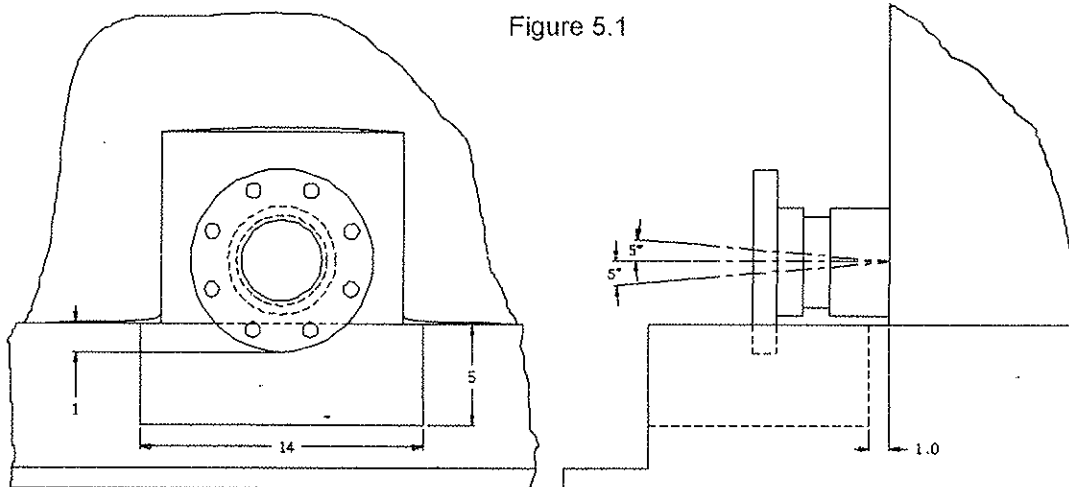


Figure 5.1



NOTES:

1. TANK MUST BE FULLY SUPPORTED BY A SOLID PAD. (CONSULT A LOCAL CIVIL OR STRUCTURAL ENGINEER).
2. ALL TANK OUTLETS MUST BE CONNECTED TO PIPING WITH FLEXIBLE CONNECTORS OR EXPANSION JOINTS CAPABLE OF 4% DIMENSIONAL MOVEMENT AS CLOSE TO TANK AS POSSIBLE (18" OR LESS). FLEXIBLE CONNECTION SHOULD BE DESIGNED FOR 45° ANGULAR MOVEMENT DUE TO TANK EXPANSION/CONTRACTION.
3. OTHER CONNECTION METHODS ARE AVAILABLE FOR SUMO OUTLETS. (FLANGE ADAPTER SHOWN FOR EXAMPLE ONLY)
4. DIMENSIONS "B" AND "C" ARE RECOMMENDED MINIMUM DIMENSIONS ONLY (NOT REQUIRED).

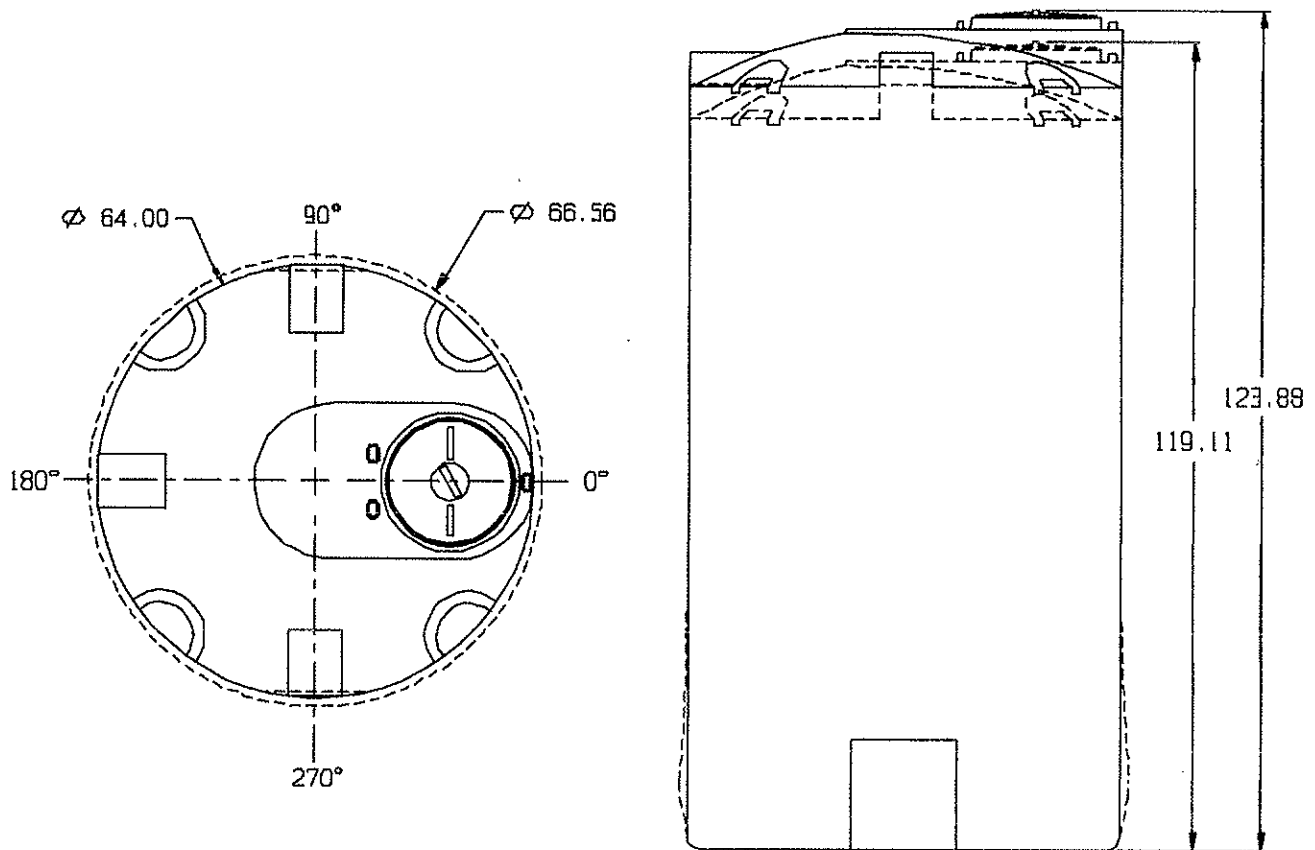
SIZE	DIM. "A"	DIM. "B"	DIM. "C"
2"	1.13'	10"	5"
3"	1.13'	12"	5"
4"	1.40'	14"	5"
6"	1.35'	15"	5"

Figure 5.2

5.3 TANK FITTINGS AND CONNECTIONS

5.3.1 Most tank fittings are typically left installed in the tank. Some fittings are not installed due to damage potential or customer request. Customer job site fitting installation insures proper gasket compression and minimizes fitting damage potential. Some distributors sell or install their own tank fittings or accessories. **These fittings or accessories are not warranted by SII.**

5.3.2 All tank connections must have adequate provisions for tank expansion/contraction due to temperature and load changes. See Figure 5.3. These provisions should allow 4% dimensional movement. Rigid piping must not be directly connected to tank outlets. SII strongly recommends using expansion joints or other provisions for all tank connections. Please see the hose connection example in Figure 5.4. SII has developed the Flexmaster expansion joint for 2" and 3" bolted tank connections. Please see section 7.11 for more details. **The use of rigid piping or the failure to provide for the expansion of the tank will void all warranties.**



THIS EXAMPLE SHOWS 4% DIMENSIONAL CHANGE AFTER LONG TERM COLD FLOW HAS OCCURRED. THE HIDDEN LINES SHOW THE LONG TERM DEFLECTED CASE FOR THIS TANK AT 4% DEFLECTION. TANK DEFLECTION IN THE SHORT TERM WILL EXHIBIT A DIFFERENT SHAPE THAN WHAT IS SHOWN. SHORT TERM DEFLECTION IS GOING TO OCCUR MORE AT THE MID POINT OF THE TANK AND THEN SETTLE OVER A LONG TIME PERIOD TO WHAT IS SHOWN. THIS IS THE AMOUNT OF DEFLECTION THAT SHOULD BE DESIGNED INTO ANY PIPING CONNECTIONS TO THIS TANK. THE FLEXIBLE CONNECTION SYSTEM WOULD NEED TO ACCOMMODATE THIS TYPE OF MOVEMENT. TYPICAL MOVEMENT UNDER NORMAL LOADING AND TEMPERATURE CONDITIONS IS USUALLY LESS THAN WHAT IS SHOWN.

Figure 5.3

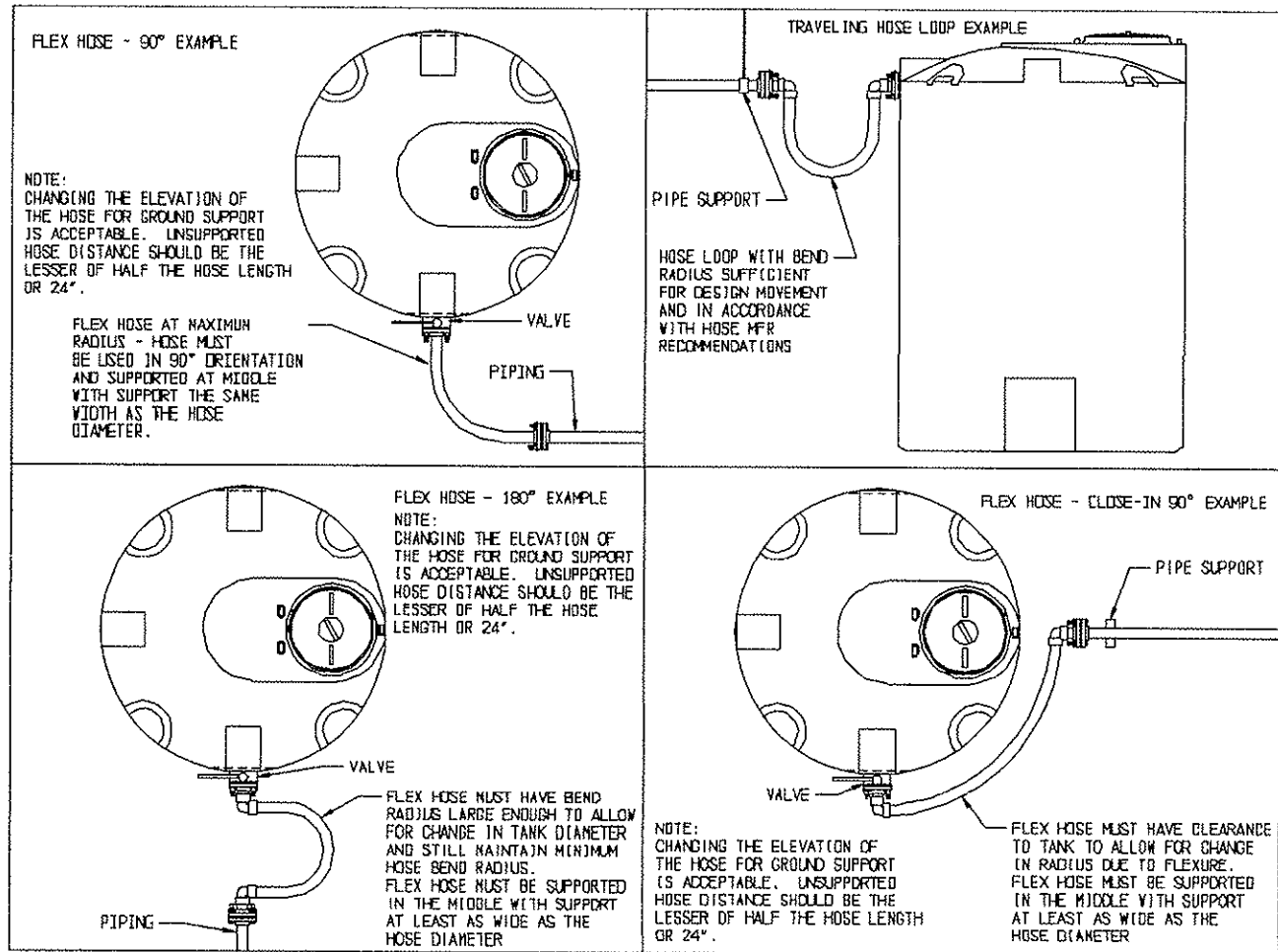


Figure 5.4

5.3.3 FITTING INSTALLATION GENERAL GUIDELINES - If fittings are to be customer drilled and installed, there are some general installation guidelines which may be helpful.

5.3.3.1 LOCATION - It is very important that fitting location be carefully considered prior to cutting any holes. SII recommends (fitting-size dependent) a 6" minimum centerline height for fittings on tanks less than 3000 gallons with the fitting gasket at least 1-1/2" above or below the end of any tank knuckle radius. SII recommends (fitting size dependent) a 9" minimum centerline height for fittings on tanks 3000 gallons or larger with the fitting gasket at least 3" above or below the end of any tank knuckle radius. SII recommends locating all fittings so gasket seal areas do not go through any tank flange lines or any molded-in tank feature (i.e. gallonage markers, logos, ribs, edges of tank flats, etc.). SII does not recommend field cutting and installation of fittings on insulated tanks. Fittings must be located to avoid interference with tie-down devices and to allow for tightening of fittings nut(s). Mark all of the proposed fitting locations with a marker. Re-inspect all of the locations prior to cutting any holes.

5.3.3.2 TOOLS - It is very important to obtain the correct tools before attempting to install any tank fitting. Tools you will need for installing tank fittings properly include:

- *Marker for laying out holes
- *Tape measure, straight edge, plum-bob (to align fittings meant to be aligned), etc.
- *1/2" drill motor
- *Hole saw sized to the O.D. of the fitting body if bulkhead style (see section 6.1, and 6.2).
- *Hole saw sized to the I.D. of the fitting flange hole or the same size as the fitting's size if flange style (see section 6.3, and 6.5).
- *Drills for any bolt holes (size +1/16" larger than the size of the bolts)
- *Deburring tool (a drum sander and 150 - 220 grit sandpaper may also be used)

*Wrenches (adjustable, sockets, strap wrench, etc.)

5.3.3.3 PROCEDURE

1. Disassemble the fitting and use it as a final location check as noted in 5.3.3.1.
2. With the center hole marked, cut the tank hole using the correct size hole saw (see 5.3.3.2).
3. If the fitting is a flange style (see section 6.3 and 6.5) then mark one of the bolt holes using the outer flange. The bolt holes should be oriented so the bolt holes straddle the principal centerline of the tank. With the hole correctly located and marked, drill the bolt hole.
4. Temporarily install one bolt and position the flange over the main fitting hole.
5. Mark the bolt hole opposite the bolt hole already drilled and drill that bolt hole.
6. Temporarily install another bolt and drill the remaining bolt holes using the flange as a guide.
7. With all of the fitting's holes drilled, gently deburr the hole(s) with the deburring tool. Do not put any nicks or scratches into the tank. Sand any nicks or scratches out with sandpaper greater than 120 grit.
8. Clean away any debris from the sealing surface of the tank.
9. For tanks greater than 1/2" thick, measure the tank wall thickness. If the wall thickness is not consistent within $\pm 1/32$ " around all of the fitting hole(s), some sanding on the inside of the tank wall will be necessary. This must be done carefully and as little as necessary. The purpose of the sanding is to make the wall thickness even, not to create a flat on the tank wall. The final finish sanding should be done with greater than 120 grit sand paper (preferably 220 grit).
10. With all of the fitting's hole(s) prepared, install the fitting using the instructions from the appropriate section (6.1, 6.2, 6.3, or 6.5). The inside tank wall surface must be clean and smooth at time of fitting installation.

5.4 TESTING AND FINAL INSPECTION

5.4.1 After all fittings are installed and all connections to the tank have been made, fill the tank with water and hold for at least 5 hours to identify any leaks. **A record of the water pre-test must be submitted to SII to validate the tank warranty.**

5.5 ACCESSORY PARTS

5.5.1 Various parts must be packaged separately to prevent damage during transportation. These parts are usually bagged or boxed to prevent loss or damage. Some parts may be shipped inside of the tank.

6. FITTINGS

NOTE: The following installation instructions assume the tank has been predrilled and prepared for fitting installation by the factory. Most fittings are factory installed, but check fittings for damage and gasket compression. See section 5.2 for general tank fitting information if a fitting is to be installed without a factory prepared location. Prior to installing fittings, check the sealing surface for debris and/or scratches which could cause leakage.

6.1 THREADED BULKHEAD FITTING

6.1.1 Remove the nut (C) from the fitting body (A) and gasket (B). See Figure 6.1 for part identification.

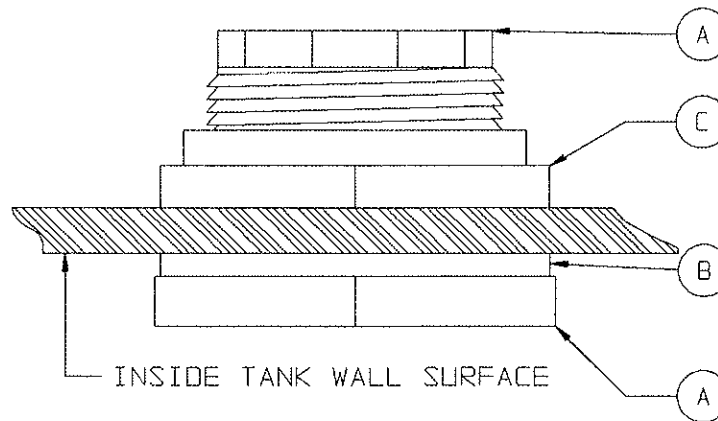


Figure 6.1

6.1.2 Working from inside the tank, slide the fitting body (A) through the hole in the tank. The gasket (B) should be between the fitting body flange and the inside tank wall. Install the nut (C) on the fitting threads protruding on the outside of the tank.

6.1.3 To obtain proper gasket compression for bulkhead fitting installation, tighten the fitting nut hand tight (check to see if it engages the tank wall). Tighten the nut an additional 3/4 turn for fittings less than 1 in., or 1/3 turn for fittings 1 in. or larger. A light lubricant, such as PAM cooking spray, is recommended to prevent thread seizing on bulkhead fittings. Inspect the gasket to make sure it is fully contacting the inner surface of the fitting body flange and the inside tank wall. Gasket compression should be between 25 - 50%. **Recheck fitting tightness periodically.**

6.2 SELF-ALIGNING THREADED BULKHEAD FITTING

6.2.1 Follow the same procedures as detailed under threaded bulkhead fitting installation steps 6.1.1 - 6.1.3.

6.2.2 Piping should be installed into the fitting ball with an appropriate thread sealant (i.e. Teflon pipe sealant). Adjust the piping to the required angle (within the limits of the fitting). When the piping has been located as required, tighten the PVC ball retainer ring located on top of the PVC ball.

6.3 BOLTED FLANGE FITTING

6.3.1 The bolted flange fitting shall be constructed with 2 ea. 150 lb. flanges (C1 and C2), 2 ea. 150 lb. flange gaskets (D1 and D2), the correct number of full threaded bolts (A), bolt gaskets (B), flat washers (E), lock washers (F), and hex nuts (G) for the flange specified. NOTE: If the tank wall thickness is greater than or equal to 0.75", the inner flange (C1) and the inner flange gasket (D1) may be omitted in certain low stress applications only. Please consult factory prior to omitting any components or the tank warranty may be voided. Refer to Figure 6.2 for part identification.

6.3.2 Disassemble the fitting as shipped by removing the bolt's hex nuts, lock washers, flat washers, outer flange, and outer flange gasket. Locate the fitting hole on the inside of the tank and insert the bolts (still installed on the inner flange and gasket) through the drilled holes in the tank. Place the outer flange gasket over the bolts on the outside surface to the tank. Place the outer flange over the outer gasket and bolts. Install the flat washers, lock washers, and hex nuts on the bolts. Check to make sure the fitting assembly appears as shown in Figure 6.2.

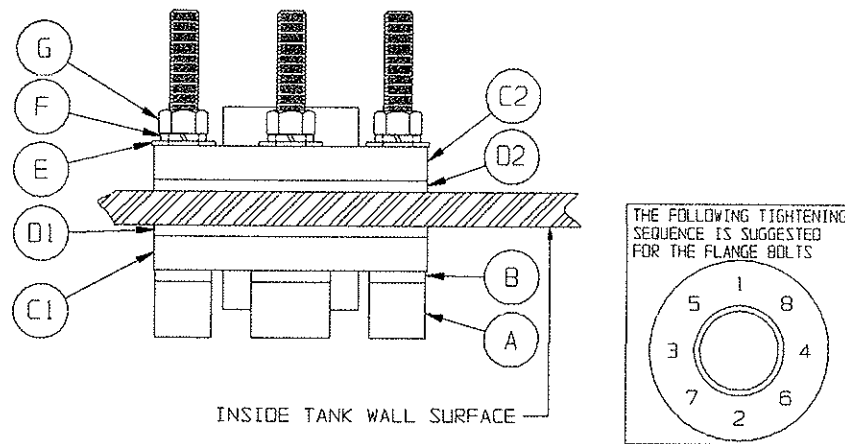


Figure 6.2

6.3.3 To obtain proper gasket compression, tighten all the fitting nuts hand tight with a deep socket using the bolt tightening sequence shown until the gaskets engage the tank wall and the lock washers are compressed. Tighten each nut an additional 3 turns (2 turns if the inner flange and gasket are not utilized) using the same sequence (do not tighten more than 1 turn at a time). A light application of lubricating oil is necessary to prevent thread seizing on S.S. bolts. Gasket compression should be between 25 - 50%. While gasket compression needs to be the controlling factor to obtain a proper seal, do not apply more torque than recommended by the flange manufacturer. See torque value listed on flange. **Recheck fitting tightness periodically.**

6.4 BOLTED STAINLESS STEEL FITTING

6.4.1 The bolted stainless steel fitting shall be constructed with 1 ea. inside flange with studs (A), 2 ea. fitting gaskets (B), 1 ea. outside flange (C), and the correct number of lock washers (D), and hex nuts (E) for the fitting specified. Refer to Figure 6.4 for part identification.

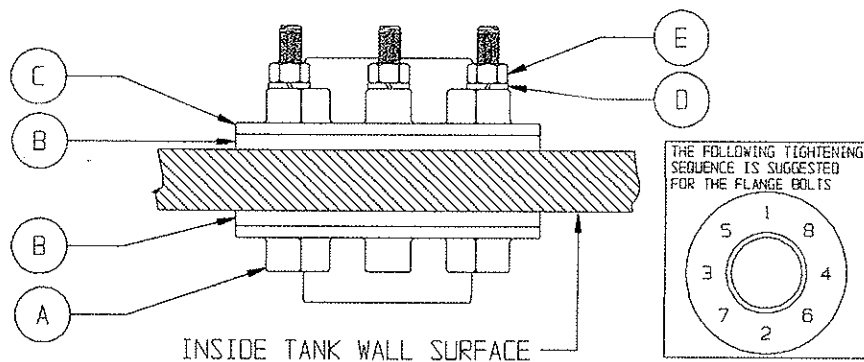


Figure 6.4

6.4.2 Disassemble the fitting as shipped by removing the hex nuts, lock washers, outside flange and outside flange gasket. Locate the fitting hole on the inside of the tank and insert the fitting's studs through the drilled holes in the tank. A gasket (B) should be between the inside fitting flange and the inside tank wall. Place the outside flange gasket and outside flange over the studs on the outside surface of the tank. Install the lock washers and hex nuts on the studs. Check to make sure the fitting assembly appears as shown in Figure 6.4.

6.4.3 To obtain proper gasket compression, tighten all the fitting nuts hand tight with a deep socket using the bolt tightening sequence shown until the gasket engages the tank wall and the lock washers are compressed. Tighten each nut an additional 1-1/4 - 2 turns using the same sequence (do not tighten more than 1

turn at a time). Do not apply more than 15 ft. - lbs. of torque. A light application of lubricating oil is necessary to prevent thread seizing on S.S. bolts. Gasket compression should be between 25 - 50%. **Recheck gasket tightness periodically.**

6.5 SNYDER UNITIZED MOLDED OUTLET - (SUMO™) (PATENT NO. 5,374,026)

6.5.1 The SUMO fitting shall be constructed with 1 ea. smaller o-ring (A), 1 ea. larger o-ring (B), and 1 ea. SUMO adapter (C). Refer to Figure 6.5 for part identification. **NOTE - The tank is shipped with a shipping stabilizer installed in the SUMO outlet. NEVER move the container without the shipping stabilizer installed.**

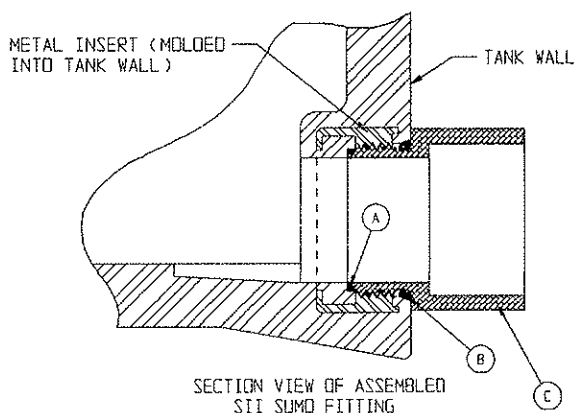


Figure 6.5

6.5.2 Once the tank has been properly placed on its foundation, remove the shipping stabilizer and clean away any dirt or debris from the SUMO outlet threads and o-ring seats. Use only a soft moist cloth. **NEVER USE A TOOL THAT COULD SCRATCH THE O-RING SEATS.**

6.5.3 Install the smaller o-ring inside the SUMO molded-in fitting. Make sure it is placed in the o-ring seat area evenly. Carefully stretch the larger o-ring enough to install it on the SUMO adapter. Only a SII SUMO adapter may be used. Use of a non-approved adapter will void the tank warranty. The o-ring may be lubricated with a suitable lubricant such as water. Do not use silicone or Teflon sealants. Screw the adapter in until the step on the adapter is flush with the tank wall. Do not over-torque the adapter (25 ft. - lbs. of torque maximum). Figure 6.5 shows a sectional view of an assembled SUMO fitting.

6.5.4 Once the SUMO adapter is installed, other components may be attached to the adapter. A union or flange adapter with a flexible expansion joint should be installed as close to the tank as possible to allow for future disassembly. The SUMO fitting must have adequate clearance for any piping accessories and allow for a $\pm 5^\circ$ outlet angle change. Consult factory for pad and/or accessory clearance questions. A notch in the tank support pad may be necessary (see Figure 5.2).

6.6 SIPHON TUBE FITTINGS

6.6.1 Siphon tubes may be added to the fittings specified in sections 6.1, 6.3, 6.4, and 6.5. Siphon tubes shall be customer installed with the tank in a vertical position after fitting installation.

6.6.2 PVC and CPVC siphon tubes need to be solvent welded with the proper solvent cement into the socket of a previously installed fitting. Threaded siphon tubes need to be threaded in place with Teflon pipe sealant applied to the threads prior to the fitting being installed.

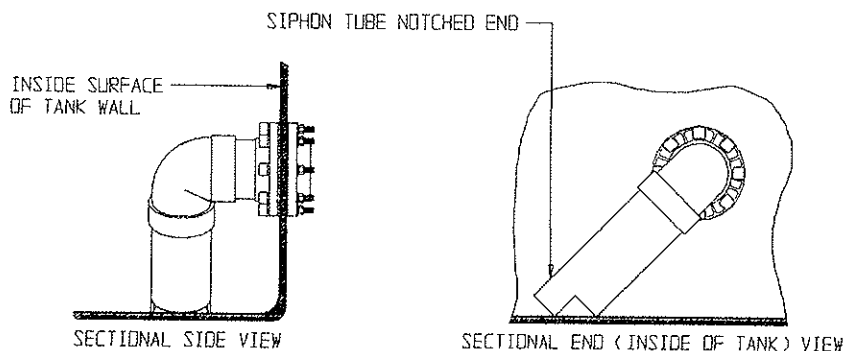
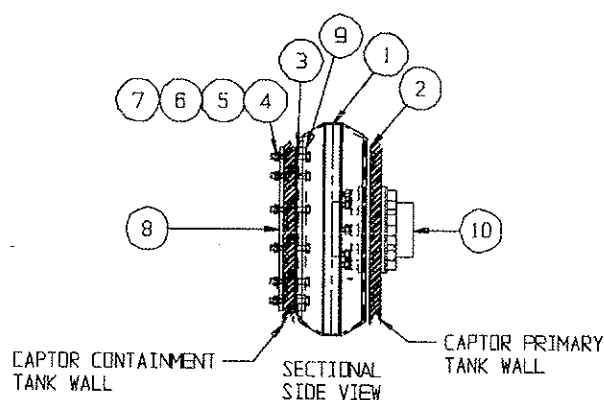


Figure 6.6

6.6.3 Siphon tubes should be located with the cut notch corner in close proximity of the floor of the tank for maximum drainage, and the siphon tube tilted to the side of the fitting. Refer to Figure 6.6 for proper placement of the siphon tube in the tank.

6.7 UNIFIED FITTING OUTLET (UFO™) - FOR USE WITH CAPTOR CONTAINMENT TANKS ONLY

3.7.1 The Unified Fitting Outlet (UFO™) is a flexible outlet device that allows primary tanks to be equipped with sidewall fittings while maintaining a seal between the primary and containment tanks that moves with tank expansion/contraction. The UFO will allow 2 to 4 in. bolted fittings to be utilized while maintaining a flexible containment seal. This option is normally a factory installed option for use with a Captor containment tank assembly only. Consult factory for more details. The bolted fittings used with this option follow the same sealing/tightening criteria as detailed in sections 6.3 and 6.4. An example of this option (patent pending) is shown in Figure 6.7.



10	PROPER BOLTED FITTING ASSEMBLY	1
9	FLANGE 1PC. S.S. CAPTOR FITTING BOOT	1
8	FLANGE 2PC. S.S. CAPTOR FITTING BOOT	1
7	NUT HEX S.S.	12
6	WASHER LOCK S.S.	12
5	WASHER FLAT S.S.	24
4	BOLT S.S.	12
3	GASKET - CAPTOR BOOT 12 BOLT FLANGE	1
2	GASKET - BOLTED FITTING	1
1	FITTING BOOT - CAPTOR	1
ITEM	PART DESCRIPTION	QTY

Figure 6.7

7. TANK ATTACHMENTS

7.1 U-VENTS

7.1.1 Standard u-vents are constructed from PVC or CPVC and are provided with a loose male adapter. This allows the u-vent to be cut to the desired height. A threaded or solvent welded socket fitting can be used. U-vents can be purchased with an optional bug screen insert (CPVC holder and fiberglass 17 x 17 screen) installed.

7.1.2 When installing the u-vent in a solvent weld socket fitting, solvent weld the u-vent with the proper solvent cement in the desired position into a previously installed fitting. If the u-vent is to be used in a threaded fitting, solvent weld the male adapter provided to the u-vent and install the u-vent assembly into a previously installed threaded fitting. Refer to Figure 7.1 for an exploded illustration of this assembly.

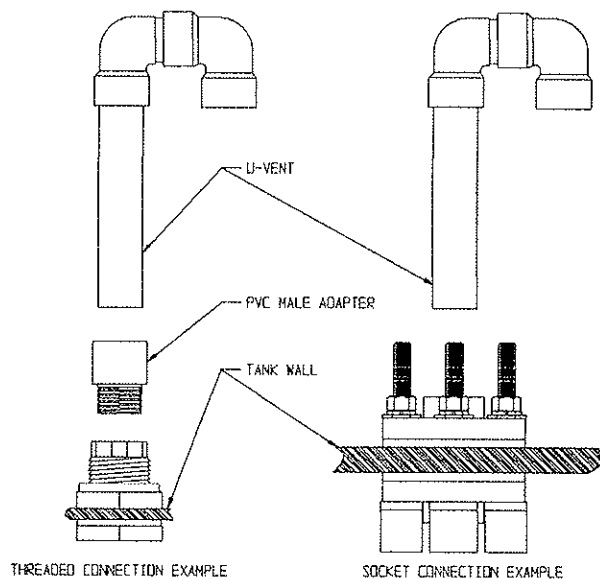


Figure 7.1

7.2 DOWN PIPES (TANK FITTING SUPPORTED) - EXTERNAL AND/OR INTERNAL

7.2.1 Down pipes are shipped loose and have been cut to size to meet customer specifications. To maintain warranty, all down pipes shall be supported at 5 ft. maximum intervals with the support structures provided.

7.2.2 Assemble the piping loosely using Figure 7.2, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to meet the customer's requirements. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 7.2.

7.2.3 Assemble and install support structures as shown in Figure 7.2 (without the saddle clamp covercaps and clips). Make sure the support clamp orientation is correct (with the small width of the wedge toward the

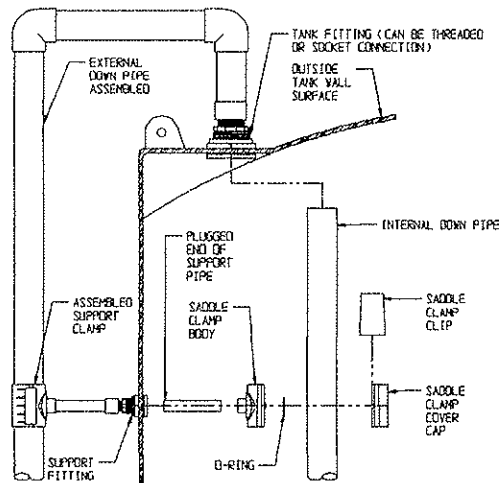


Figure 7.2

top of the tank) and that the plugged support pipes are installed with the plugged end as close to the support fitting as possible. Assemble and install piping as per the customer approved drawing. As piping is being installed on the tank, lock it in place with the saddle clamp cover caps and clips provided (make sure that the sealing o-ring is in the proper position as the pipe is positioned into the saddle support body). Seal all threaded pipe connections with Teflon pipe sealant and connect solvent weld sockets with solvent cement.

7.3 DOWN PIPES (WELDED BOSS SUPPORTED) - EXTERNAL AND/OR INTERNAL

7.3.1 Down pipes are shipped loose and have been cut to size to meet customer specifications. To maintain warranty, all down pipes shall be supported at 5 ft. maximum intervals with the support structures provided. Internal down pipes is required to have 6" minimum clearance height.

7.3.2 Assemble the piping loosely using Figure 7.3, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to meet the customer's requirements. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 7.3.

7.3.3 Assemble and install support structures as shown in Figure 7.3 (without the saddle clamp cover caps and clips). Since the support fitting does not penetrate the tank wall, the threaded connection to the support fitting does not need pipe sealant. Make sure the support clamp orientation is correct (with the small width of the wedge toward the top of the tank). Assemble and install piping as per the customer approved drawing. As piping is being installed on the tank, lock it in place with the saddle clamp cover caps and clips provided (make sure that the sealing o-ring is in the proper position as the pipe is positioned into the saddle support body). Seal all threaded pipe connections (except the support fittings) with Teflon pipe sealant and connect solvent weld sockets with solvent cement.

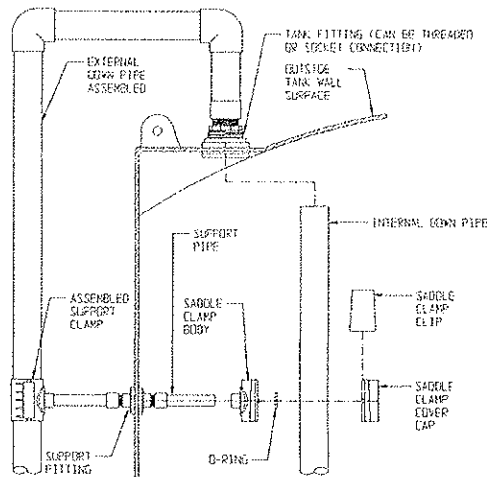


Figure 7.3

7.4 DOWN PIPES (WELDED PE SUPPORTED) - EXTERNAL AND/OR INTERNAL

7.4.1 Down pipes are shipped loose and have been cut to size to meet customer specifications. To maintain warranty, all down pipes shall be supported at 5 ft. maximum intervals with the support structures provided. Internal down pipes are required to have 6" minimum clearance height.

7.4.2 Assemble the piping loosely using Figure 7.4, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to meet the customer's requirements. The piping should be inserted into the holes in the welded support structures prior to installing the fitting in the tank. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 7.4. Seal all threaded pipe connections with Teflon pipe sealant and connect solvent weld sockets with the correct type of solvent cement.

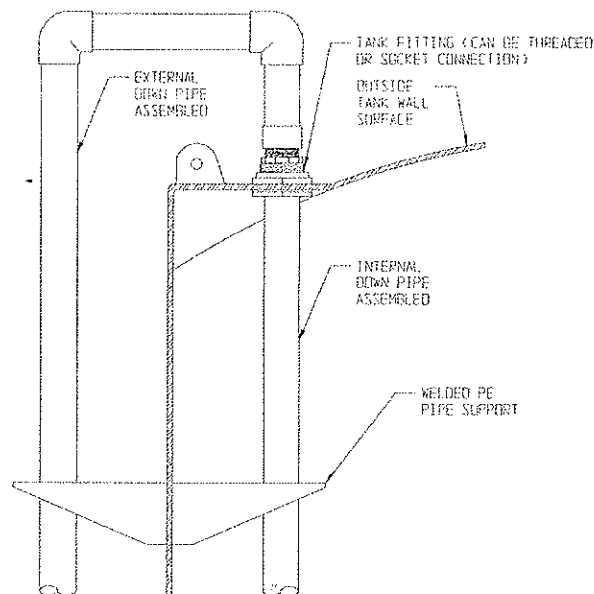


Figure 7.4

7.5 DOWN PIPE - INDEPENDENTLY SUPPORTED - (EXTERNAL ONLY)

7.5.1 Down pipes are shipped loose and have been cut to size to meet customer specifications. To maintain warranty, all down pipes shall be supported at 42 in. maximum intervals with the support clamps provided.

7.5.2 Assemble the piping loosely using Figure 7.5, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to meet the customer's requirements. Mark the strut post base on the concrete when in proper position. Install 2 ea. 3/8" adhesive anchors and bolt base into position. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 7.5.

7.5.3 Assemble and install support structures as shown in Figure 7.5. Make sure the support clamps are spaced evenly. Locate the strut catchers and twist 90° to lock in place. Install the clamps to the strut catchers with the #10 screws provided. Clamps 3 in. and larger require 2 ea. strut catchers, #10 screws and #10 washers. The pipe will click into position in the clamps. Make sure all clamps have clicked to full engagement and are tight. Assemble and install piping as per the customer approval drawing. Seal all threaded

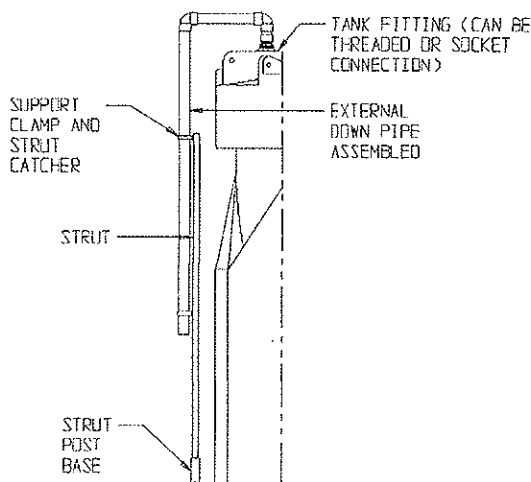


Figure 7.5

pipe connections with Teflon pipe sealant and connect solvent weld sockets with solvent cement.

7.6 FLEXIBLE SIGHT LEVEL GAGES

7.6.1 Sight level gage assemblies are shipped loose and have been cut to size to meet customer specifications. Sight gages may be ordered with either no valve, 1, 2, or 3 valves. Please refer to the customer approved drawing to determine the number of valves required.

7.6.2 Using the assembly drawings shown in Figure 7.6, verify that all parts are present and assemble the unit per the appropriate drawing. Seal all threaded pipe connections with Teflon pipe sealant. Gallonage decals may be purchased as separate items and customer applied to the tank to assist in indication of tank gallonage. NOTE - Gallonage decals are not available for all tank sizes.

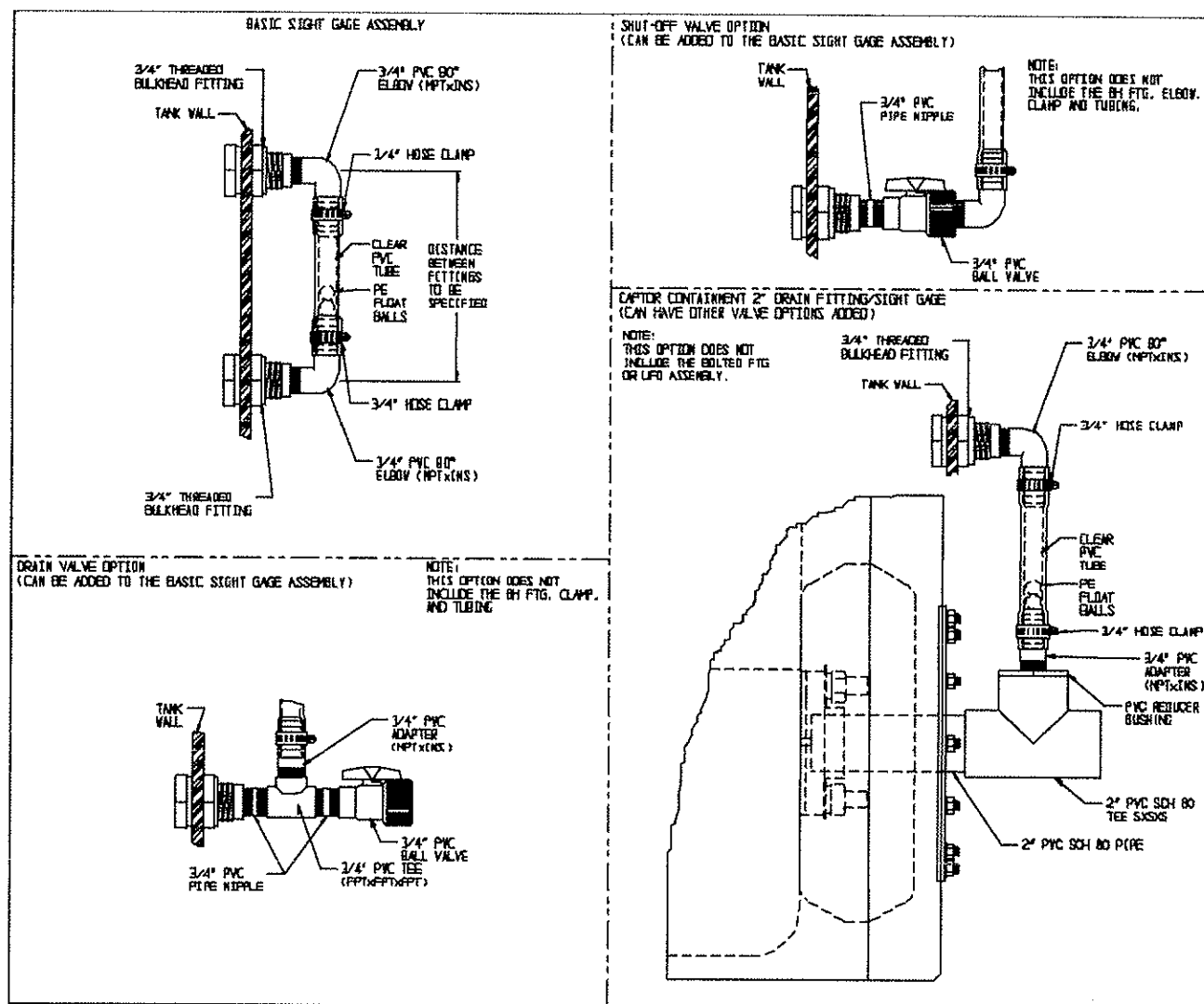


Figure 7.6

7.7 REVERSE LEVEL SIGHT GAGE

7.7.1 The component parts (except the rope) have been cut to meet SII and customer specifications. The sight gage shall be supported at 5 ft. maximum intervals to the liquid holding tank with the support structures provided.

7.7.2 Assemble the piping loosely using Figure 7.7, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to length. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 7.7. NOTE - Do not use solvent weld cement on the outside joints indicated in Figure 7.7. SII recommends periodic inspection of the rollers in the tee assemblies and the rope to ensure proper operation of the gage. If it is a requirement to seal these joints, a silicone based caulking should be sufficient.

7.7.3 Assemble and install the support structures as shown in Figure 7.7 (without the saddle clamp cover caps and clips). Make sure the support clamp orientation is correct (with the small width of the wedge toward the top of the tank) and that the plugged support pipes are installed with the plugged end as close to the support fitting as possible. Make sure that the indicator board has been installed over the outer pipe supports as shown in Figure 7.7. Assemble and install piping as per the customer approved drawing. As piping is being installed on the tank, lock it in place with the saddle clamp cover caps and clips provided (make sure that the sealing o-ring is in the proper position as the pipe is positioned into the saddle support body). Seal all

threaded pipe connections with Teflon pipe sealant and connect solvent weld sockets with the correct solvent cement (except the joints as noted in Figure 7.7).

7.7.4 With the inner and outer tank pipes in place, connect the rope provided to the tank float (This is accomplished by threading the rope through the center hole in the float and out one of the side holes, double knotting the rope, cutting off any excess material and pulling the rope back so the knot holds under the center hole.) and lower it into the inner pipe as shown. Thread the rope through the tee assemblies and the connecting pipe as shown. At this point the float should be at the bottom of the tank, the tee assemblies and connecting pipe should be assembled and sitting off at an angle from the outer clear 2" PVC pipe. With the rope threaded through the outer tee assembly, attach the rope to the indicator in a position parallel with the zero mark on the indicator board. (This is accomplished by threading the rope through the center hole in the indicator, double knotting the rope, checking the indicator position, adjusting as necessary and cutting any excess material protruding from the bottom of the indicator.) Put the indicator into the outer clear 2" PVC pipe while swinging the tee assemblies and connecting pipe into position. With all piping and tee assemblies installed, install the 3" PVC pipe plugs. During the tank hydrotest and first operations of the tank, check the gage for proper level indication and adjust as necessary. NOTE - This is a gallonage indicator and is not intended as an accurate measuring device.

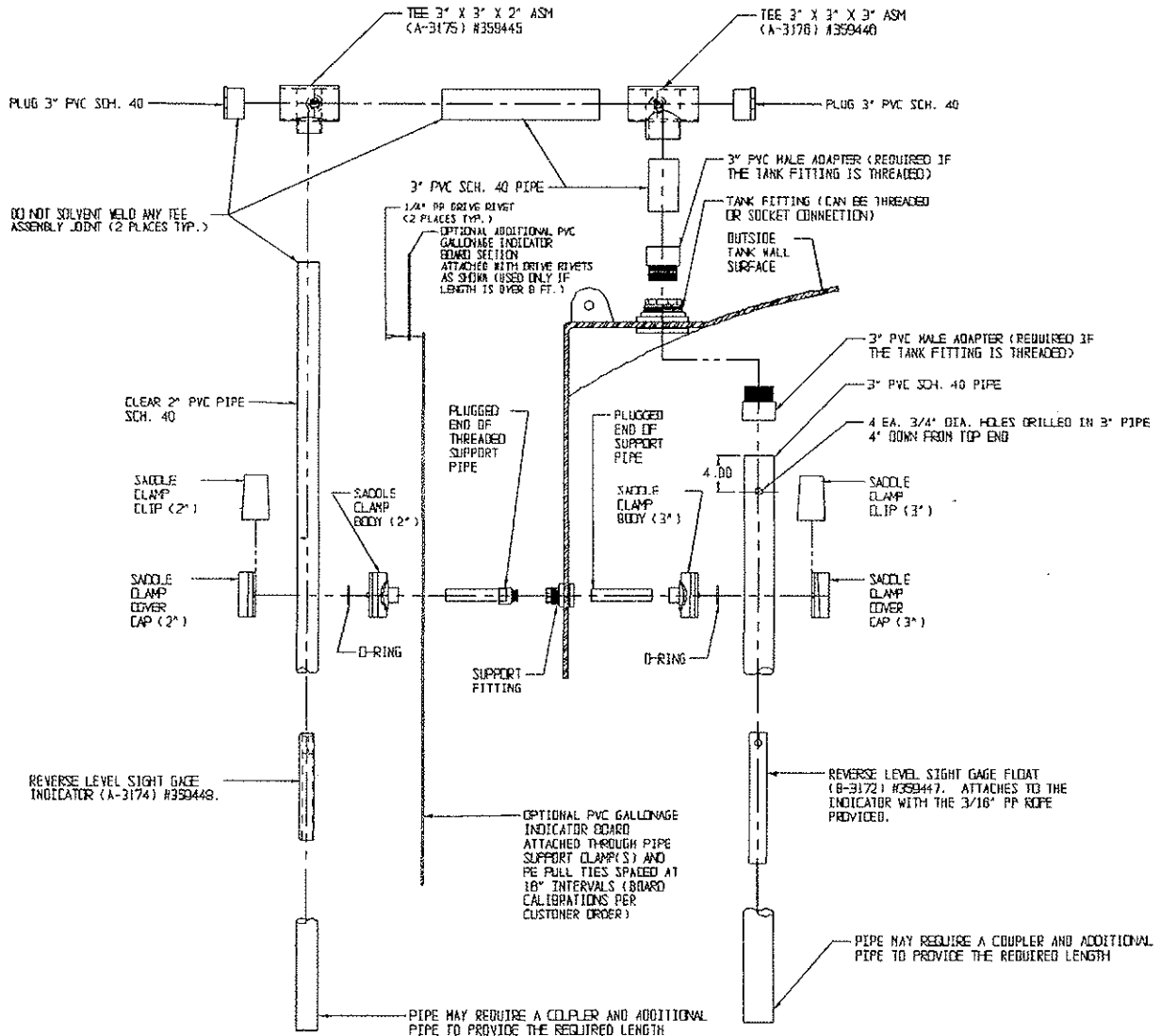


Figure 7.7

7.8 ULTRASONIC LEVEL INDICATOR

7.8.1 Install the PE bulkhead fitting per section 6.1 for sensors with male pipe threads. Install the sensor into the fitting with Teflon[®] pipe sealant. Remove the display unit box cover. Attach the display unit to the PE mounting plates provided on the tank with 4 ea. #10 S.S. Self-tapping screws. Attach the sensor cable to the control box with small strain relief and connect wires per label in the box. Please see Figure 7.8 below for sensor wire attachment information. Attach the unit to 110 VAC and test unit. The display unit is preprogrammed for the tank ordered. The display will show hundreds of gallons (display x 100 = gallons). Refer to literature shipped with unit to answer any additional questions.

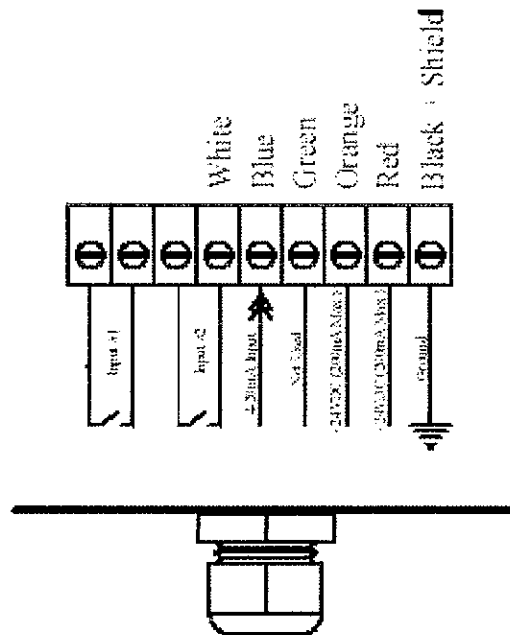


Figure 7.8

7.9 LEAK DETECTOR UNIT (FOR USE WITH CAPTOR CONTAINMENT TANKS ONLY)

7.9.1 The leak detector unit consists of a proximity sensor, 2 in. FPT fitting connection, 2 in. bung plug, $\frac{3}{4}$ in. strain relief, and an indicator box. Install the $\frac{3}{4}$ in. strain relief into the 2 in. bung plug. Loosely install the proximity sensor cord into the strain relief with the sensor face to the inside of the plug assembly. Place the sensor in the interstitial space between the primary and secondary tanks approximately 1 in. above the tank bottom and securely tighten the strain relief to hold the sensor and sensor cord into position. Remove the indicator box cover. Attach the indicator box to the PE mounting plates provided on the tank with the 2 ea. #10 S.S. self-tapping screws. Attach the sensor cable to the control box with small strain relief and connect wires per label in the box. Please see Figure 7.9. Connect unit to 110 VAC per label in the box using strain relief provided or other acceptable methods and test the unit. The indicator box will show a green light when power is on and the sensor is not detecting a liquid. The light is a push to test light allowing the operator to test for power outage or malfunction. If the green light goes out there are two possibilities. If the green light does not come on when the button is pushed, this would indicate a lack of power to the unit or the light bulb is burned out. If the green light comes on when pushed, then a possible leak condition is indicated.

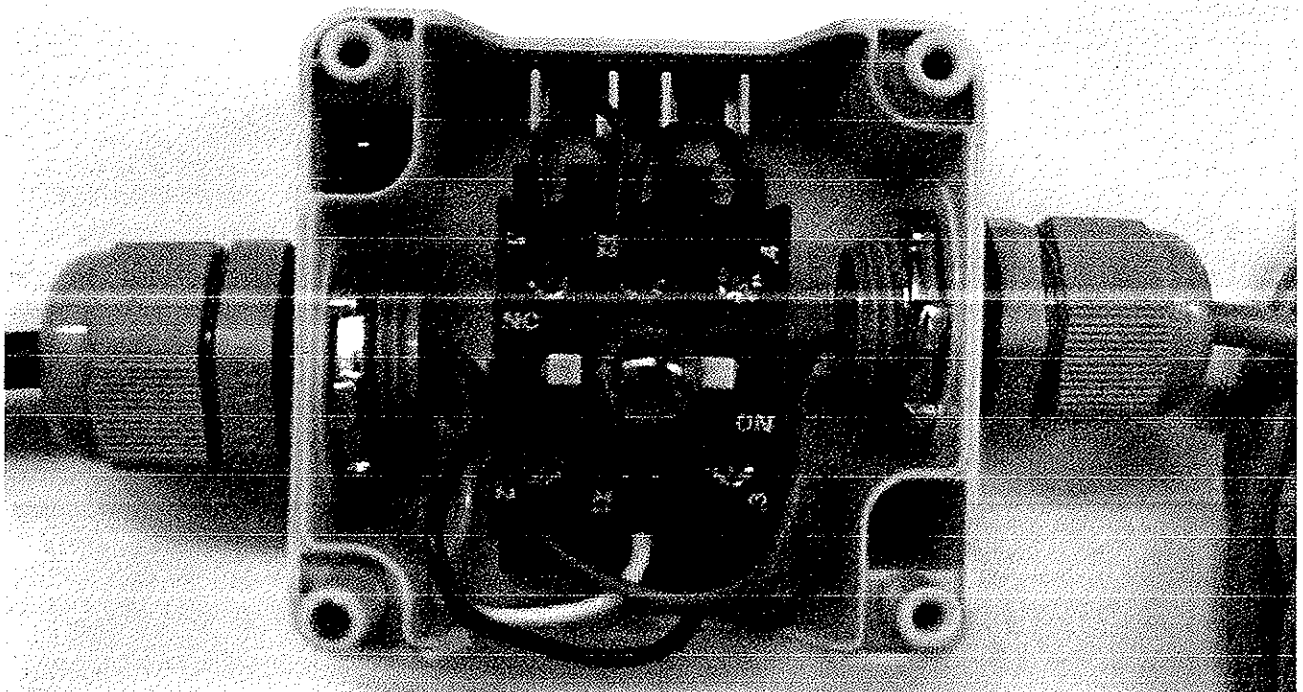
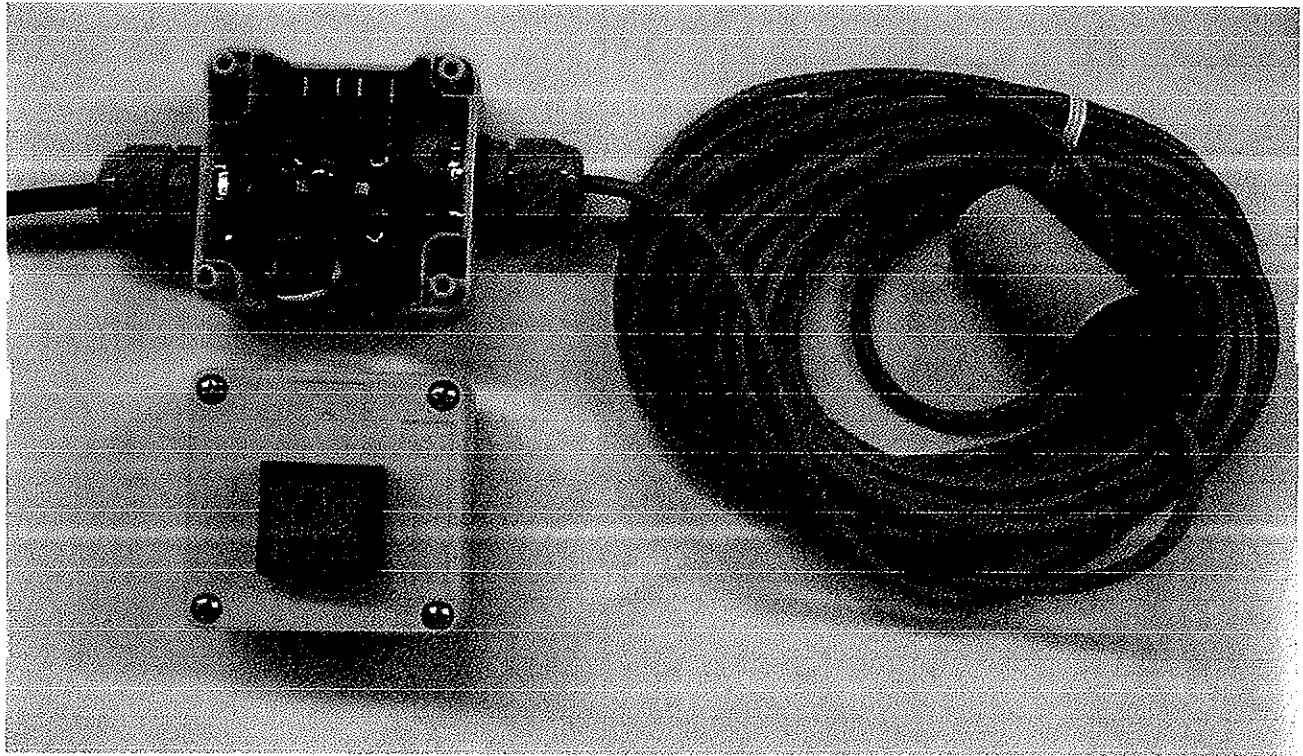


Figure 7.9

7.10 FLANGE ADAPTERS

7.10.1 Standard flange adapters are constructed from PVC or CPVC and may be purchased for solvent weld socket fittings or threaded fittings. Flange adapters for threaded fittings are provided with loose male adapter to allow the customer to adjust adapter length and flange position to match the piping at the installation. Refer to Figure 7.10 for an illustration of a flange adapter.

7.10.2 When installing the flange adapter in a solvent weld socket fitting, cut the flange adapter pipe to desired length (factory supplied 12" length) and solvent weld the flange adapter with the proper solvent cement in the desired position in a previously installed fitting. If the flange adapter is to be used in a threaded fitting, install the male adapter into the fitting with Teflon[®] pipe sealant, cut the flange adapter to the desired length, and solvent weld the flange adapter to the male adapter in the desired position with the proper solvent cement.

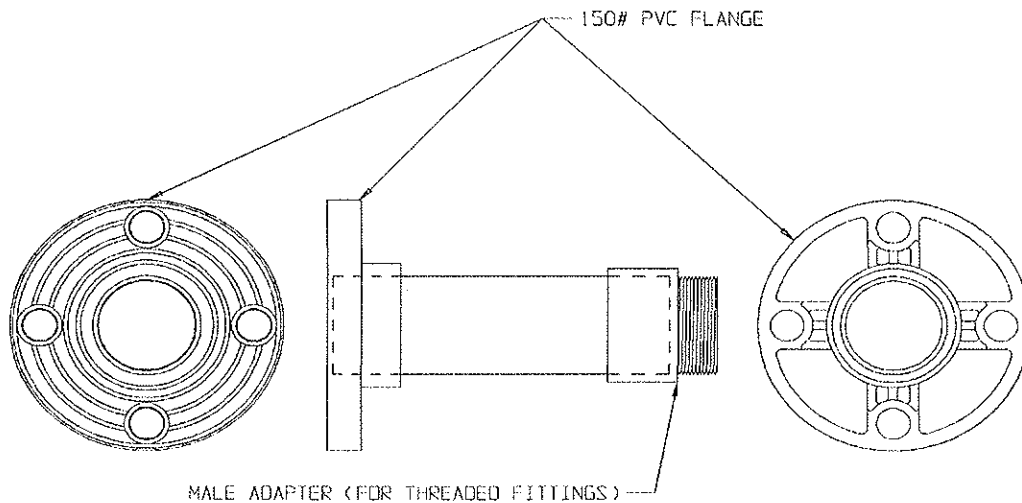


Figure 7.10

7.11 Flexmaster Expansion Joints

7.11.1 Service Conditions:

- .2. The expansion joints are intended for use in low pressure (< 20 PSIG) piping applications or for use as the inlet of a flooded suction feed connection. The maximum use temperature of the expansion joints is 130°F for HDLPE materials and 140°F for XLPE materials.
- .3. The application must be properly defined for the expansion joint. Application design movement must not exceed the design movement of the expansion joint. Please refer to the chart attached for design movement capabilities and spring rates. Also refer to the piping examples for proper installation examples. If the application exceeds the design capabilities of the expansion joint, please contact the manufacturer.

7.11.2 Alignment:

- .1. Expansion joints are not designed to make up for piping misalignment error. Pipe misalignment should be no more than 1/4" in any direction.

7.11.3 Pipe Support:

- .1. Piping must be supported in all directions so expansion joints to not carry any piping weight.

7.11.4 Installation:

- .1. Unbolt and remove split flanges from the faces of the expansion joint. Check to make sure the flange faces are clean and free of foreign materials. Flange faces should be free of any scratches or nicks. If scratches or nicks occur, sand the surface smooth with 220 grit sand paper using a random orbital sander.
- .2. Locate the expansion joint between two 150# flanges spaced for the prescribed neutral length + 1/2" (the thickness of two full face 150# flange gaskets). Install bolts as shown in the drawing below. To obtain proper gasket compression, tighten all the fitting nuts hand tight using an opposing bolt tightening sequence until the gaskets engage the flanges and the lock washers are compressed. Tighten

each nut an additional 5/8 turn – 1-3/8 turns using the same sequence (do not tighten more than 1/2 turn at a time). A light application of lubricating oil is necessary to prevent thread seizing on S.S. bolts. Gasket compression should be between 25 - 50%. Tighten bolts to achieve gasket compression. Recheck fitting tightness periodically.

Flexmaster Expansion Joints										
Nominal size I.D.	Neutral Length (in.)	± Axial Movement	± Lateral Movement	Angular Deflection	Axial Spring Rate lbs./in.	Lateral Spring Rate lbs./in.	# Holes	Bolt Pattern	Bolt Size	Weight (lbs.)
2	20.71	4	2	5	N/A	N/A	4	150#	5/8"	8.44
3	31.5	4	2	5	27.3	6.6	4	150#	5/8"	13.86

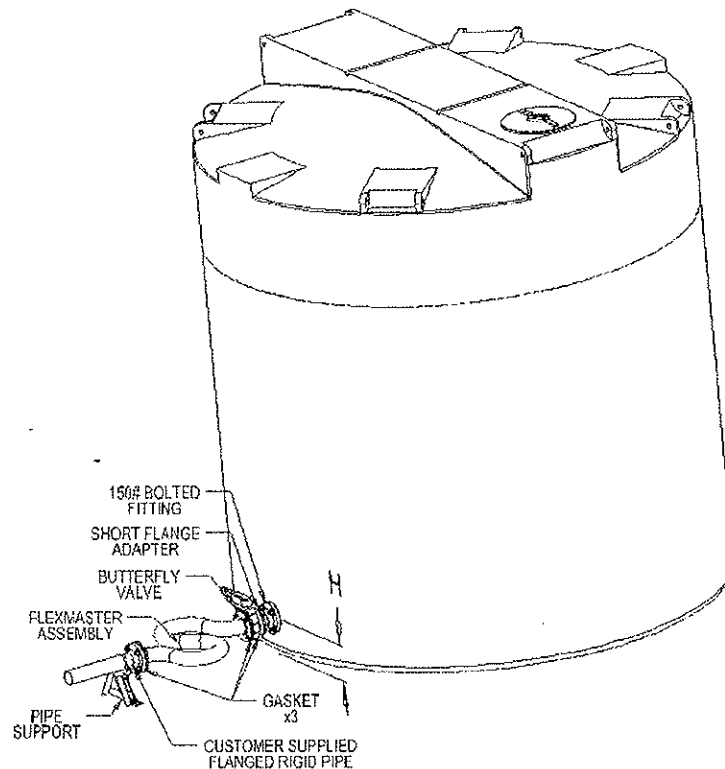


Figure 7.11

With the Flexmaster expansion joint installed horizontally as shown in the example above, dimension "H" can be up to 50" maximum and still meet the SII recommendation of 4% dimensional movement design. If the height of the fitting is above 50", install the Flexmaster in a vertical configuration as shown in Figure 7.13.

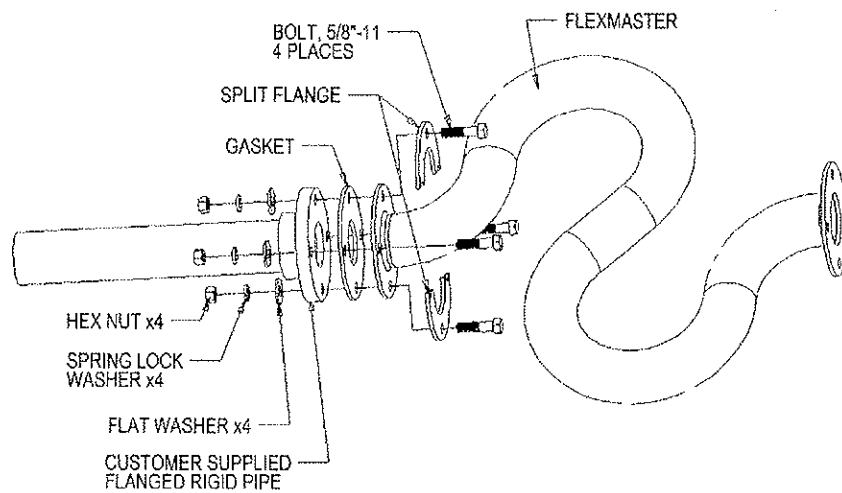


Figure 7.12 – Exploded Assembly

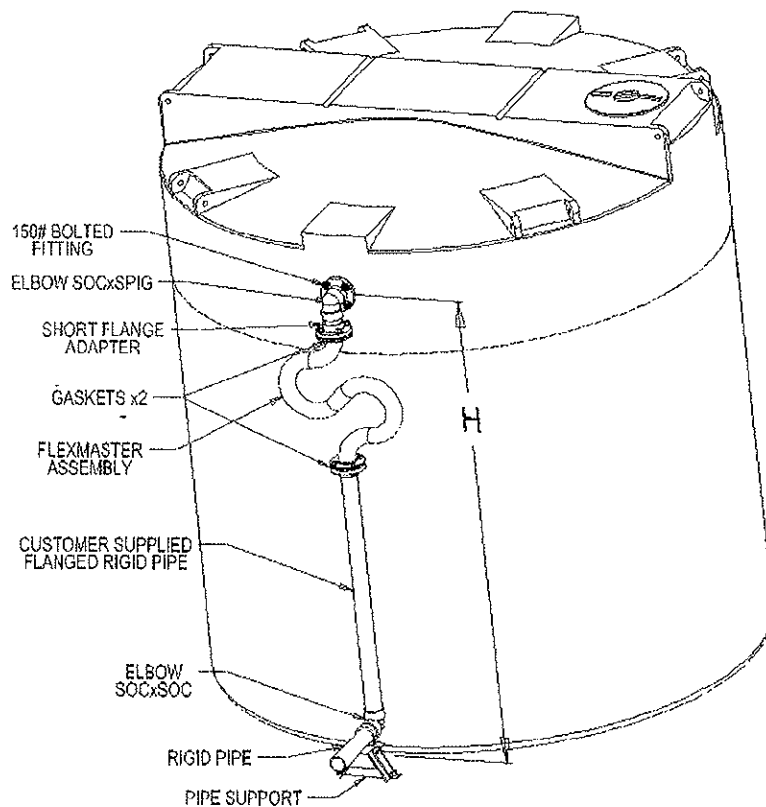


Figure 7.13

With the Flexmaster expansion joint installed vertically as shown in the example above, dimension "H" can be up to 100" maximum and still meet the SII recommendation of 4% dimensional movement design. If the

height of the fitting is above 100", an additional Flexmaster can be installed in the vertical configuration to provide additional movement capability.

8. TANK ACCESSORIES

8.1 LATERAL RESTRAINT SYSTEM (FLAT BOTTOM TANKS)

8.1.1 The lateral restraint system is designed for tank position restraint on a concrete pad inside of an enclosed building. **It is not designed for wind or seismic restraint capabilities.** Using the assembly drawing and table shown in Figure 8.1, verify that all parts are present.

8.1.2 Locate the tank on the concrete pad as desired. The pad required for the restraint system must be 18-3/4" larger in diameter than the tank diameter for proper application of 1/2" adhesive anchor bolts (assumes 6-3/8" edge distance required). Lay out the bands around the tank (alternate long bands and short bands if both lengths are provided) with the studs and angle ends sticking out away from the tank. Fasten the bands together with the 3/8" - 16 x 4" hex head bolts as shown in the drawing. Raise the bands 17" and loosely install the anchor clips using the 1/2" - 13 hex nuts and 1/2" washers provided. Tighten the 3/8" - 16 x 4" hex head bolts to remove band looseness. Mark the slot locations of the anchor clips, remove the clips, and install the required number of 1/2" anchor bolts. Anchor bolts are not provided by the manufacturer and must be purchased by the customer.

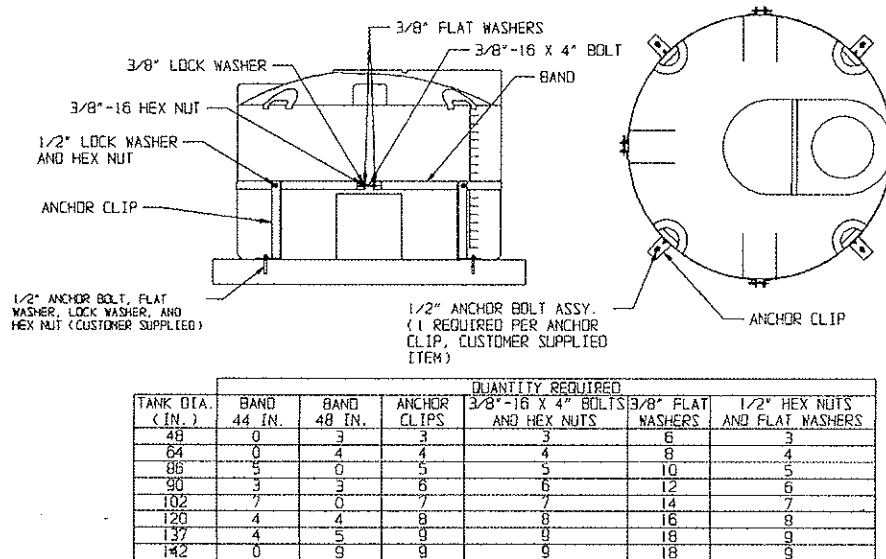


Figure 8.1

8.1.3 Replace the anchor clips and secure the clips to both bands and the concrete pad. Do not over tighten the bands to the tank. The band tension should only remove looseness and not cause any tank deflection.

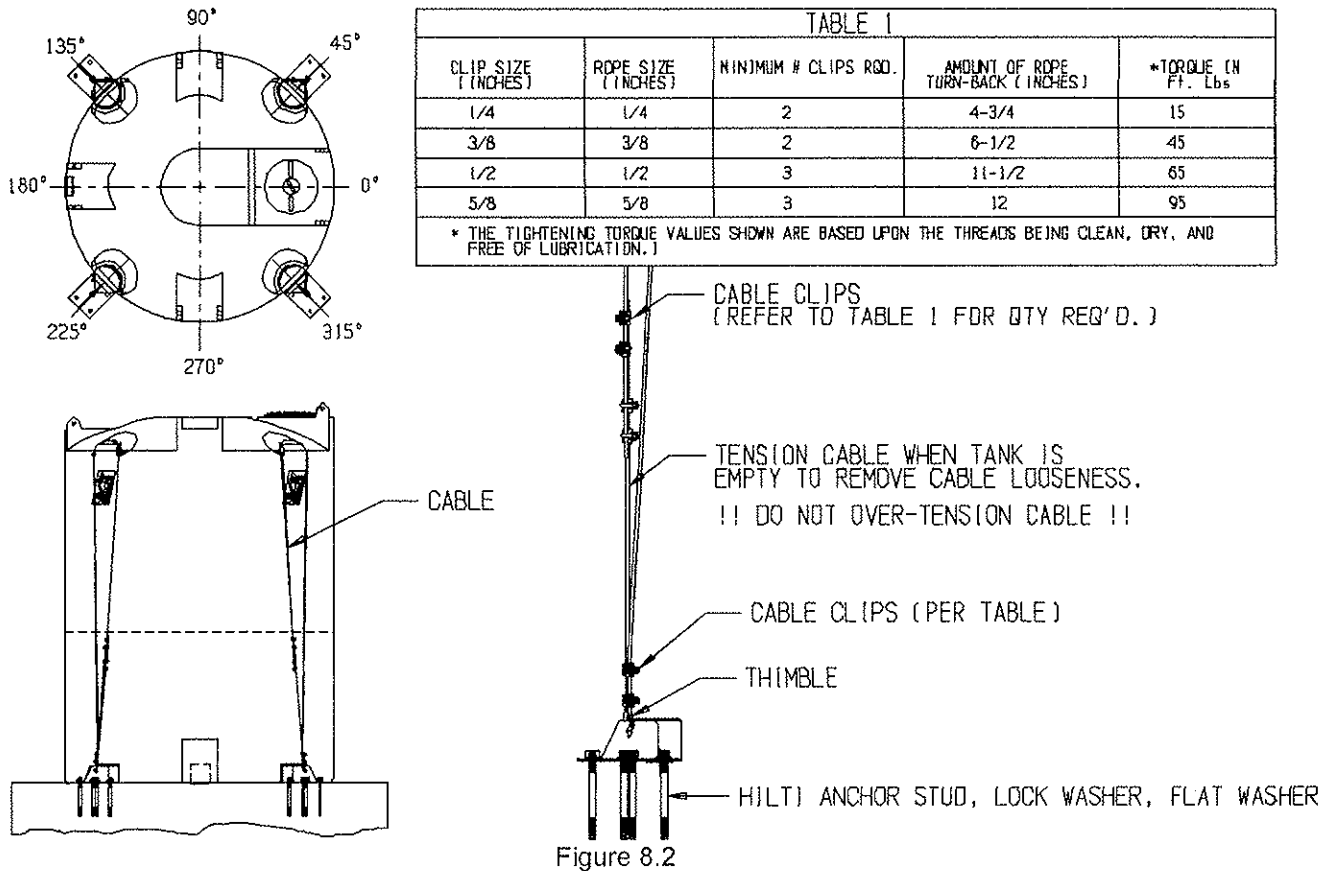
8.2 WIND/SEISMIC TANK RESTRAINT SYSTEM (FLAT BOTTOM TANKS)

8.2.1 The wind/seismic tank restraint system is designed for tank restraint on an appropriate concrete pad under 110 MPH wind or seismic zone 4 conditions. Using the assembly drawing and table sent with the assembly, verify that all parts are present. Please see Figure 8.2 for a restraint system installation and assembly information.

8.2.2 Locate the tank on the concrete pad as desired. Lay out all anchors required (4 or 8) equally spaced, (4 anchors must be directly below the tank tie down locations). Make sure all anchors are located next to the tank with the front face of the anchor weldment located next to the tank. Mark all the anchor bolt locations, remove the anchors and install the required Hilti adhesive model HVA anchor bolts as specified in the assem-

bly drawing and table sent with the assembly. These anchor bolts are not provided by the manufacturer and must be purchased by the customer. Customer must follow all Hilti anchor bolt installation instructions.

8.2.3 Replace the anchors and secure the anchors to the concrete. Fasten the tank to the concrete pad with the required cable (make sure the cable sheath is on the cable and located around the lug locations) as shown by the assembly drawing utilizing the cable thimbles and clamps provided. Tension the cable before filling the tank to remove cable looseness. Do not over-tension the cables as this may cause tank damage. The cable tension will change with tank loading and temperature changes - DO NOT re-tension the cables.



8.3 WIND/SEISMIC TANK-RESTRAINT SYSTEM (CONE BOTTOM TANKS)

8.3.1 The wind/seismic tank restraint system is designed for cone bottom tank restraint on an appropriate concrete pad under 110 MPH wind or seismic zone 4 conditions using a SII cone stand for proper tank support. Using the assembly drawing and table shown in Figure 8.3, verify that all parts are present.

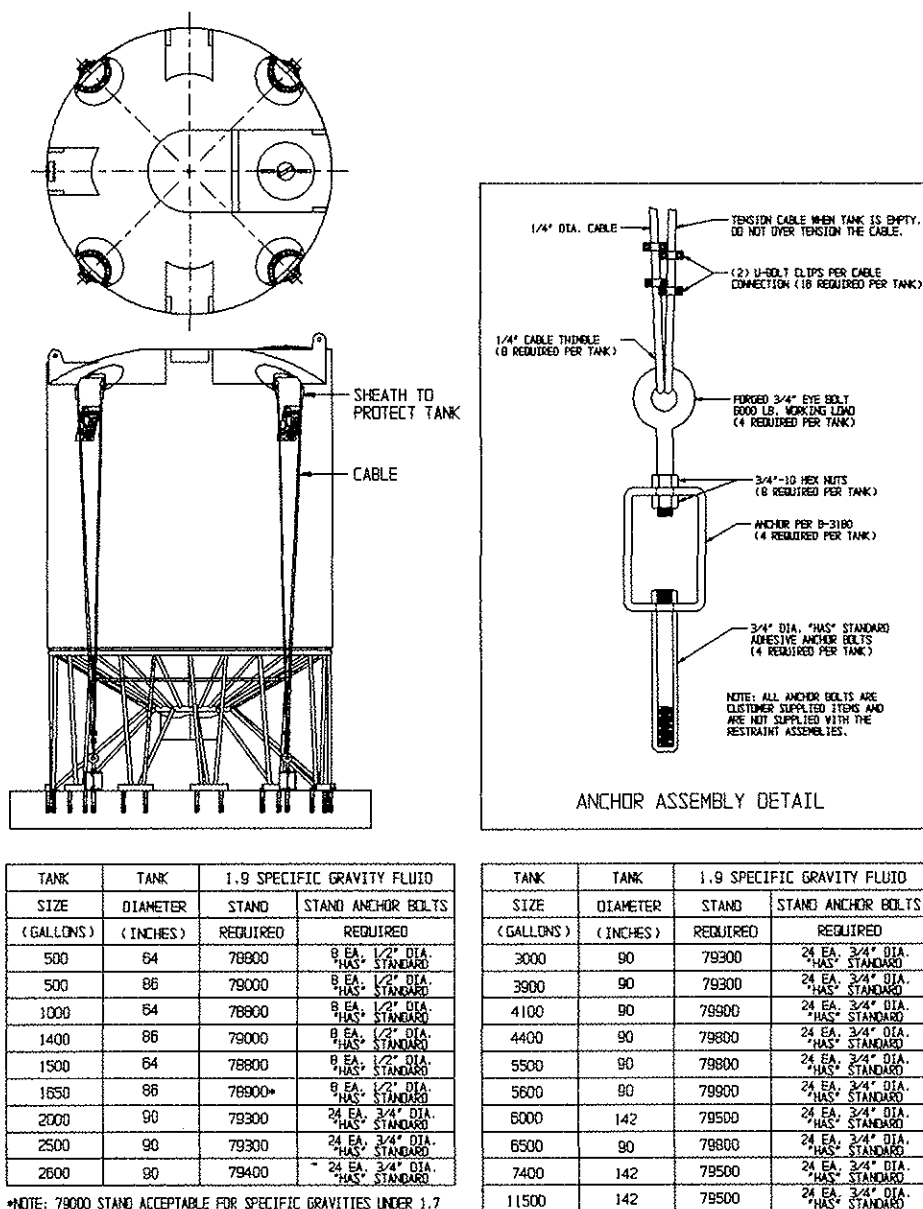


Figure 8.3

8.3.2 Locate the tank and stand on the concrete pad as desired. The pad required for the restraint system must be 24" larger in diameter than the tank diameter for proper application of 3/4" adhesive anchor bolts (assumes 10" edge distance required). Lay out the four anchors provided directly below the tank tie down locations. Make sure all anchors are located so the hole in the anchor aligns with the tank wall. Mark all the anchor bolt locations (stand and anchor positions), remove the stand and anchors and install the required Hilti adhesive model HVA anchor bolts as specified by the assembly drawing and the SII seismic restraint drawing B-3182. These anchor bolts are not provided by the manufacturer and must be purchased by the customer.

8.3.3 Replace the stand and anchors and secure to the concrete pad. Install the 3/4" eyebolts loosely as shown by the drawing. Fasten the tank to the concrete pad with the required cable (make sure the cable sheath is on the cable and located around the lug locations) as shown by the assembly drawing utilizing the cable thimbles and clamps provided. Tension the cable before filling the tank to remove cable looseness. Do not over-tension the cables as this may cause tank damage. The cable tension will change with tank loading and temperature changes - DO NOT re-tension the cables.

8.4 STEEL LADDERS

8.4.1 Steel ladders are designed in accordance with OSHA 1910.27 and are to be mounted next to the tank on a concrete pad at the same elevation as the bottom of the tank. The concrete pad area that the ladder mounts to must be of sufficient size as to comply with OSHA standards regarding proper access to and from the ladder. This should be determined by the construction site engineer based on the specific application. The pad must be of sufficient size to allow proper attachment of 1/4" anchor bolts (check with anchor bolt manufacturer for embedment and edge distance required). The ladder mounting system is designed to allow for tank expansion and contraction due to temperature and loading changes. Using the assembly drawing and table shown in Figure 8.4, verify that all parts are present and assemble accordingly.

NOTE: This ladder is provided for tank inspection only. At no time should the operator step off this ladder onto the tank unless stepping onto an approved work platform with guard rails or utilizing some other approved safety device. Proper safety equipment (i.e. guard rails, safety harness, etc.) must be used to step onto the tank. Consult applicable regulations to determine proper equipment for other than inspection work.

8.4.2 Attach the two pivoting attachment arms to the ladder using 1 ea. 1/2"-13 x 2" hex head bolt and 2 ea. 1/2" - 13 hex nuts. Double nut each bolt by tightening the first nut to 85 ft. - lbs. of torque and then jamming the second nut to the first nut by holding the first nut and tightening the second to 85 ft. - lbs. of torque. Position the ladder on the tank and attach the top pivoting attachment arms to the tank with the ladder attachment tube and cotter pin provided (see Figure 8.4). Position the ladder parallel with the side of the tank and mark the 1/4" anchor bolt locations. Install appropriate 1/4" anchor bolts and attach the bottom of the ladder to the concrete pad. Anchor bolts are not provided by the manufacturer and must be purchased by the customer.

8.5 STEEL LADDER CAGES

8.5.1 Using the assembly drawing shown in Figure 8.5 and the instructions in section 8.5.2, verify that all parts are present and assemble accordingly. These cages are designed for use only with the SII steel ladder design. Cages are required for ladders used to ascend to heights exceeding 20 ft.

NOTE: Assembly is easier if the cages are installed on the ladder before the ladder installation to the tank.

8.5.2 Install the cages loosely using the u-bolts provided starting with the top cage unit (4 ft. unit with a larger bolt pattern). The bottom cage unit must have a larger diameter at the bottom than at the top of the unit and the bottom edge of the unit be located a minimum of 7 feet and a maximum of 8 feet above the ground. When the cage units have been properly located and spaced evenly, tighten the u-bolts securely.

8.6 FRP LADDERS (up to 300" height)

8.6.1 FRP ladders are designed in accordance with OSHA 1910.27 and are to be mounted next to the tank on a concrete pad at the same elevation as the bottom of the tank. The concrete pad area that the ladder mounts to must be of sufficient size as to comply with OSHA standards regarding proper access to and from the ladder. This should be determined by the construction site engineer based on the specific application. The pad must be of sufficient size to allow proper attachment of 5/8" anchor bolts (check with anchor bolt manufacture for embedment and edge distance required). The ladder mounting system is designed to allow for tank expansion and contraction due to temperature and loading changes. Using the assembly drawing and table shown in Figure 8.6, verify that all parts are present and assemble accordingly.

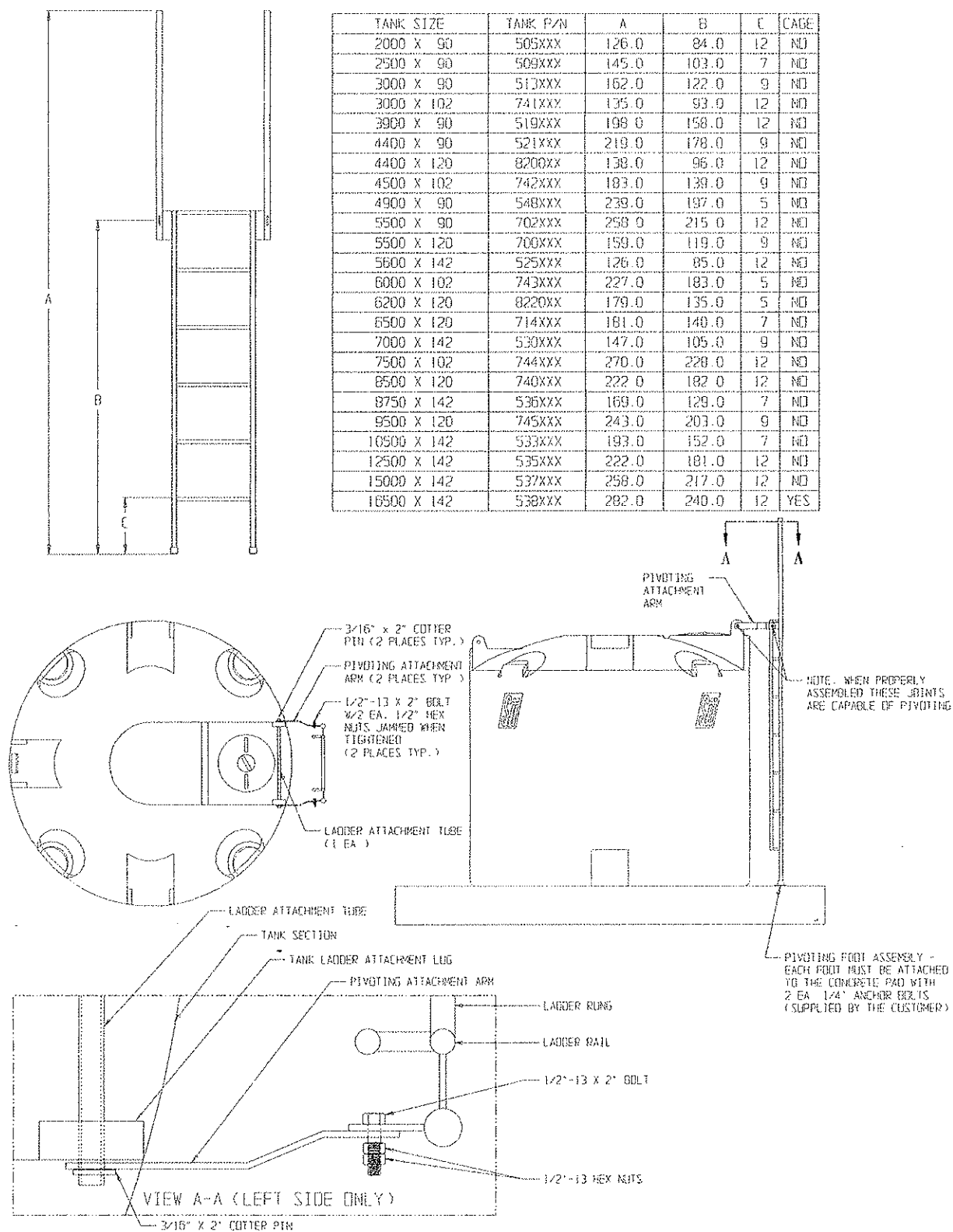


Figure 8.4

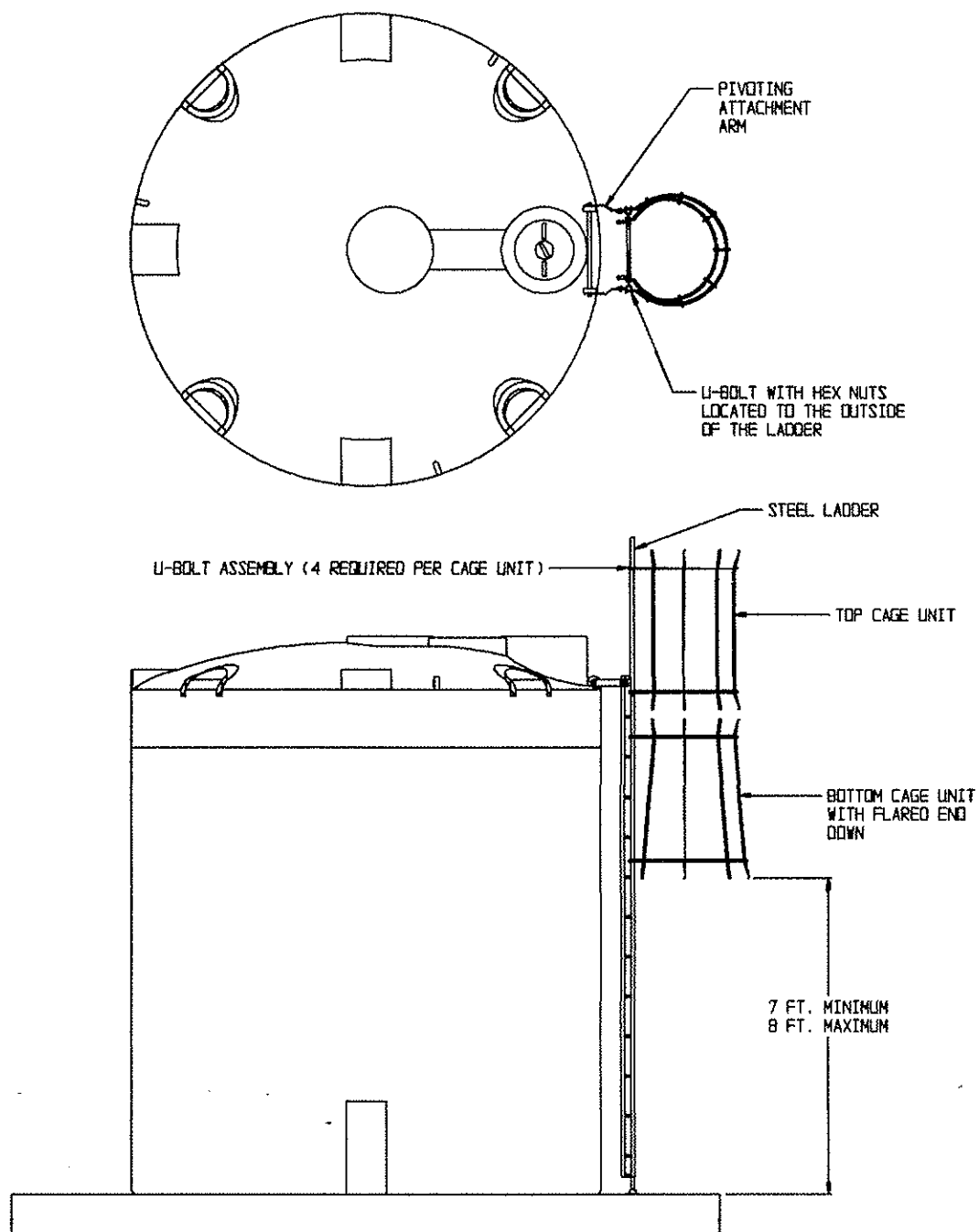


Figure 8.5

NOTE: This ladder is provided for tank inspection only. At no time should the operator step off this ladder onto the tank unless stepping onto an approved work platform with guard rails or utilizing some other approved safety device. Proper safety equipment (i.e. guard rails, safety harness, etc.) must be used to step onto the tank. Consult applicable regulations to determine proper safety equipment.

8.6.2 Attach the stainless steel top pivoting attachment arms to the ladder using the 1/2" bolt and 3/4" bushing assemblies (2 required) as shown in Figure 8.6. Position the ladder on the tank and attach the top pivoting attachment arms to the tank with the ladder attachment tube and cotter keys provided (see assembly drawing). Position the ladder parallel with the side of the tank and mark 4 ea. 5/8" anchor bolt locations. Install appropriate 5/8" anchor bolts and attach the bottom of the ladder to the concrete pad. Anchor bolts are not provided by the manufacturer and must be purchased by the customer.

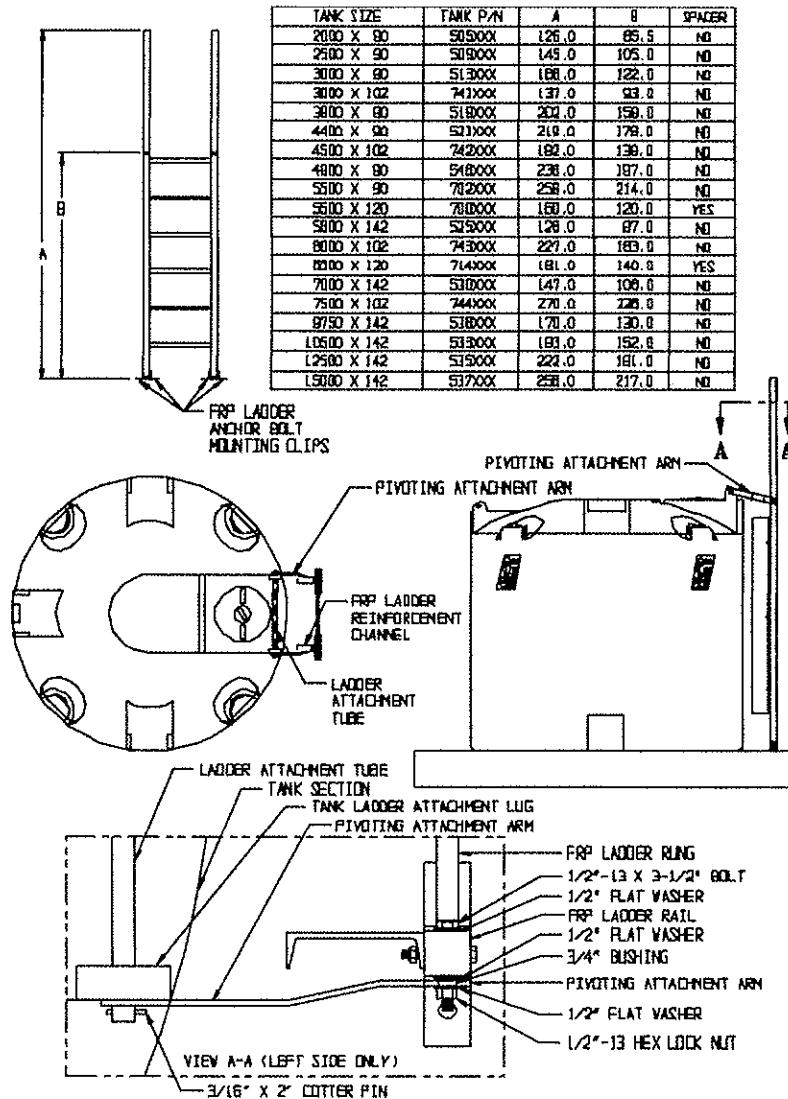


Figure 8.6

8.7 FRP LADDER CAGES

8.7.1 Using the assembly drawing shown in Figure 8.7 and the instructions in section 8.7.2, verify that the correct number of fasteners have been shipped to attach the FRP cage unit. These cages are designed for use only with the SII FRP ladder design. Cages are required for ladders used to ascend to heights exceeding 20 ft.

NOTE: Assembly is easier if the cage unit is installed on the ladder before ladder installation.

8.7.2 Position the cage unit on the ladder with the flared end toward the ladder base. Attach the cage to the ladder using the 3/8" stainless steel bolts provided (4 bolt assemblies per cage hoop).

8.8 HORIZONTAL LEG TANK INSTALLATION

8.8.1 Horizontal leg tanks are to be used only with adequate support. Horizontal leg tank skids are available for SII horizontal leg tanks (750-1685 gallons) to provide adequate support and a structural support frame that provides easy attachment for a variety of stationary applications. The hoop pipe restraints restrain the leg tank and give it additional structural support. Hoop restraints are available for tanks 525 gallons and larger. Hoops are required on tank sizes above 730 gallons. The use of a SII skid is not required, but it is important to have proper support under all of the tank support areas (points which would contact the ground if

the tank was sitting on level ground) and a method to attach and tighten the hoop pipe restraint system. An example assembly drawing is shown in Figure 8.8.

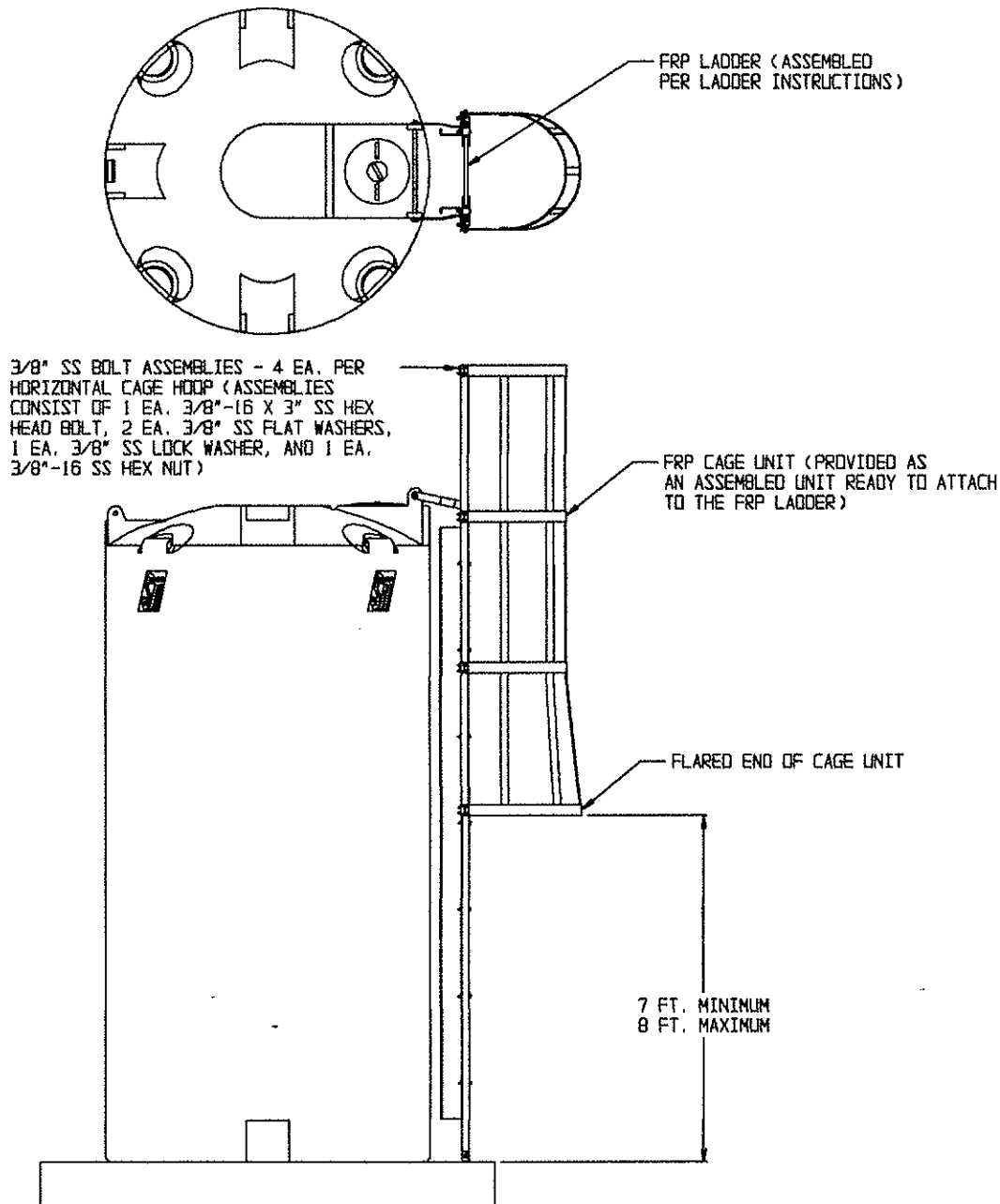


Figure 8.7

8.8.2 In the example shown, position the skid provided in the desired location and attach as necessary for the application. Position the tank on the skid with the legs centered over the hoop mounting holes in the top of the skid.

8.8.3 With one person on each side of the tank, insert J-bolts into the hoop holes and lift the hoop into position directly above the tank legs. Spread the hoop slightly while sliding the hoop (centered in the pipe guide channel formed into the tank legs) onto the tank. Insert the J-bolts into the proper holes in the top of the skid. Install the bevel washer, lock washer, and hex nut on each of the J-bolts loosely. Do not tighten the hex nuts yet. See view A-A shown in Figure 8.8 for an illustration of the loosely assembled J-bolt/hoop assembly.

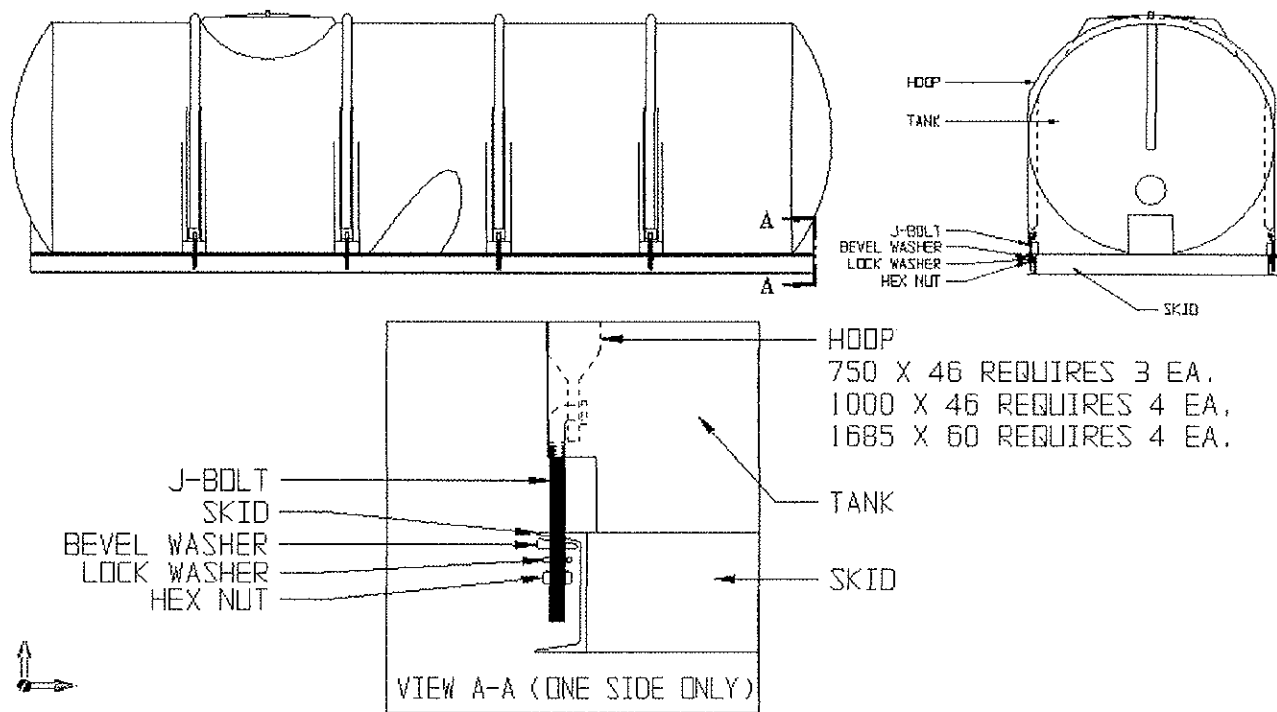


Figure 8.8

8.8.4 Repeat the procedure as detailed in section 8.8.3 for each of the remaining hoops required. When all hoops have been loosely installed, check the tank and hoop alignment to make sure the placement is correct. When proper alignment has been established, start tightening the hex nuts on each hoop. Tighten both sides of the hoop equally until the top of the hoop is tight all the way around the top of the tank and proper tension is obtained. Proceed to the next hoop and repeat the tightening procedure until all of the hoops have proper tension. Recheck the hoop tension after the tank has been filled. Tighten the hoops as necessary until the top of the hoop is tight all the way around the top of the tank.

8.9 CONE BOTTOM TANK STAND EXTENSIONS

8.9.1 Cone bottom tank stand extensions are designed specifically for use with SII cone bottom tank stands. Cone bottom tank stands equipped with extensions are not approved for seismic restraint applications. The extensions are provided in 20" and 40" welded units and are used to increase cone bottom tank clearance 20" or 40".

8.9.2 Install the extensions onto the cone stand legs with the bolt assemblies provided. Tighten bolts to 300 ft.-lbs of torque. With the extensions in place, proceed with the cone stand installation as previously described.

8.10 HEATED TANKS

8.10.1 Heated tanks are insulated with a minimum of 2" of 2-3 lb./ft.³ polyurethane foam material with an "R" value of 8.33/in. The insulation is sealed with 2 coats of acrylic latex mastic. Although this appears to be a tough, resilient covering, it can be easily torn or broken if the tank is not properly transported. **Use only carpeted and padded equipment to move an insulated tank.** Do not allow the tank to drop or roll on rough surface as this may damage the insulation.

8.10.2 Heated tanks are equipped with at least 1 control box with maintenance temperature and over-limit temperature settings. The maintenance temperature setting should be set at the desired maintenance temperature. The over-limit temperature setting should be adjusted to 10 degrees above the desired maintenance temperature. The maximum temperature the over-limit control should be set to is 140° F for

crosslinked polyethylene tanks and 130° F for high density linear polyethylene tanks. Be sure to check tank material type and design before setting any control temperatures over 100° F. It is best to keep the tank at the lowest temperature necessary to accomplish the desired objective. The Figure 8.11 on the next page shows a standard 110 VAC control box front cover with the control functions shown. This control box has calibration functions for the temperature probes. The control box is factory calibrated and should not need re-calibrated. If there are any questions about control box calibration, consult the factory. Figure 8.12 shows a schematic of the terminal connections possible located under the control box front cover. The terminals available for customer connection are: line in, over-limit alarm relay, and low-limit alarm relay. There are other control boxes available with different functions not detailed in these instructions. Please consult the factory with questions regarding other types of control boxes available. Do not expose control box to atmosphere during or after installation for extended periods of time as this could cause condensation. Refer to the control box instructions and schematics sent with each tank for further details.

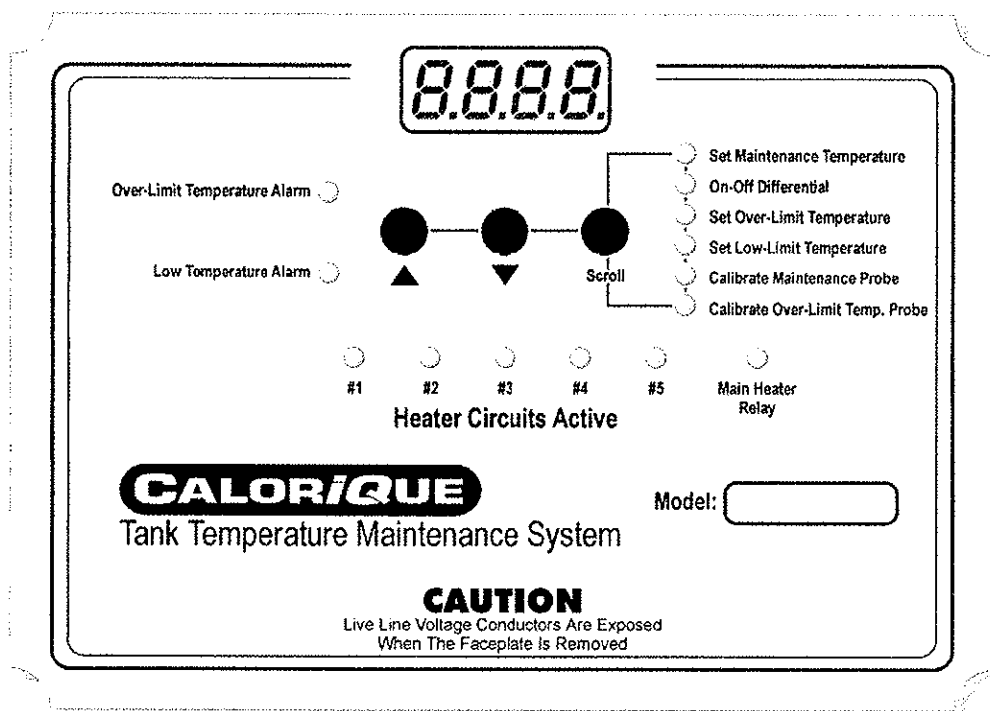


Figure 8.11

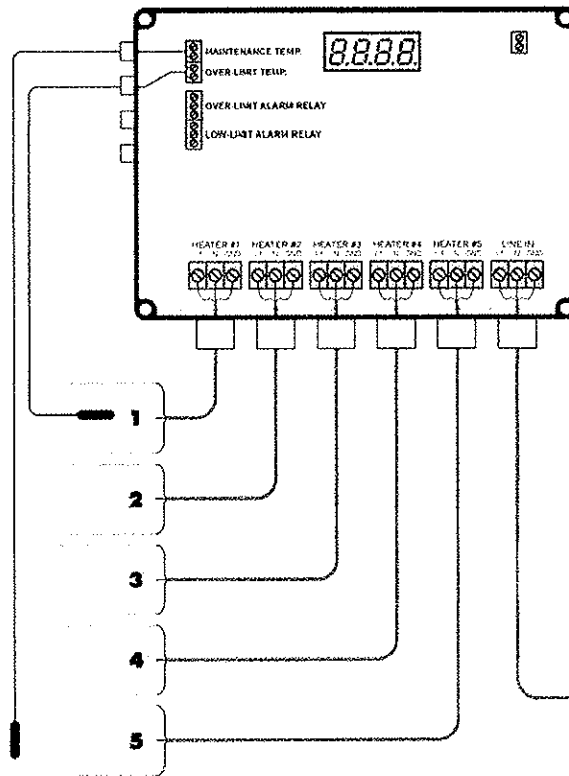


Figure 8.12

9. TANK MAINTENANCE

9.1 TANK INSPECTION

9.1.1 Simple periodic inspections of the tank installation can prevent problems and chemical loss from occurring. Inspection intervals should be consistent with site usage (the more times liquid is processed through the tank site, the more frequent the inspections). The checking procedure should be as follows:

1. Inspect the tank for physical damage such as cuts, impacts, cracks, swelling, softening of tank walls, and stress cracks (caused by long term exposure to environmental conditions and stress). NOTE: A tank inspection guide is available on the SII website at the following address: www.snydernet.com or can be obtained for tank inspections and analysis through the Customer Service Department at SII.
2. Inspect the fittings for broken parts, cracks, wear marks, or other signs of potential leaks.
3. Inspect gaskets for deterioration. Look for discoloration, bulges, checking or crazing. All of these symptoms could indicate potential failure.
4. Inspect any valves and/or pumps that may be connected to the tank. Also inspect the hoses and connections for any signs of wear.

10. SII PRODUCT POLICY STATEMENTS

10.1 SII STANDARD LIMITED WARRANTY

10.1.1 Distributors and their authorized distribution have the responsibility of calling to the attention of their customers the following Snyder Industries, Inc. standard limited warranty, prior to acceptance of an order from the customer for any Snyder Industries, Inc. product. Record all required warranty information in section 2.1 and retain this information for use in the advent of a warranty question.

10.1.2 Snyder Industries, Inc. warrants to the purchaser for use that if any manufactured tank product is proven to be defective in material or workmanship within 3 YEARS from the date of original invoice from factory, and Snyder Industries, Inc. is notified within 15 days after such defect is discovered, Snyder Industries, Inc. will (at company option) either replace or repair said part. Snyder Industries, Inc. warrants to the purchaser for use that if any tank fitting, attachment, or accessory product is proven to be defective in material or workmanship within 1 YEAR from the date of original invoice from factory, and Snyder Industries, Inc. is notified within 15 days after such defect is discovered, Snyder Industries, Inc. will (at company option) either replace or repair said part. This Snyder Industries Standard Limited Warranty does not apply to damage resulting from misuse, improper application of recommended materials, neglect, material wear, accident, or improper installation or maintenance. Said part will not be considered defective if it substantially fulfills performance specifications. **THE FOREGOING STANDARD LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE AND OF ANY OTHER TYPE, WHETHER EXPRESSED OR IMPLIED.** Snyder Industries, Inc. neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said tank product and will not be liable for incidental or consequential damages. **THE REMEDIES STATED HEREIN SHALL BE THE EXCLUSIVE REMEDIES AVAILABLE UNDER THIS STANDARD WARRANTY. CLAIMS UNDER THIS STANDARD LIMITED WARRANTY SHALL BE HANDLED UNDER THE SNYDER INDUSTRIES, INC. SERVICE POLICY.** Snyder Industries, Inc. will not be responsible for any charges incurred in repairing or servicing any Snyder Industries, Inc. product except as such repairs are made at Snyder Industries, Inc. or by Snyder Industries, Inc. personnel or as approved in writing from Snyder Industries, Inc. Customer Service.

10.2 SII WARRANTY EXCEPTIONS

10.2.1 Distributors and their authorized distribution have the responsibility of calling to the attention of their customers any exceptions to the Snyder Industries, Inc. standard limited warranty, prior to acceptance of an order from the customer for any Snyder Industries, Inc. product.

10.2.2 Due to the uniqueness of tank applications, Snyder Industries, Inc. may offer warranties other than the standard warranty. These warranty statements will be in writing from Snyder Industries, Inc. The warranty period may be longer than 3 years as in the case for purchased extended warranties, or the warranty period may be shorter than 3 years as in the case for certain chemical/material applications. Please consult Snyder Industries, Inc. if you have any questions regarding warranty coverage and/or requirements.

10.3 RETURN MERCHANDISE/WARRANTY CLAIM PROCEDURE

10.3.1 SII has specific procedures for return merchandise and warranty claims. To make a claim, please contact the Customer Service Department at SII by mail, phone or e-mail:

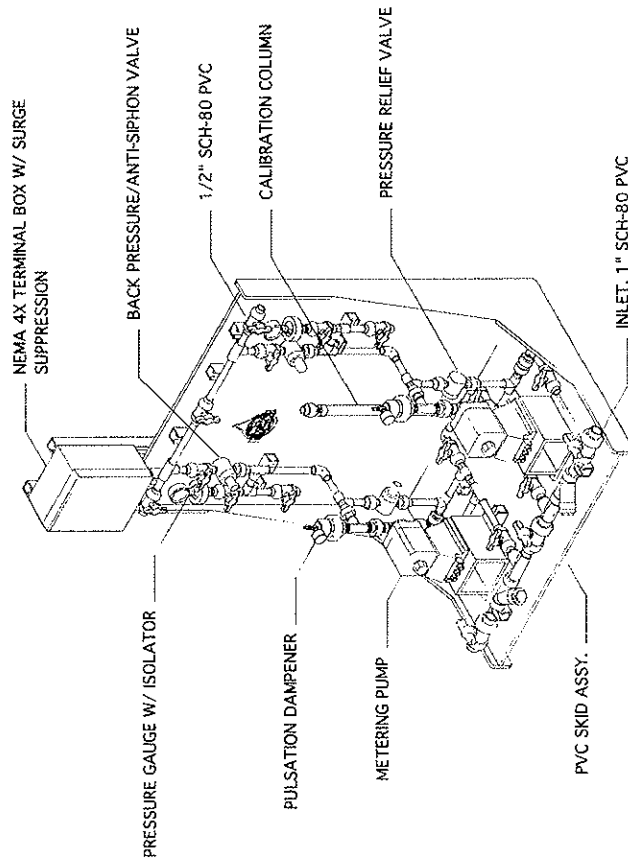
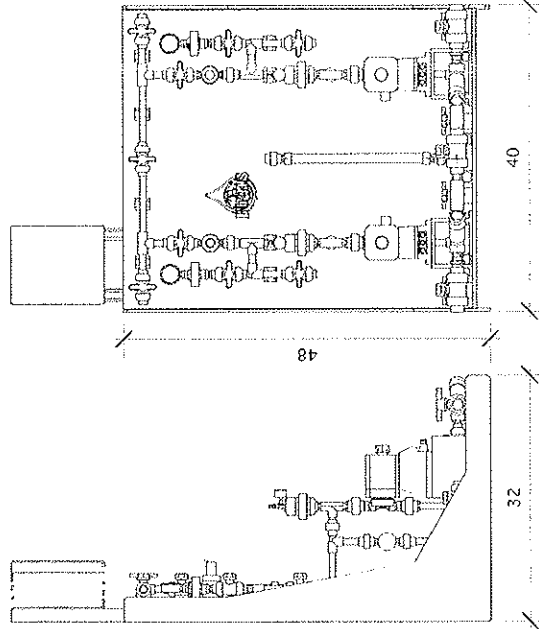
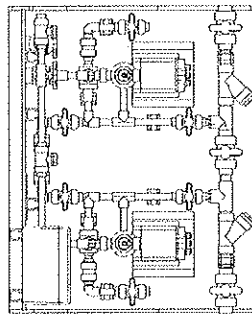
Snyder Industries, Inc.
P.O. BOX 4583
Lincoln, NE 68504
(402) 467-5221
FAX: (402) 467-6493
E-mail: sales@snydernet.com

The following information will be required to assist in filing your claim:

1. Product identification (tank size, part number, serial number, etc.)
2. SII customer order number
3. Name and phone number of person making the claim
4. Distributor/company name, address, and phone number
5. Description of reason for claim
6. Pictures of failure and installation
7. MSDS of chemicals stored
8. Temperature of tank application

ORLANDO UTILITIES COMMISSION
STANTON ENERGY CENTER WTP
SODIUM HYPOCHLORITE 'POST' FEED SYSTEM

SKID/PUMP INFORMATION



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P.O. BOX 360817
MELBOURNE, FL. 32936
PH 321-255-1931
FAX 321-255-3947

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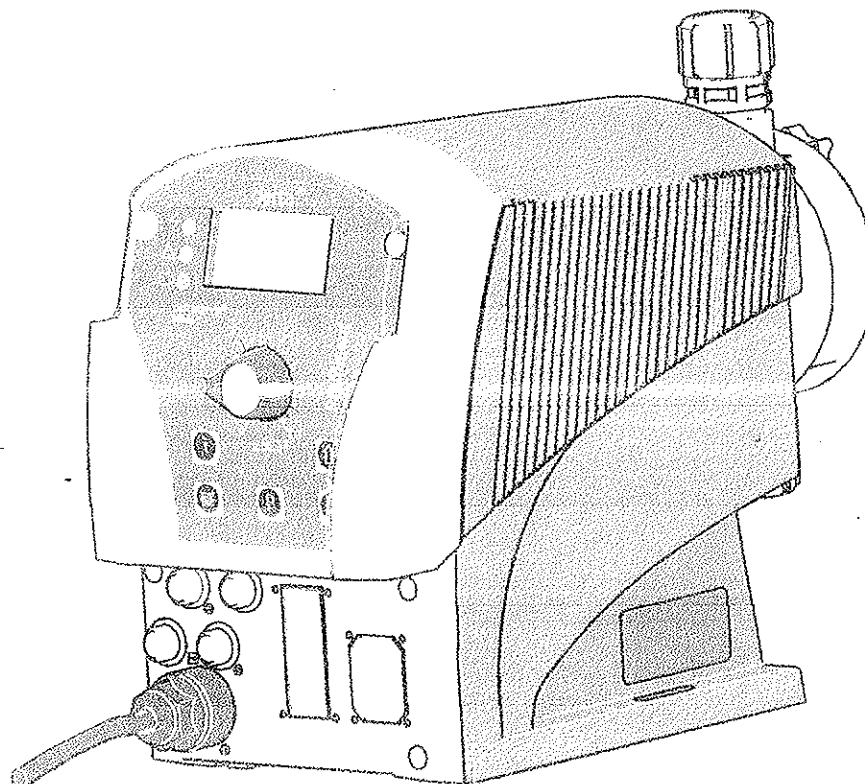
Title DUPEX METERING SKID, 1/2" SCH-80 PVC		
Part Number MS2A1.1	Drawn By CAS	Date 2/14/05
CAD File Name MS2A1.1_DATA		

1.4 delta® Solenoid-driven Diaphragm Metering Pumps

1.4.1

delta® Diaphragm Metering Pumps with Controlled Solenoid Drive

Continuous or pulsing operation
Adaptation of the pump to the metering medium
Detection of blocked metering points, broken metering lines and trapped air or gas bubbles in the liquid end by the integrated injection control optoGuard®
Output range 7.5 - 75 l/h, 25 - 2 bar
Large adjustment range: continuously 1:1,800, discontinuously 1:36,000
Stroke length continuously adjustable between 0 - 100 % (recommended 30 - 100 %)
Material versions PVDF, acrylic and stainless steel
Patented coarse / fine bleed valve
Diaphragm failure detection and signalling (option)
Adjustment and display of the output alternatively as strokes/min or l/h via the keyboard
Large, illuminated graphic display
External control through potential-free contacts with optional pulse transfer and reduction
Option of external control via standard signal 0/4-20 mA
Interface for PROFIBUS® or CANopen (option)
Option 14-day process timer for time- and event-dependent metering tasks
Port for 2-phase level switch
3 LED display for operation, warning and error messages in full text
Concentration input for volume-proportional metering
Automatic bleeding
Pump type 2508 with 7.5 l/h at 25 bar
Material NP for pump types 2508, 1612, 1608, 1020, and 0730
HV liquid ends for high-viscosity media.



pk_1_131_2

1.4 delta® Solenoid-driven Diaphragm Metering Pumps

Technical data

Pump type	Max. pressure bar	Delivery rate l/h	Stroke Volume cm³/stroke	Max. stroke rate Strokes/min	Connection size o ∅ x i ∅ mm	Suction head mWC	Shipping weight PVT SST kg
DLTA 2508	25	7.5	0.62	200	8 x 4**	5*	10 / 11
DLTA 1608	16	7.8	0.65	200	8 x 5**	5*	10 / 11
DLTA 1612	16	11.3	0.94	200	8 x 5	6*	10 / 11
DLTA 1020	10	19.1	1.59	200	12 x 9	5*	10 / 11
DLTA 0730	7	29.2	2.43	200	12 x 9	5*	10 / 11
DLTA 0450	4	49.0	4.08	200	G3/4 - DN10	3*	10 / 11
DLTA 0280	2	75.0	6.25	200	G3/4 - DN10	2*	10 / 11

* Suction height (mWC) = suction height with primed liquid end and primed suction line

** For stainless steel version 6 mm connection width

Materials in contact with medium

Type	Liquid end	Suction/pressure port	Gaskets	Valve balls
NPE	Plexiglass	PVC	EPDM	Ceramic
NPB	Plexiglass	PVC	FPM	Ceramic
PVT	PVDF	PVDF	PTFE	Ceramic
SST	Stainless steel 1.4404	Stainless steel 1.4404	PTFE	Ceramic

Type of connections

Plastic	8-12 mm	Hose compression fitting
	DN 10	Hose grommet d16 DN 10
Stainless steel	6-12 mm	System Swagelok
	DN 10	Insert Rp 3/8

Metering diaphragm with PTFE coating

Reproducibility of metering $\pm 2\%$ when used in accordance with notes in the operating instructions.

Permissible ambient temperature -10° C to 45° C.

Mean power consumption 78 W

IP rating IP 65, insulation class F

Scope of delivery: Metering pump with mains cable (2 m) and connector, connecting kit for hose/pipe connection according to table.

1.4 delta® Solenoid-driven Diaphragm Metering Pumps

1.4.2 Identcode Ordering System

delta® series

DLTA	Type	Capacity
		bar l/h
	2508	25.0 7.50
	1608	16.0 7.80
	1612	16.0 11.30
	1020	10.0 19.10
	0730	7.0 29.20
	0450	4.0 49.00
	0280	2.0 75.00
	Dosing head/valves material	
	PV	PVDF/PVDF not for pump type 2508
	NP	Acrylic glass/PVC only for pump type 2508, 1608, 1612, 1020, 0730
	SS	Stainless steel/stainless steel
	Seals/diaphragm material	
	T	PTFE/PTFE coated
	S	PTFE/diaphragm additionally with FPM coating for silica-laden media
	B	FPM/PTFE-coated
	E	EPDM/PTFE-coated
	Liquid end version	
	0	Without ventilation, without valve spring
	1	Without ventilation, with valve spring
	2	With ventilation, without valve spring
	3	With ventilation, with valve spring
	4	HV version for high-viscosity media
	Hydraulic connections	
	0	Standard connectors as per technical data
	5	Discharge-side connector for 12/6 hose, suction-side standard
	Diaphragm rupture indicator	
	0	Without diaphragm failure indication
	1	With diaphragm failure indication
	Version	
	0	With ProMinent logo
	Power supply	
	U	Universal controller 100-240 V
	Cable and plug	
	A	2 m Europe
	B	2m Switzerland
	C	2 m Australia
	D	2 m USA / 115 V
	1	2 m without plug
	Relay	
	0	Without relay
	1	alarm relay normally energised 1 x C/O contact 230 V – 8 A
	3	alarm relay normally de-energised 1 x C/O contact 230 V – 8 A
	4	as 1 + pacing relay 2 x N.O. contacts 24 V – 100 mA
	5	as 3 + pacing relay 2 x N.O. contacts 24 V – 100 mA
	A	Shutdown and alarm relay normally energised 2xN.O. cont. 24 V–100mA
	C	as 1 + 4-20 mA output 1 x N.O. contact 24 V – 100 mA
	F	with automatic bleeder not for pump type 2508
	Accessories	
	0	Without accessories
	1	With foot and metering valve, 2m suction line and 5 m pressure line (only for type 2508, 1608, 1612, 1020, and 0730)
	2	As 0 + measuring cup
	3	As 1 + measuring cup
	Control variant	
	0	Manual + external contact with pulse control
	3	Manual + external contact with pulse control + analog 0/4-20 mA
	4	as 0 + 14-day process timer
	5	as 3 + 14-day process timer
	C	CANopen
	R	As 3 + PROFIBUS® interface, M12
	Access code	
	0	Without access code
	1	With access code
	Language	
	DE	German
	EN	English
	FR	French
	ES	Spanish
	Pause/level	
	01	Pause N.C. contact level, N.C. contact

1.4 delta® Solenoid-driven Diaphragm Metering Pumps

1.4.3

Spare Parts Kits, Replacement Diaphragms

Replacement parts kit for delta®, consisting of:

- 1 metering diaphragm
- 1 suction valve compl.
- 1 pressure valve compl.
- 2 valve balls
- 1 kit gaskets
- 1 connecting kit

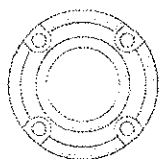
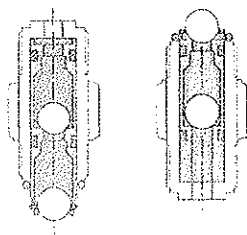
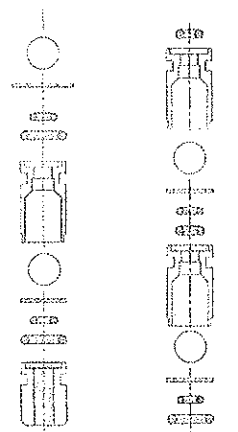
Stainless steel version without suction and pressure valve compl.

Spare parts kits for delta®

Type	Materials in contact with medium	Order no.
Type 2508	NPE	1033172
	NPB	1033171
	SST	1030226
Type 1608	NPE	1030620
	NPB	1030611
	PVT	1030225
	SST	1030226
Type 1612	NPE	1030536
	NPB	1030525
	PVT	1027081
	SST	1027086
Type 1020	NPE	1030537
	NPB	1030526
	PVT	1027082
	SST	1027087
Type 0730	NPE	1030621
	NPB	1030612
	PVT	1027083
	SST	1027088
Type 0450	PVT	1027084
	SST	1027089
Type 0280	PVT	1027085
	SST	1027090

Replacement diaphragms for delta® series

Type	Materials in contact with medium	Order no.
Type 2508/1608	all materials	1030353
Type 1612	all materials	1000248
Type 1020	all materials	1000249
Type 0730	all materials	1000250
Type 0450	all materials	1000251
Type 0280	all materials	1025075



pk_1_008



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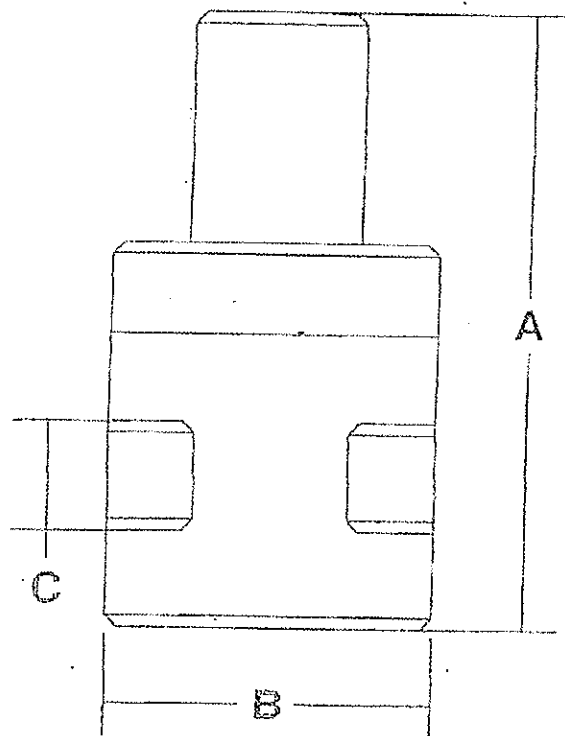
BACK PRESSURE VALVE

SPECIFICATIONS

Sizes:	1/4", 1/2", 3/4", 1", 1 1/2", 2"
Connections:	NPT, Socket, Flange
Pressure Adjustment:	10 - 150 psi; 50 - 350 psi
Max. Temperature (°F):	Plastic 140°; Metal 300°B
Materials of Construction:	
Diaphragm:	PTFE/EPDM, Optional: Viton
Valve Top:	PVC; CPVC; Steel; 316 SS
Valve Body:	PVC; CPVC; PP; PTFE PVDF; 316 SS; Alloy 20; Hastalloy C

Back pressure valve(s) shall be provided to provide a constant back pressure at the chemical metering pump discharge and to prevent syphoning. The back pressure valve(s) shall be fully adjustable with no metal parts in contact with the media. The back pressure valve(s) shall have _____ bodies and _____ diaphragm.

DIMENSIONS



Size Code	A (in)	B (in)	C (npt)
BPT025	3.5	2.375	1/4"
BPT050	4.6	2.375	1/2"
BPV025	3.5	2.375	1/4"
BPV050	5.5	3.5	1/2"
BPV075	5.5	3.5	3/4"
BPV100	5.6	3.5	1"
BPV150	9.0	5.5	1 1/2"
BPV200	9.0	5.5	2"

call 1-888-859-9726

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PVC BACK PRESSURE VALVE Part List/Maintenance

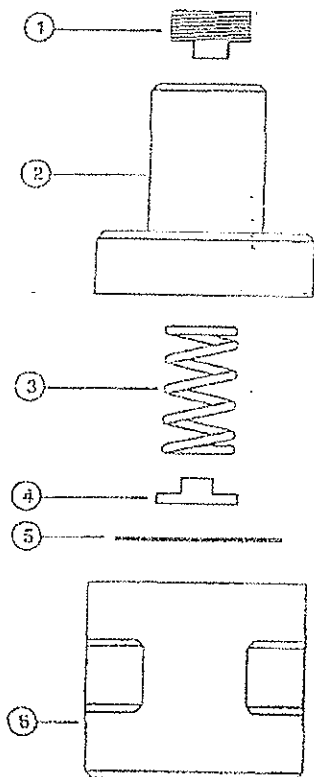
Maintenance:

The back pressure valve is designed to require minimum maintenance. However, periodic replacement of the diaphragm is required. The valve allows for servicing without removal from the chemical line if desired.

Caution: Make certain that the system is not under pressure and that the chemical lines have been thoroughly flushed with suitable neutralizing agent prior to disassembly. Wear appropriate protective clothing, consult MSDS or chemical supplier for recommendations.

Remove the pressure adjustment screw to remove the pressure from the diaphragm (Tip: keep track of turns required to remove screw). For T-Series valves unscrew the valve top, for V-Series valves remove the 4 cap nuts.

Inspect the diaphragm and replace if necessary. Inspect the valve seat area, clean any deposits making sure not to damage the seat area. Inspect the pressure spring for signs of rust or corrosion, replace if necessary. Place diaphragm (PTFE side towards valve bottom), support disc and spring on valve body and reassemble valve. Reinstall the pressure adjustment screw to approximately the same position as prior to disassembly. For exact setting use a pressure gauge, clockwise to increase, counterclockwise to decrease.



ITEM	DESCRIPTION	PART #
1	Adjustment Screw, 1/4" - 1", PVC	→ PV-00902
	Adjustment Screw, 1 1/2" - 2", PVC	PV-00920
2	Valve Top, 1/4" - 1/2" T-Series, PVC	→ PV-004015
	Valve Top, 1/2" - 1" V-Series, PVC	PV-004051
	Valve Top, 1 1/2" - 2" V-Series, PVC	PV-00408
3	Pressure Spring, 1/4" - 1/2" T-Series, PVC	→ PV-00601
	Pressure Spring, 1/2" - 1" V-Series, PVC	PV-00602
	Pressure Spring, 1 1/2" - 2" V-Series, PVC	PV-00603
4	Support Disc, 1/4" - 1/2" T-Series, PVC	→ PV-00701
	Support Disc, 1/2" - 1" V-Series, PVC	PV-00705
	Support Disc, 1 1/2" - 2" V-Series, PVC	PV-00708
5	Diaphragm, 1/4" - 1/2" T-Series, PTFE/EPDM	→ PV-00800
	Diaphragm, 1/2" - 1" V-Series, PTFE/EPDM	PV-00810
	Diaphragm, 1 1/2" V-Series, PTFE/EPDM	PV-00820
	Diaphragm, 2" V-Series, PTFE/EPDM	PV-00830
6	Valve Body, 1/4" T-Series, PVC	BPV-00501
	Valve Body, 3/8" T-Series, PVC	BPV-00561
	Valve Body, 1/2" T-Series, PVC	→ BPV-00511
	Valve Body, 1/2" V-Series, PVC	BPV-00511
	Valve Body, 3/4" V-Series, PVC	BPV-00521
	Valve Body, 1" V-Series, PVC	BPV-00531
	Valve Body, 1 1/2" V-Series, PVC	BPV-00541

call 1-888-859-9726

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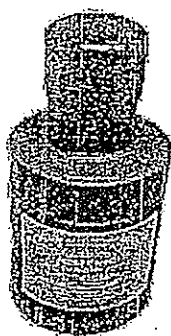


BLUE PLANET ENVIRONMENTAL SYSTEMS, INC.
P.O. Box 350817
Melbourne, FL 32935

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Web: www.blueplanetenv.com

SPECIFICATION

BACK PRESSURE VALVE



Diaphragm back pressure valves are designed to enhance the performance of chemical feed systems by applying a continuous back pressure to the chemical feed pump, while also acting as an anti-syphon valve.

The diaphragm back pressure valve applies a positive discharge pressure to a metering pump system to prevent syphoning and eliminate varying dosage rates caused by fluctuating downstream pressure. The diaphragm is held against the valve seat by an internal spring. When the preset pressure is exceeded, the diaphragm is forced upwards and chemical flows through the valve to the injection point. The back pressure valve is field adjustable from 0 - 150 psi via the adjustment screw.

The back pressure valve can be installed anywhere in the discharge line, provided there is some downstream pressure. If there is no downstream pressure the back pressure valve should be installed at the dosage point to prevent syphoning and drainage of the chemical line. It is important however that all chemical system equipment such as pulsation dampeners, pressure relief valves and pressure gauges are between the pump and back pressure valve.

Back pressure valve performance will be enhanced with the installation of a pulsation dampener to smooth out the discharge/suction cycles of the pump. This will allow the diaphragm to "float" inside the valve chamber, minimizing wear on the stress points of the diaphragm. Consult BPES for pulsation dampener material and sizing recommendations.

Model Information

BP 1 - 2 - 3 - 4

1 = Design
T - Compact
(1/4" - 1/2")
V - Full Size

2 = Size
025 - 1/4"
050 - 1/2"
075 - 3/4"
100 - 1"
150 - 1 1/2"
200 - 2"

3 = Material
P - PVC
CP - CPVC
PP - Polypropylene
T - PTFE
K - PVDF
S - 316 SS
A - Alloy 20
C - Hastalloy C

4 = Options
V - Viton Diaphragm
S - Socket Connection
F - Flanged Connection
OS - Optional Steel Top
OSS - Optional 316 SS Top
MS - 50 to 350 psi; Steel Top
MSS - 50 to 350 psi; 316 SS Top
AR - Optional Air Release

call 1-888-859-9726

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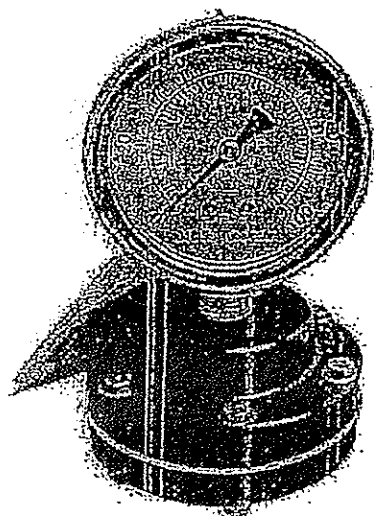


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SPECIFICATION

PRESSURE GAUGE WITH ISOLATOR

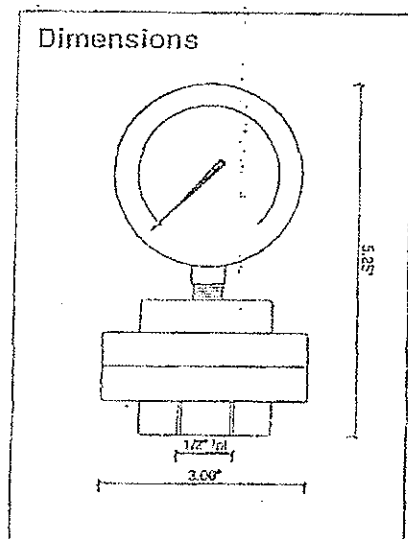


- OFFERS PROTECTION FROM CORROSION AND CLOGGING.
- INDUSTRIAL QUALITY ALL STAINLESS STEEL GAUGE WITH 2 1/2" DIAL.
- 1/2" FPT BOTTOM CONNECTION.

The Industrial quality gauge with isolator provides corrosion protection by isolating the gauge from the process media. They also offer protection against clogging from suspended solids or highly viscous fluids. The isolator features a flexible diaphragm which acts as a barrier between the gauge and the process. The internal space between the gauge and the diaphragm are filled with glycerin. Pressure/vacuum on the process side of the diaphragm causes it to flex against the liquid fill which transmits the same pressure to the gauge.

INSTALLATION

Industrial quality gauge with isolator is easily installed into a piping system with the use of a close nipple and tee. Teflon tape or a suitable thread sealant should be used as required by the process. Plastic models should be installed no more than hand tight. Plastic threads will expand as more pressure is applied. The use of tools may result in a cracked housing. Metal models should be tightened snug. A strap wrench may be used, but do not overtighten. The sharp edge of a nipple inserted too far into the isolator can rupture the diaphragm.
***DO NOT DISASSEMBLE GAUGE FROM ISOLATOR.**



Model Information

PG $\frac{1}{2}$ - 2 - 3

1 = Size	2 = Housing	3 = Diaphragm
V30 - Vacuum 0-30" Hg	PV - PVC	E - EPDM
030 - Pressure 0-30 psi	P - Polypropylene	V - Viton
060 - Pressure 0-60 psi	K - PVDF	T - PTFE
100 - Pressure 0-100 psi	S - Stainless	
160 - Pressure 0-160 psi	A - Alloy 20	
200 - Pressure 0-200 psi	H - Hastalloy C	
300 - Pressure 0-300 psi		

ORLANDO UTILITIES COMMISSION
STANTON ENERGY CENTER WTP
SODIUM HYPOCHLORITE 'POST' FEED SYSTEM

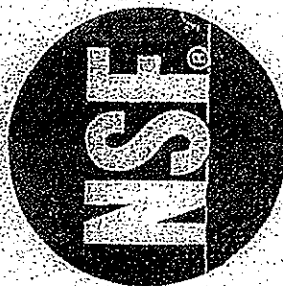
MISCELLANEOUS INFORMATION

NSF International

RECOGNIZES

ODYSSEY MANUFACTURING COMPANY
TAMPA, FL

AS COMPLYING WITH ANSI/NSF 60.
PRODUCTS APPEARING IN THE NSF OFFICIAL LISTING ARE
AUTHORIZED TO BEAR THE NSF MARK.



Certification Program
Accredited by the
American National
Standards Institute



Certification Program
Accredited by the
Dutch Council
for Accreditation



Certification Program
Accredited by the
Standards Council
of Canada

This certificate is the property of NSF International and must be returned upon request. To verify certification, call 800 NSF-MARK or (1) 734 769-8010.

May 4, 2000

Certificate #25070/25070B

Stan S. Hazan, General Manager
Drinking Water Additives



ODYSSEY
MANUFACTURING CO.

MATERIAL SAFETY DATA SHEET

REVISED 7/2/00

SECTION I CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

ODYSSEY MANUFACTURING CO.
1484 Massaro Boulevard
Tampa, Florida 33619
1-813-635-0339

EMERGENCY RESPONSE NUMBER:
1-800-ODYSSEY (FLORIDA)
1-813-635-0339 (24 hours)

SUBSTANCE: SODIUM HYPOCHLORITE
TRADE NAME: Ultra-CHLOR
CHEMICAL NAME/SYNONYMS: Sodium Hypochlorite Solution, Bleach Solution, Bleach Liquor, Hypo-
solution, Bleach, and Liquid Bleach.
CAS NUMBER: 7681-52-9
CHEMICAL FAMILY: Alkali
FORMULA: NaOCl
DOT PROPER SHIPPING NAME: Hypochlorite Solution
DOT HAZARD CLASS: 8 (Corrosive) PG III; PG II (For solutions greater than 16% available chlorine)
DOT IDENTIFICATION NO: UN1791
RQ: 100 pounds
DOT EMERGENCY GUIDE NO: 154

SECTION II COMPOSITION, INFORMATION ON INGREDIENTS

INGREDIENT(S):	
Sodium Hypochlorite (NaOCl)	10.0 - 20.0% wt
Sodium Hydroxide (NaOH)	0.1 - 0.4% wt
Water (H ₂ O)	79.7 - 89.9% wt

SECTION III HAZARDS IDENTIFICATION

NFPA CLASSIFICATION (SCALE 0-4): Health=2 Fire=0 Reactivity=1
EC CLASSIFICATION (ASSIGNED): C (Corrosive)

EMERGENCY OVERVIEW

COLOR: Yellow

PHYSICAL FORM: Liquid

ODOR: Chlorine Odor

MAJOR HEALTH HAZARDS: Respiratory Tract Burns, Skin Burns, Mucous Membrane Burns, and Eye Irritation
HAZARDOUS MIXTURES WITH OTHER LIQUIDS, SOLIDS, OR GASES: Reacts violently with acids
liberating chlorine gas. Also reacts with organic substance. When heated, gives off oxygen that may increase fire
hazard.

POTENTIAL HEALTH EFFECTS

INHALATION:

- **SHORT TERM EXPOSURE:** Irritation to respiratory tract. May have same as effects reported in other routes of exposure, burns, blisters, nausea, difficulty breathing, and lung congestion.
- **LONG TERM EXPOSURE:** Same as effects reported in short term exposure.

SKIN CONTACT:

- **SHORT TERM EXPOSURE:** Irritant, reddening of the skin. May have burns, blisters, and itching
- **LONG TERM EXPOSURE:** Same as effects reported in short term exposure.

EYE CONTACT:

- **SHORT TERM EXPOSURE:** Irritation (possibly severe), possible eye damage
- **LONG TERM EXPOSURE:** Same as effects reported in short term exposure.

INGESTION:

- **SHORT TERM EXPOSURE:** Burns, vomiting stomach pain, disorientation, bluish skin color, convulsions, coma
- **LONG TERM EXPOSURE:** Same as effects reported in short term exposure.

CARCINOGEN STATUS

OSHA: N

NTP: N

IARC: N

SECTION IV FIRST AID MEASURES

INHALATION: Remove from exposure and get fresh air. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed. Keep warm and at rest. Get medical attention immediately if artificial respiration is required.

SKIN CONTACT: Remove contaminated clothing, jewelry, and shoes immediately. Flush affected area with large amounts of water, preferably a safety shower. Use soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). For burns, cover affected area securely with sterile, dry, loose fitting dressing. If skin is burned, get medical attention immediately.

EYE CONTACT: Wash eyes immediately with large amounts of water, occasionally lifting upper and lower lids, until no evidence of chemical remains (at least 15 minutes). Continue irrigating with a normal saline solution until ready to transport to physician. Cover with sterile bandages. Get medical attention immediately.

INGESTION: Rinse mouth with water. Drink large quantities of milk (water if no milk is available). Milk of magnesia may be helpful. **DO NOT USE ACIDIC ANTIDOTES SUCH AS SODIUM BICARBONATE.** When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, do not induce vomiting and turn their head to the side. Never make an unconscious person vomit or drink fluids. Get medical attention.

NOTE TO PHYSICIAN: For inhalation, consider oxygen. For ingestion, avoid gastric lavage, emesis, sodium bicarbonate and acid solutions. Consider the use of antacids.

SECTION V FIRE FIGHTING MEASURES

FLASH POINT: Non-flammable

FLAMMABLE LIMITS: Non-flammable

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard. Oxidizer. This material will react with some metals and cause liberation of oxygen. May ignite or explode on contact with combustible materials. Toxic fumes can be liberated by contact with acid or heat.

EXTINGUISHING MEDIA: Regular dry chemical, carbon dioxide, water, or foam suitable for surrounding fire. For large fires, use regular foam or flood with fine water spray.

FIRE FIGHTING: Wear self-contained breathing apparatus and full protective clothing. Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. Use extinguishing agents appropriate for surrounding fire. Do not get water directly on material. For large fires, flood with fine water spray. Reduce vapors with water spray. Apply water from a protected location or from a safe distance. Avoid body contact or inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

SECTION VI ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE: Do not touch spilled material. Stop leak if possible without personal risk. For small spills, collect spilled material in appropriate container for disposal and consider absorbing with sand or other non-combustible material (e.g., do not use sawdust or other combustible material). Be advised, however, that the use of absorbing material is creating hazardous waste and this absorbing material must now be disposed of properly. Collect spilled material in appropriate container for disposal. For small dry spills, move containers away from spill to a safe area. For large spills, dike for later disposal. If possible, do not allow material to enter sewers, streams, ponds or storm conduits as concentrated solutions will seriously injure aquatic life. Keep unnecessary people away, isolate hazard area and deny entry. Contain in as small an area as possible, such as a holding area for dilution and neutralization. Contain spill in plastic drums when available. Dispose of in accordance with Federal, State, and local regulations. Personnel engaged in cleanup operations must be equipped with NIOSH approved respirator protection, rubber boots, gloves, and clothing to avoid body contact. Reportable Quantity (RQ): 100 pounds. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800) 424-8802 (USA) or (202) 426-2675 (USA).

ADVANCE PLANNING: Plan in advance for an occupational release and have necessary equipment and neutralization agents on-site. Contact Odyssey Manufacturing for assistance.

SECTION VII HANDLING AND STORAGE

Store in vented, closed containers that provide protection from direct sunlight. Keep separated from incompatible substances and do not store near acids, heat, or oxidizable materials or organics. When handling, do not mix with other cleaning agents that may liberate chlorine gas vapors (e.g., acidic agents).

Store and handle in accordance with all current regulations and standards including NFPA 430 Code for the Storage of Liquid and Oxidizing Materials.

SECTION VIII EXPOSURE CONTROLS AND PERSONNEL PROTECTION

EXPOSURE LIMITS: 2 mg/m³ AIHA recommended STEL 15 minute(s) for Sodium Hypochlorite

VENTILATION: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Splash goggles are preferred to a faceshield. Another option is to wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: It is recommended to wear appropriate chemical resistant clothing to avoid body contact such as a rubber apron or rain suit. Boots are preferred for footwear.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: Under conditions of frequent use or heavy exposure, respiratory protection may be needed.

Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use.

- Any chemical cartridge respirator with organic vapor cartridge(s).
- Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)
- Any air-purifying respirator with a full facepiece and an organic vapor canister
- Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply (Use for Unknown Concentrations or those that may be Immediately Dangerous to Life or Health)
- Any self-contained breathing apparatus with a full facepiece (Use for High Concentrations or those which are immediately Dangerous to Life or Health)

SECTION IX PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL APPEARANCE: Liquid

APPEARANCE AND ODOR: Clear - Chlorine odor like household bleach.

COLOR: Greenish -Yellowish cast

MOLECULAR WEIGHT: 74.44

MOLECULAR FORMULA: Na-O-Cl

BOILING POINT: Degrades at 230 Degrees Fahrenheit
FREEZING POINT: 7 Degrees Fahrenheit
SPECIFIC GRAVITY: 1.15 - 1.17 at 60 Degrees Fahrenheit
PH: Approximately 11 - 13
VAPOR PRESSURE (mm HG): Vapor Pressure of water + decomposition product Vapor Pressure
VAPOR DENSITY: Not Available
SOLUBILITY IN WATER: Complete
VOLATILITY: Not Available
EVAPORATION RATE: >1
COEFFICIENT OF WATER /OIL DISTRIBUTION: Not Available

SECTION X STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.
CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Dangerous gases may accumulate in confined spaces. May ignite or explode on contact with combustible materials.
INCOMPATIBLES: Acids, metals, amines, combustible materials, reducing agents. Specific reactions with sodium hypochlorite include the following:
ACIDS: Violent reaction.
ALUMINUM: Corrosive action.
AMINES: Form explosive chloramines.
AMMONIA: Form explosive chloramines.
AMMONIUM SALTS: May form explosive product.
BENZYL CYANIDE (ACIDIFIED): Explosive reaction.
CELLOULOSE: Violent reaction
ETHYLENEIMINE: Forms explosive 1-chloroethyleneimine.
FORMIC ACID: Explosive mixture.
METHANOL: May form explosive compound.
NITROGEN COMPOUNDS: Forms explosive N-chloro compounds.
ORGANIC AND COMBUSTIBLE MATERIALS: Fire and explosion hazard.
OXALIC ACID: Intense reaction
REDUCING AGENTS: Fire and explosion hazard
ZINC: Corrosive
HAZARDOUS DECOMPOSITION:
Thermal decomposition products – Chlorine and Hydrochloric Acid Vapors
Decomposition Products – Hypochlorous Acid Vapors
POLYMERIZATION: Will not polymerize.

SECTION XI SODIUM HYPOCHLORITE TOXICOLOGICAL INFORMATION

IRRITATION DATA: 10 mg eyes – rabbit moderate
TOXICITY DATA:
1gm/ kg oral-woman; TDLo; 45mg/kg intravenous-man TDLo; 5800 mg/ kg oral-mouse LD50; 140 mg/ kg/9 week(s) continuous oral-rat TDLo
CARCINOGEN STATUS: According to the IARC, animal inadequate evidence, human no adequate data, Group 3 (Hypochlorite salts)
LOCAL EFFECTS:
Corrosive: inhalation, skin contact, eye, ingestion hazards
ACUTE TOXICITY LEVEL:
Slightly Toxic if ingested
MUTAGENIC DATA:
Mutation in micro organisms – Salmonella typhimurium 1mg / plate (-S9); DNA repair – Escherichiacoli 20ug/ disc; DNA damage – Escherichiacoli 420 umol/L; phage inhibition capacity – Escherichiacoli 103 ug/ well; micronucleus test - non-mammalian species multiple 200 ppb; cytogenetic analysis - non-mammalian species multiple 120 ug/ L; cytogenetic analysis – human lymphocyte 100 ppm 24hour(s); sister chromatid exchange – human embryo 149 mg/ L; cytogenetic analysis – hamster lung 100 mg/ L
HEALTH EFFECTS:

INHALATION

ACUTE EXPOSURE: May cause severe bronchial irritation, sore throat with possible blistering, coughing,

stomatitis, nausea, labored breathing, shortness of breath and pulmonary edema. 10-20 mg/m³ causes burning of the nose and throat; 40-60 mg/m³ may be fatal. If sufficient amounts are absorbed, may cause effects as detailed in acute ingestion.

CHRONIC EXPOSURE: No data available.

SKIN CONTACT

ACUTE EXPOSURE: Extent of damage depends on concentration, pH, volume of solution and duration of contact. May cause redness, pain, blistering, itchy eczema and chemical burns. Sensitization reactions are possible in previously exposed persons.

CHRONIC EXPOSURE: Effects depend on concentration and duration of exposure. Repeated or prolonged contact with corrosive substances may result in dermatitis or effects similar to acute exposure. Allergic dermatitis has also been reported.

EYE CONTACT

ACUTE EXPOSURE: May cause redness, pain, and blurred vision. Solutions of 5% splashed in human eyes have caused a burning sensation and later only slight superficial disturbance of the corneal epithelium which cleared completely in the next day or two without special treatment. However, one animal study reports a 5% solution causing only moderate irritation with clearing within 7 days. A higher concentration of 15% tested on rabbit eyes caused immediate severe pain, hemorrhages, rapid onset of ground-glass appearance of the corneal epithelium, moderate bluish edema of the whole cornea, chemosis and discharge for several days. Such eyes have sometimes healed in 2-3 weeks with slight or no residual corneal damage but they had neovascularization of the conjunctiva and distortion of the nictitating membrane by scarring.

CHRONIC EXPOSURE: Depending on concentration and duration of exposure, symptoms may be as those of acute exposure.

INGESTION

ACUTE EXPOSURE: May cause irritation and erosion of the mucous membranes, vomiting (possibly bloody) and abdominal pain and spasms. A drop in blood pressure, shallow respiration, edema (possibly severe) of pharynx, larynx, and glottis, confusion, convulsions, delirium and coma may occur. Cyanosis and circulatory collapse are possible. Esophageal or gastric perforation and strictures are rare. Death may occur, usually due to complications of severe local injury such as toxemia, shock, perforations, hemorrhage, infection and obstruction. Massive ingestions may produce fatal hyperchloremic metabolic acidosis or aspiration pneumonia.

CHRONIC EXPOSURE: Sensitization reactions are reported in individuals who are exposed in small amounts through their water supply. High doses have caused sperm abnormality in mice.

SECTION XII ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

FISH TOXICITY: 94.0 ug/L 96h hour(s) LC50 (Mortality) Cutthroat trout
(*Oncorhynchus clarki*)

INVERTEBRATE TOXICITY: 31.6 ug/L 7 hour(s) 1C50 (Species Diversity) Protozoan phylum (Protozoa)

ALGAL TOXICITY: 90 ug/L 96 hour(s) LC50 (Mortality) Algae, phytoplankton, algal mat (Algae)

PHYTOTOXICITY: 230 ug/L 35 hour(s) (Biomass) Curled pondweed (*Potamogeton crispus*)

OTHER TOXICITY: 2.1 ug/L 28 day(s) (Chlorophyll) Aquatic community (Aquatic community)

ENVIRONMENTAL SUMMARY: Highly toxic to aquatic life.

SECTION XIII DISPOSAL CONSIDERATIONS

Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. Dispose in accordance with all applicable regulations.

SECTION XIV TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101 SHIPPING NAME-UN NUMBER: Sodium Hypochlorite) - UN1791

U.S. DOT 49 CFR 172.101 HAZARD CLASS OR DIVISION: 8

U.S. DOT 49 CFR 172.101 PACKING GROUP: III (less than 16% available chlorine) / II (16% or more available chlorine)

U.S. DOT 49 CFR 172.101 AND SUBPART E LABELING REQUIREMENTS: Corrosive

U.S. DOT 49 CFR 172.101 PACKAGING AUTHORIZATIONS:

EXCEPTIONS: 49 CFR 173.154
NON- BULK PACKAGING: 49 CFR 173.203 (less than 16% available chlorine) / 49 CFR 173.202 (16% or more available chlorine)
BULK PACKAGING: 49 CFR 173.241 (less than 16% available chlorine) / : 49 CFR 173.242 (16% or more available chlorine)
U.S. DOT 49 CFR 172.101 QUANTITY LIMITATIONS:
PASSENGER AIRCRAFT OR RAILCAR. 5 LITERS / (less than 16% available chlorine) / 1 LITERS (16% or more available chlorine)
CARGO AIRCRAFT ONLY: 60 LITERS / (less than 16% available chlorine) / 30 LITERS (16% or more available chlorine)

SECTION XV REGULATORY INFORMATION

U.S. REGULATIONS

TSCA INVENTORY STATUS: Y

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CERCLA SECTION 103 (40CFR302.4): Y

SODIUM HYPOCHLORITE: 100 LBS RQ

SARA SECTION 302 (40CFR355.30) : N

SARA SECTION 304 (40CFR355.40) : N

SARA SECTION 313 (40CFR372.65) : N

SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40CFR370.21):

ACUTE: Y

CHRONIC: N

FIRE: N

REACTIVE: N

SUDDEN RELEASE: N

OSHA PROCESS SAFETY (29CFR1910.119): N

STATE REGULATIONS:

California Proposition 65: N EUROPEAN REGULATIONS:

EC NUMBER (BINECS) : 231-668-3

EC RISK AND SAFETY PHRASES:

R 31 Contact with acids liberates toxic gas.

R 34 Causes burns.

S ½ Keep locked-up and out of reach of children.

S 28b After contact with skin, wash immediately with plenty of soap and water.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)

S 50 Do not mix with incompatible materials.

CONCENTRATION LIMITS:

C>10% C R 31-34

5%≤C≤10% Xi R 31-36/38

GERMAN REGULATIONS:

WATER HAZARD CLASS (WGK) : 2 (Official German Classification)

SECTION XVI OTHER INFORMATION

For additional information, contact our technical service department.

Information contained in this MSDS refers only to the specific material designated and does not relate to any process or use involving other materials. This information is based on data believed to be reliable, and the Product is intended to be used in a manner that is customary and reasonably foreseeable. Since actual use and handling are beyond our control, no warranty, express or implied, is made and no liability is assumed by Odyssey Manufacturing in connection with the use of this information.

Safety Eye & Ear Protection

Combination Shower and Eyewash

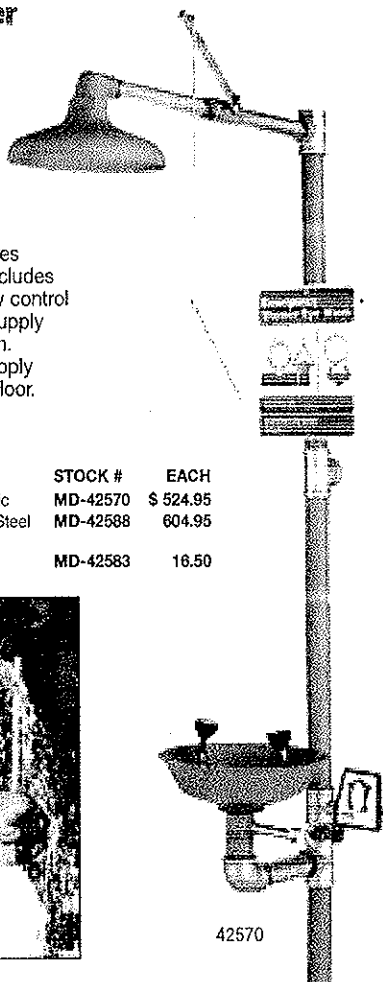
- Galvanized piping
- Stainless actuators

Floor-mounted combination shower and eyewash station. Eyewash features two GS-Plus gentle-spray heads calibrated to deliver 1.8 gpm at line pressures from 20 to 100 psi. Each head includes a flip-top dust cover, internal flow control and filter to remove impurities. Supply and drain are 1-1/4" NPT. 90" high. Drain 8" horizontal from floor; supply enters from top or at 66" above floor. Ships UPS. Ship weight: 50 lbs. Conforms to ANSI standards.

DESCRIPTION	BOWL	STOCK #	EACH
Shower with Eyewash	ABS Plastic	MD-42570	\$ 524.95
Shower with Eyewash	Stainless Steel	MD-42588	604.95
Replacement Spray Head (for Eyewash)	---	MD-42583	16.50



42570



Freeze-Proof Showers

- With eyewash
- One control for both shower and eyewash

Ideal for outdoor use. Standard depth of valve is 36", 1-1/4" NPT hook-up; other depths available. Weight: 60 lbs. Ships UPS in two packages. Conforms to ANSI standards.

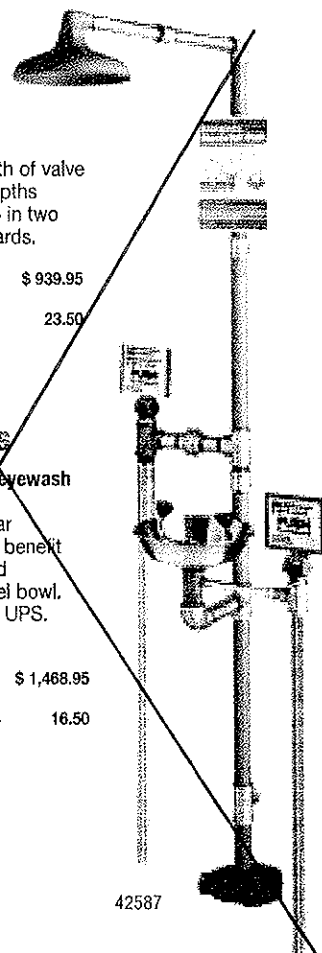
Freeze-Proof Shower/Eyewash	MD-42585	\$ 939.95
Replacement Spray Head (for Eyewash)	MD-42584	23.50

Dual-Control Freeze-Proof Showers

- Separate controls for shower and eyewash

This is another version of our popular freeze-proof shower with the added benefit of controls on both the eyewash and shower portions and a stainless steel bowl. Conforms to ANSI standards. Ships UPS. Ship weight: 83 lbs.

Dual-Control Shower/Eyewash	MD-42587	\$ 1,468.95
Replacement Spray Head (for Eyewash)	MD-42583	16.50



42587

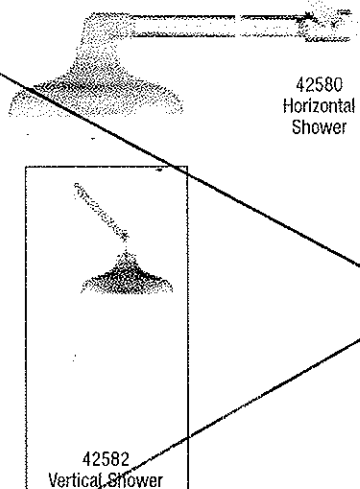
Showers

- Horizontal or vertical models

ABS plastic shower head mounted to heavy wall galvanized pipe with 1" NPT connection is designed to provide flow pattern that meet ANSI Standards when minimum flow is provided.

Shower has a 1" chrome plated bronze stay-open ball valve and stainless steel pull rod assembly with actuation graphic. Available in horizontal or vertical models. Conforms to ANSI shower standards. Ships UPS. Ship weight: 8 lbs.

Horizontal Shower	MD-42580	\$ 438.95
Vertical Shower	MD-42582	156.95



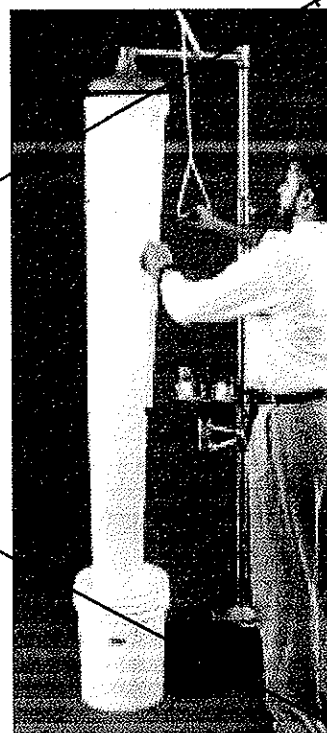
42580
Horizontal
Shower

Shower Testing Chute with Pail

- Hassle free, easy to use

This shower tester is designed to make your weekly test of your emergency showers as hassle-free as possible. Includes a vinyl chute, telescoping rod and bucket with lid. Great for a laboratory or any other place you don't want water all over the floor.

Shower Testing Chute w/ Pail	MD-42548	\$ 103.50
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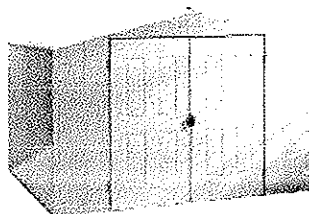
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Royal Outdoor Products

Winchester 10x8 Vinyl Storage Building (Window Kit Sold Separately)

Item #: 73290 Model: S01006001



Product Availability:

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Description

(4.7)

Exterior Width: 118 3/16", Depth: 97 3/4",
Height: 86 3/8"

Storage Space - Sq. Ft.:

80

Material:

Vinyl

80 square feet of unobstructed storage

Rafter-free interior allows for optimum storage capabilities

Maintenance free vinyl panels

Classic gable roof style compliments any home's architecture

Accessories may be installed during or after installation

Equipped with two 71" x 35" steel doors

Steel doors are equipped with door handles

Steel doors require painting allowing the homeowner to add a splash of color to the unit

Doors swing outward allowing for maximum storage capabilities

Ventilation included

Extension kits may be added

Optional base system available

10 year warranty

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