

CHLORINE BARGE LOADING PROCEDURE
1988

SL 086971

CHLORINE BARGE LOADING PROCEDURE

Chlorine is a nonflammable compressed gas (grade) cargo. The loading and handling of chlorine is very different from other barge loading procedures. Chlorine is not permitted to be shipped in bulk on manned vessels (ships), only barges. Only certain parts of the "Standard Barge Loading, All" applies to the loading of chlorine; therefore, this procedure will contain the necessary details.

The loading of a chlorine barge will involve three classifications of personnel; therefore, necessary training will be done at the different levels. The lead tankerman, tankerman, and tankerman helper will receive hands-on-training in the field as to shore piping, barge piping, valve changing and scale tanks. This training will be done by an experienced tankerman.

Key Reference Sections

Chlorine	46 CFR, Part 151.50-31
Regulated by Subchapter D	46 CFR, Part 151.01-10
Certificate of Inspection	46 CFR, Part 151.04-1
Inspection Required	46 CFR, Part 151.04-2
Minimum Requirements	46 CFR, Part 151.05
Open Hopper Barges	46 CFR, Part 151.45-5
Shipping Papers	46 CFR, Part 151.45-7
Signals	46 CFR, Part 151.45-9

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Compressed Gases	46 CFR, Part 151.50-30
Inspection	46 CFR, Part 151.50-31
Cargo of Particular Hazard	33 CFR, Part 126.10
Chemical Data Guide	Page 60

Duties- The tankerman and tankerman helper will prepare and load the barge. The lead tankerman will obtain scale tank numbers, line up and start transfer. He will also take the barge off by weight from the Liquefaction Control Room with the help of the tankerman and tankerman helper at the dock.

Preparing Chlorine Barge for Loading

1. Be sure the barge is secured to the dock using a minimum of six lines. The barge loading manifold must be spotted opposite the dock manifold in order to hook up barge.
2. Inspect the barge and fill out the preloading and inspection form.
3. Gauge the barge via draft readings, using the four corners as gauging points.
4. Pump out any water in the hopper compartments, beginning with stern compartments first, then the bow compartments.
5. Inspect the loading hoses. Check the test date on hoses and on the Barge Tanks. Barge Tanks must be hydrostatically tested every three years. Inspect the Barge "Pinger", to make sure it operates. The pinger batteries should be changed every six months. Special batteries are required. Get them from the Dock Foreman.

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6. Hook up two liquid lines and one gas line to the barge loading piping. On PPG Barges hook up two liquid lines and two gas lines. Use new gaskets on all flanges. Disconnect hand operated boom from the liquid and gas lines on the dock after hookup. NOTE: Check to make sure the two 1" purge valves between the liquid and gas lines on the barge loading piping are closed.
7. Hook up barge loading loops to the gas valves on two tanks on the barge. Make sure that one port and one starboard tank are hooked up at the same time. The other two tanks may be hooked into the gas piping of the barge by using a flexible hose with flange connections. This will be used for blowing down and sniffing purposes only.
8. Check the pressure on the hooked up tanks as you test the loading loops and piping for leaks. Record this pressure on the loading form.
9. Prior to blowing down the barge, be sure the sniff valve in the Liquefaction building is closed and that the blowdown valve is lined up properly. Notify S. Liquefaction or Mercury Cell of pressure to be blowdown.
10. Blow the barge down to 30-35 psig, if blowing to Sulphur Chloride; 5-10 psig going to Mercury Cell. Do not put the barge on sniff if the pressure is greater than 35 psig.
11. Before putting barge on sniff, close blowdown valve on dock manifold and blow back into each tank on barge separately with 250 air pressure to make sure a check is not stuck on barge tanks. Verify pressure on each tank after doing this.

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12. When ready to begin sniffing the tanks, make sure the blowdown valve at South Liquefaction is closed. Open the sniff valve and begin pulling a vacuum. Contact the chlorine rack and have them monitor the sniff available to prevent overloading of the sniff system. Pull just enough vacuum on the barge tanks to do the necessary valve and inspection work.
13. Remove a gas valve and inspect the tank interior with a light. Be sure there is a vacuum on the tank before removing the valve. It will be necessary to remove the "basket check" to see inside the tank. NOTE: The check basket has left hand threads. The check seat has normal threads. Be sure the tanks are clean and dry. Inspect the ball, check seat and basket beneath the gas valve. (Balls are K-Monel, weigh 30-32 grams and are non-magnetic. Inspect the check seat, check body pins and balls beneath the liquid valves. (Balls are Tungsten-Carbide weigh 52-54 grams and slightly magnetic.
14. Change all angle valves on the chlorine barge, replacing all the gaskets, be sure you use 1/8 " gaskets. Plug the valve holes when you remove them so you don't lose the vacuum.
15. Hook-up liquid loading loops to the first two ready tanks. Also rehook the gas loops on the first two ready tanks.
16. Shut off all valves on the barge tanks. Shut off the sniff at the loading manifold and pressure check all valves and connections for leaks using 250 psig air. A mixture of ammonia and water is to be used to detect leaks.

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17. Inspect the barge safety valve by removing the housing. If the safety shows signs of a leak, it should be replaced or reworked.
18. Check the operation of the automatic shutdown valves. This should be done daily.
19. After all valve and inspection work is complete, put the barge back on sniff and pull a 15 to 20-inch vacuum.
20. Check the vacuum on the barge tanks by closing off the sniff and reading the manifold gauge.

Loading Chlorine Barges

1. The lead tankerman will obtain tanks from the foreman. Be sure the tank numbers are in agreement with Operations. Tanks 14, 15, 16, and 17 are controlled by South Liquefaction, while Tanks 18, 19, 20, and 21 are controlled by North Liquefaction.
2. The lead tankerman will complete scale tank weighing, lining up and filling of river lines. Line up scale tanks through the pumps to the closed loading valves on the manifold at the dock. Be sure only one scale tank is lined up to each transfer header. Complete all necessary tagging. Barge tank valves should be closed at this time. Record the scale tank number and the number of the barge tank it will be going into.
3. Lines must be filled with chlorine to get a starting weight. The lead tankerman will start the pump at South Liquefaction and the North Liquefaction operator will start those pumps.

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If the liquid loading lines are empty, sniff off the gas at the dock via the sniff line until you get liquid chlorine. Watch the sniff system carefully. Check with North and South Liquefaction to determine if the scale has stopped moving. This will indicate the lines are full.

4. If a tank from South Liquefaction is to be used, record the weight of the scale tank before filling the line, fill the line, then record the final scale tank weight for use as the starting weight. If a North Liquefaction tank is to be used, the tank must be topped off before loading. North Liquefaction operators will perform the topping off. Record the starting scale tank weight, filled line weight and topped off weight. The topped off weight will be used as the starting weight.
5. The amount of chlorine necessary to fill one barge tank is 550,000 lbs. Do not pull North Liquefaction tanks below 110,000 lbs or South Liquefaction tanks below 75,000 lbs. Make sure the starting weights are sufficient to allow for this.
6. Once the starting weights are recorded, the lead tankerman is to notify the dock to begin loading.
7. Open the manifold valves at the dock to the barge tanks. valves. Check the barge piping for leaks.
8. Start the transfer very slowly to prevent sticking the scale tank checks. All barge liquid valves should be fully open (min.3-4 rounds) so the check valves will operate in case of a hose break.

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9. Frequent checks of the barge and scale tanks should be made during loading to determine if leaks have developed. Be sure to check the block valve between the north and south river loading headers. It must be closed to avoid mixing the tanks.
10. If necessary, have the dock tankerman make adjustments in loading rates so that one tank will finish ahead of the other.
11. Blowing down for samples can begin two or three hours prior to coming off. The sample must be at least 80% chlorine in the vapor space. Sunlight breaks down the KI solution, store in the control room. Change solutions if you continue to get bad readings.
12. The lead tankerman will position himself at the appropriate Liquefaction Control Room when transfer nears completion to observe the weights. Notify the dock tankerman about 5000 lbs prior to coming off to let him know to stand by. When the weight is within 1500 lbs. of coming off, the lead tankerman will call out the weights to the dock tankerman so he can shut down the transfer.
13. When loading is complete, all personnel will check and agree on the final weight.
14. Let the line pressure bleed back into the scale tank thru one of the by-pass valves.
15. Secure the scale tank and loading lines. Open the river lines into tank No. 6. If #6 cannot be used, let the river lines float on the respective tanks. Pull tags and notify the Liquefaction lead operator.

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16. Close off all barge valves and sniff loading lines and loading loops. Reconnect hand operated boom to the loading lines from the dock and disconnect all piping.
17. After disconnection, the barge has to remain in the plant 24 hours before the barge can be secured for shipping.
18. Check the condition of the light standards, Chem Cards, dry compartment hatches etc. and report any discrepancies to the Lead Tankerman.
19. Complete all loading forms, log book entries and manifest for shipping. MAKE SURE ALL PAPER WORK IS TURNED IN TO THE SHIPPING DEPARTMENT SECRETARY.

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KEY POINTS

1. The chlorine barge loading operation should be shut down during ship or barge movements in the dock area. Barge valves and dock manifold valves should be closed. For ship movements barge lines should be blown and cleared. NEVER LEAVE LINES LIQUID FULL EVEN FOR SHORT PERIODS OF TIME.
 - a. There will be no movement of liquid chlorine while a ship is moored at "C" dock.
 - b. Blowing down of chlorine barge can be permitted while a ship is moored at "C" dock at the discretion of the Shift Foreman, depending on the wind direction, necessity of barge preparation, etc. and that the chlorine dock facility is manned with sufficient personnel to perform this operation.
2. If chlorine barge loading is to shut down for an extended period, the barge is to be closed off and the loading lines sniffed. This also applies if the barge is to be unattended for any length of time.
3. The automatic shutdown valve on the bank must be operated once a day at some point but do not shut the auto valve against the loading pump during loading operations. Notify the Foreman if it is not working properly. Automatic valves must be operated and working before barge loading can start.

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4. If loading chlorine barge is completed and no other barge is to be loaded, then automatic valves should be shut. Barge lines from automatic valves to loading manifold on the dock including the manifold should be cleared of chlorine and put on sniff.

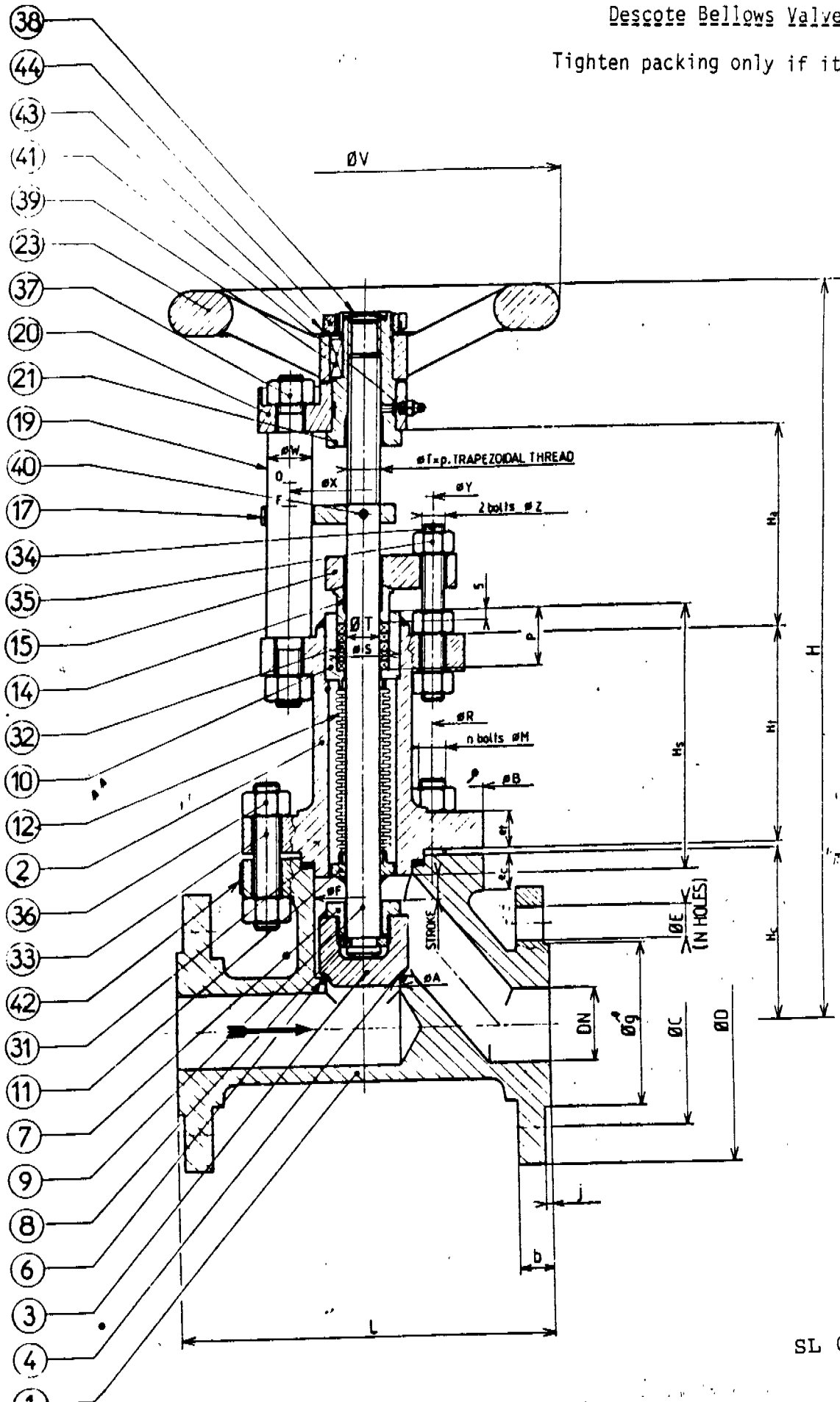
NOTE: After vacuum is obtained on the lines from the dock manifold to the automatic valves on shore, pressurize to 50 psig and leave this pressure on the line. (This is the same procedure we use to put lines back into service after maintenance work to have air space in the expansion bottles.)

5. Change the 6" nipples on loading piping every trip. Wash, dry and paint the loading piping (stabbers) each trip. Paint the inside of the dome every trip.

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Descote Bellows Valve

Tighten packing only if it leaks.



ADVANTAGES OF PHOENIX BELLOWS SEALED GLOBE VALVES

13% Chrome Steel Upper Stem

Split Spindle avoids torsional forces on bellows, coupling serves as "OPEN" and "CLOSED" indicator.

Connecting Bolts make installation of limit switches, actuators and locking devices easy.

Safety Stuffing Box for secondary seal to atmosphere

Double walled Bellows protected in the bonnet designed for at least 10,000 cycles.

Bleed Hole for pressure release.

Stem Guide to avoid distortion of bellows.

Tongue and Groove flange arrangement between body and bonnet for tight static seal.

Tilting, conic Disc hardened with stellite for perfect seating.

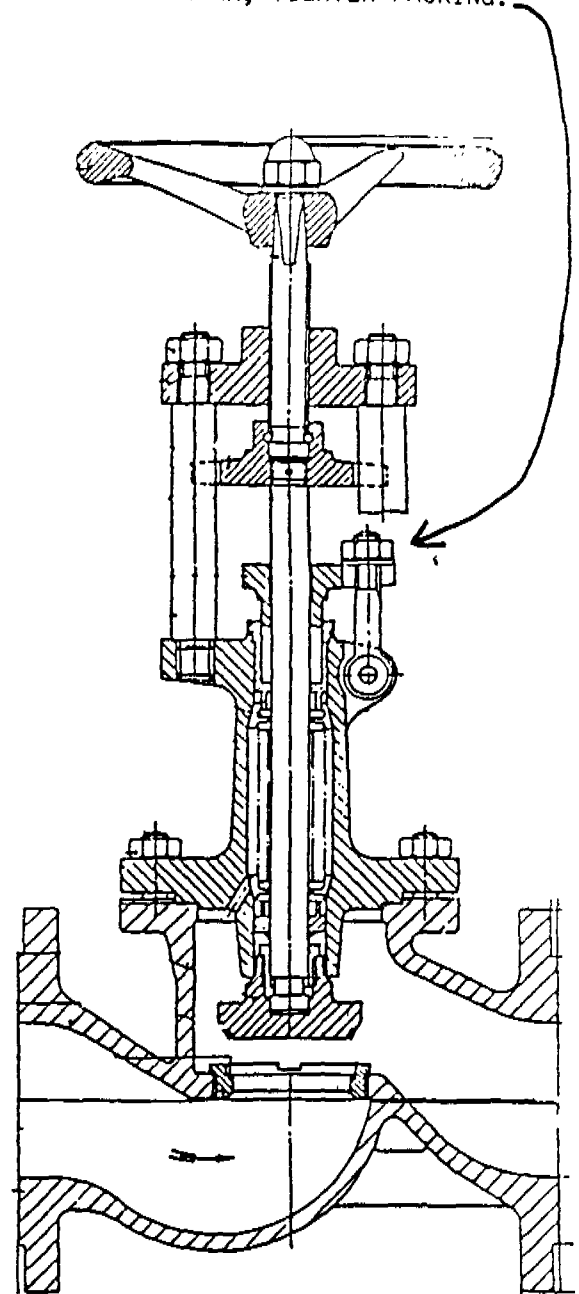
Travel stop serves as back-seat to avoid build-up on bellows.

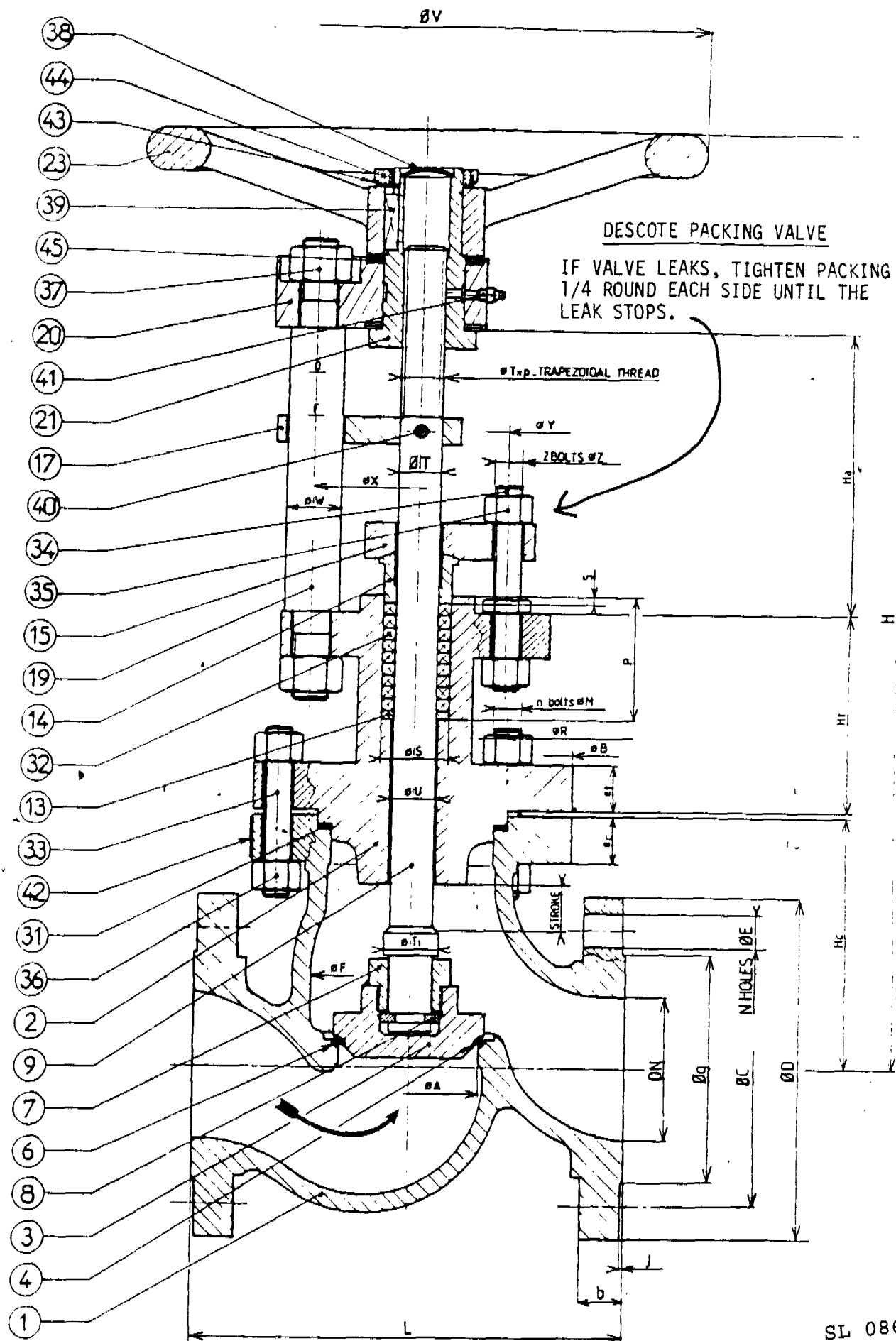
Replaceable seat for in-line maintenance, stellite for leaktight seal.

Smooth flow-path and bellows located in the bonnet, guarantee good cv-values.

CHARLESTON PROCESS CONTROL stocks PHOENIX valves for "General" and "Special" Applications as shown on the following pages. Other pressure ratings and Valves in other materials are available upon request.

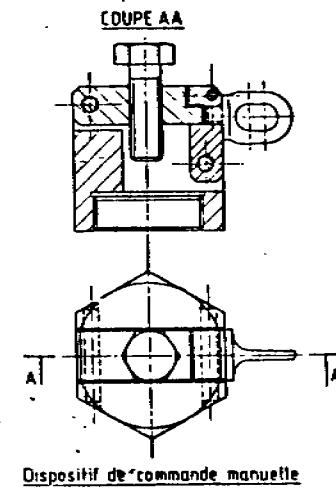
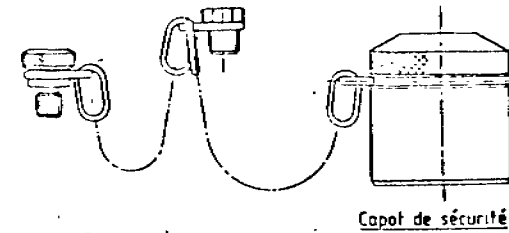
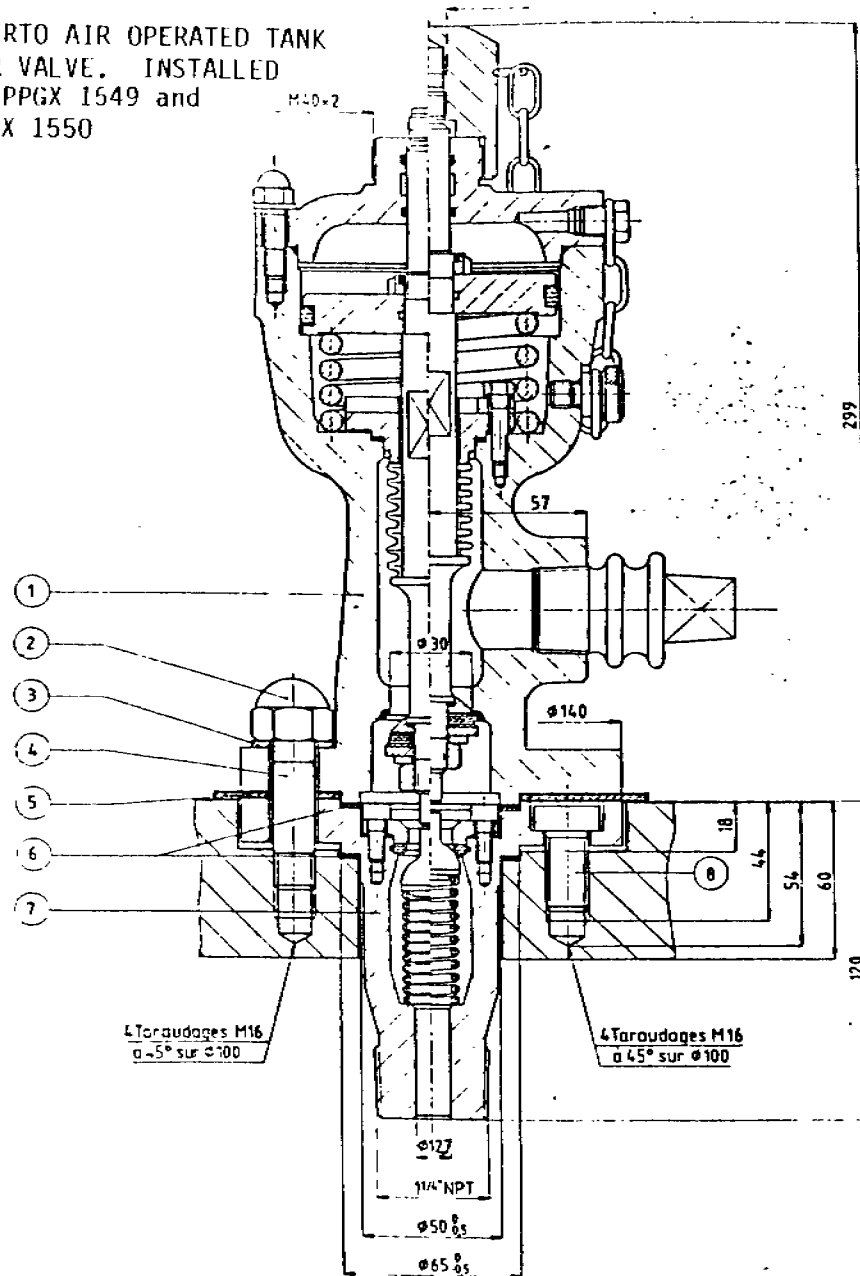
PACKING IS TO BE LEFT LOOSE. IF BELLOWS START TO LEAK, TIGHTEN PACKING.





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EMERTO AIR OPERATED TANK
CAR VALVE. INSTALLED
ON PPGX 1549 and
PPGX 1550



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LAWRENCE LIQUID CHLORINE VERTICAL PUMPS

TECHNICAL DATA

1. While pumping, the 3-stage pumps were designed to pump 100-135 gpm at a discharge pressure of 200 psig. This corresponds to 75,000-100,000 lbs/hr of chlorine. Since we have pressure drop in lines and have to go through several valves, the losses bring us down to about the 60,000-70,000 lb/hr that we normally see with these pumps.
2. The excess flow valves seat at 150 gpm. They will also seat at 185 psig during start-up of the pump.
3. During start-up, the pump has no discharge pressure on it, so initially, it has the ability to pump well above 200 gpm until the discharge pressure builds up. This is well above the flow or pressure at which the excess flow valve seats.
4. The internal SRV relieves at 300 psig. Because the SRV relieves inside a tank that is normally operating between 45-50 psig, this pressure also has to be overcome. This means that the internal SRV actually does not relieve until 350 psig in reality.
5. Upon start-up or when a tank car is opened up for loading, the pump has to build up 165 psig after the check valve seats before it can relieve the internal SRV.
6. The pump dead head pressure with no recirculation is 250-260 psig. This cannot relieve the SRV. This continuous pressure will bend the pump shaft while it is spinning and wear out the bearings and bushings. Heat buildup also occurs down inside the pump and the bushings lose lubrication.
7. When the excess flow valve seats, the pressure shock wave surge that occurs is enough to create 6-8 times the normal pump discharge pressure (1200-1600 psig). The pump and gaskets between the pump bowls are only designed to withstand 300 psig. If the internal SRV sticks initially, the gaskets or pump casings will rupture.
8. Serious damage will occur to the pump impellers and bushings if reverse flow or reverse rotation occurs.

Rules to Follow During Normal Operations

1. Never transfer liquid or blow out lines for clearing through the pump discharge. No reverse flow can be tolerated. Close the discharge valve and use a recirculation drop or barge unloading tie-in to transfer or blow out a line. (See #8, page 1.)
2. Never start-up a pump with the discharge valve open. (See #2, & 3, page 1.)
3. Never start-up a pump by just pushing the start button once even with the discharge valve closed. (See #3, page 1.)
4. Never let the pump run deadheaded with no recirculation on the pump. (See #6, page 1.)
5. Never seat an excess flow check either during start-up or when first opening into a tank car or barge. (See #4, 5, & 7, page 1.)
6. Never close off into a tank car if no recirculation is open on the pump. (See #6, page 1.)
7. With the pump operating on recirculation, opening into a tank car or barge should be done slowly, especially if the tanks are sniffed down on a vacuum. (See #2 & 7, page 1.)

Problems Discovered During Pump Overhauls

1. Blown gaskets on pump bowls and discharge piping.
2. Bent or twisted shafts.
3. Extreme wear on the bushings and shafts.
4. Wear on the pump impellers.
5. Excess flow check balls lodged down inside the discharge piping.
6. Physical failure of the bolts that hold the pump bowls together.
7. Broken pump pressure gauges due to over ranging them beyond 300 psig.

Proper Start-up Procedure for Liquid Chlorine Pumps

1. Check to be sure that the pump discharge valve is closed.
2. Open one recirculation valve 1/3 - 1/2 open.
3. While watching the pump shaft, bump the start-stop buttons 3-4 times to slowly and smoothly bring the pump up to operating speeds.
4. Immediately stop the pump if you hear the check valve seat.
5. Slowly open up the discharge valve while watching the pump discharge pressure gauge.
6. Bring the pressure up to 200 psig.
7. Slowly fill up the transfer piping.
8. Slowly open up into the tank car or barge.
9. If not enough flow is going into the car, slowly open the pump discharge valve wide open.
10. If loading is still too slow, the recirculation valve can be throttled back some, but it must be opened back to 1/3 - 1/2 open before closing off the tank car.
11. When the car is full slowly close off to the tank car.
12. If it's going to be awhile before you can push down and start loading again, check the pump discharge pressure. If it's at or above 250 psig, some recirculation will have to be added.

PROPER START-UP PROCEDURE FOR LIQUID CHLORINE PUMPS

WITH AUTOMATIC RECIRCULATION VALVES

1. The recirculation controllers have been tested and preset on each pump. The controller box should not be opened and the settings should not be changed.
2. Check to be sure that the block valve going to the discharge pressure gauge and controller impulse line is open.
3. Be sure that the pump discharge valve is closed.
4. Open the recirculation block valve at the tank dome on the recirculation line that has the automatic valve.
5. Be sure the other two recirculation lines are blocked off.
6. While watching the pump shaft, bump the start-stop buttons 3-4 times to slowly and smoothly bring the pump up to operating speeds.
7. Immediately stop the pump if you hear the check valve seat.
8. Slowly open the discharge valve while watching the pump discharge pressure gauge.
9. You should be able to open the discharge valve wide open without seating the excess flow check.
10. Slowly fill up the transfer piping. The automatic valve will close off as needed.
11. Slowly open up into the tank car/barge.
12. When the car is full, slowly close off to the tank car.
13. The automatic valve will close while loading and open back up to put recirculation on the pump when loading is stopped.
14. Shutdown the pump and block the discharge valve if you won't be loading out of that scale tank again for several hours.
15. If you plan on loading again out of that tank during your shift and the scale tank has more than 85,000 lbs of chlorine inventory, you can leave the pump on. The automatic recirculation valve will maintain flow through the pump to prevent damage to the pump.

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OPERATION OF SCALE TANK PUMP AUTOMATIC RECIRCULATION LINE

1. The valve eliminates the need for manual recirculation.
2. The valve will allow more chlorine to be loaded each hour.
3. The valve will help to lessen the number of times an excess flow check valve is seated.
4. The valve will protect the pump when it is running while tank cars are being switched.
5. Start-up of the pump should be the same as procedure as before.
6. When filling the loading headers, the valves should be opened slowly to pressurize the headers to the Tank Car Rack or the Docks.
7. Opening into unpressurized lines too fast will seat the excess flow check even with the automatic recirculation valve.
8. As you open up to the tank car, the automatic valve will start closing to keep over 200 psig pump pressure.
9. The valve should be completely closed while loading is taking place.
10. As you start closing off on the tank car, the valve will start opening to relieve the resulting high pump discharge pressure.
11. While blocked from the tank car, the valve will remain 100% open.
12. When starting a new tank car, start opening slowly so the automatic valve has time to close off.

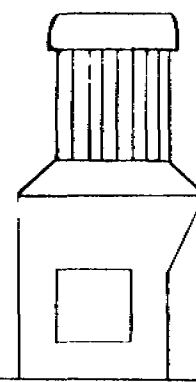
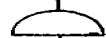
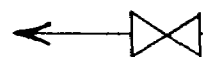
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Cl₂ Scale Tank Pump

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To
TANK
CARS



To Barge