Chlorine Safety- Best Practices & Procedures

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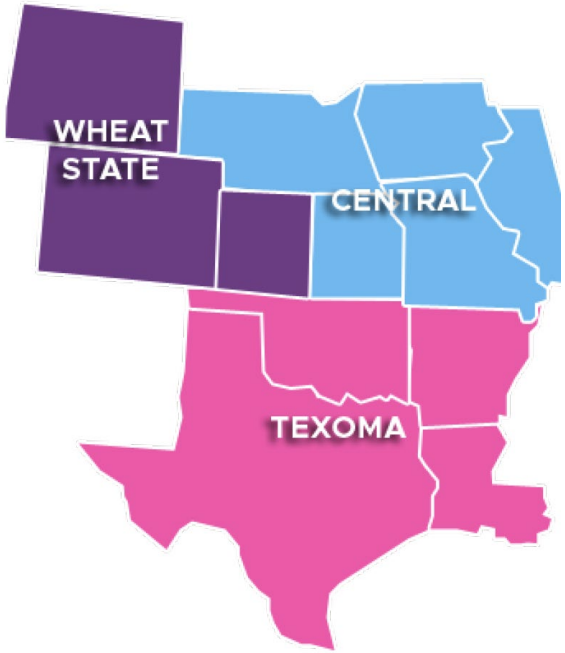
Cl
Chlorine



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INTERNATIONAL ASSOCIATION OF OPERATIVE MILLERS

2024 CWT Summer Conference

Speakers

Milling Experts

Eric Knott - *Plant Manager, Miller Milling Company*

- K- State - 2006-2010, Bachelor of Science, Milling & Ops
- Director of Texoma District

Jay St. Clair - *Senior Head Miller, Ardent Mills*

- K- State - 2002-2006, Bachelor of Science, Milling & Ops
- Central District Committee Member

Application Experts

Paul Van Camp - *Director, Sales & Marketing, Great Western MFG*

- University of Iowa, 1982-1986 BBA Finance & Marketing
- Central District Committee Member, Manufacturer Agitators

Richie Dunn - *Chlorine Technician - REPCO*

- 15+ Years Fabricating, Installing & Servicing Chlorine Systems
- 12+ Years Conducting Hands on Safety Training for Chlorine

Why Milling Applications Need Chlorine Gas

Customers Demand White Flour

Effective Antimicrobial Agent

High Ratio Cakes – Birthday/Donuts

Fruit and Angel Food Cakes

Cookies

Crackers

All-Purpose Flour

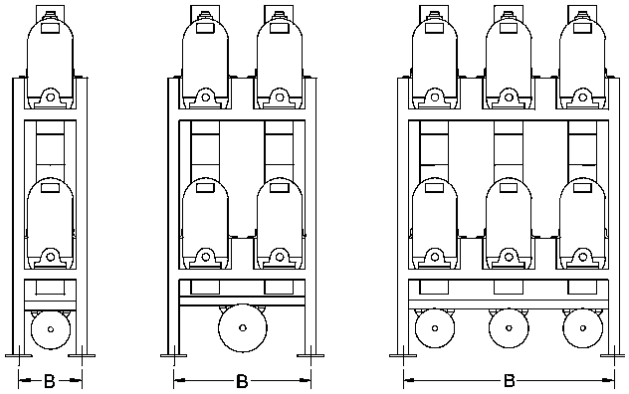
Plant Equipment Designed for Chlorine

Agitators

AB & EB Series

Plant Equipment Designed for Chlorine

AG Series



Single Pass Units

Model	A	B	C
111	63-3/4"	14-3/8"	73-3/4"
121	63-3/4"	31-1/4"	73-3/4"
211	75-3/4"	14-3/8"	85-3/4"
221	75-3/4"	31-1/4"	85-3/4"
231	75-3/4"	48-1/8"	85-3/4"
311	87-3/4"	14-3/8"	97-3/4"
321	87-3/4"	31-1/4"	97-3/4"
331	87-3/4"	48-1/8"	97-3/4"

Double Pass Units

Model	A	B	C
212	75-3/4"	14-3/8"	85-3/4"
222	75-3/4"	31-1/4"	85-3/4"
232	75-3/4"	48-1/8"	85-3/4"
312	87-3/4"	14-3/8"	97-3/4"
322	87-3/4"	31-1/4"	97-3/4"

The Agitator/Blender is built in three unique rotor lengths and in several different models to suit various capacities and treatment rates.

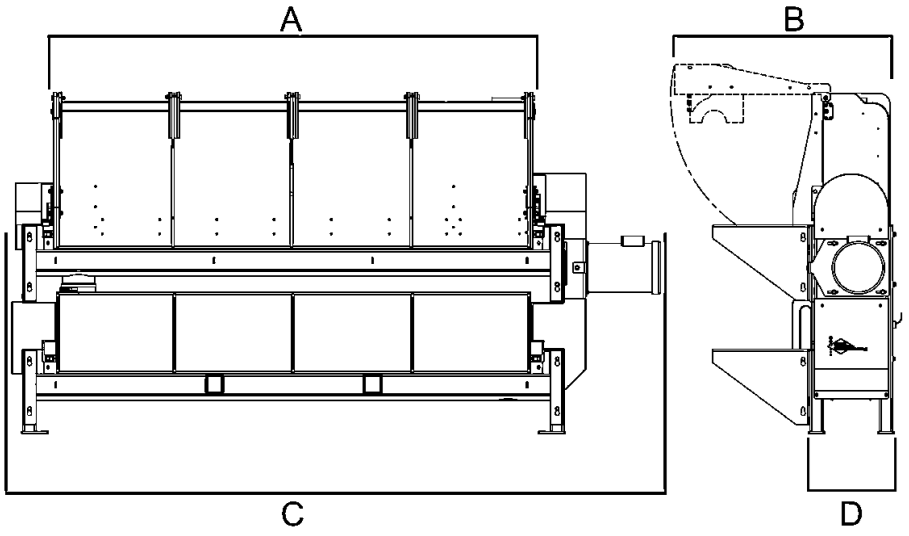
Single-pass arrangements are recommended when treatment rates do not exceed 1oz of chlorine per cwt (0.6 g/kg).

Double-pass arrangements are recommended for rates above 2 oz of chlorine per cwt (1.2 g/kg).

Rates between 1 and 2 oz of chlorine per cwt should be reviewed with Great Western prior to final equipment selection.

Plant Equipment Designed for Chlorine

EB Series



Single-Pass Units					
Model	A	B	C	D	HP
211	80 ¼"	40"	95"	15 ⅞"	3

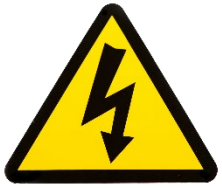
Double-Pass Units					
Model	A	B	C	D	HP
212	80 ¼"	40"	114 ¼"	15 ⅞"	5
312	92 ¼"	40"	120 ¼"	15 ⅞"	5

It is important to have Agitator Equipment manufactured in PVC due to corrosiveness of Chlorine.

PVC is rot resistant and provides increased sanitation.

Chlorine is dispensed to treat flour

What is Chlorine?
How It's Made



Electricity

Water

Salt

Brine

Chlorine

Hydrogen

Caustic Soda

Steam

Characteristics of Chlorine

Liquefied Compressed Gas

Sold in Bulk –
Barges, Railcars & Trucks

Large Packages –
Tonners (or Ton Containers)

Small Packages –
Cylinders

Greenish/Yellow Gas
(when concentration > 1,000ppm)

Amber Liquid
(while liquid is boiling)

Potent bleach like smell
(subjective 0.02 – 0.3 ppm perception)

Hazard Identification

Boiling Point Liquid Gas (-29°F)
Freezing Point (-150°F)
Heavier Than Air (2.5:1) lies in low areas
1 Volume Liquid = 460 Volume Gas
Vapor Pressure in Cylinder at 70°F is 86psig (temperature dependent)
Slightly Soluble in Water (~ 1 oz / gal)

Physical Dangers

Vapors are heavier than air. They will spread along the ground and collect and stay in poorly-ventilated, low-lying, or confined areas (e.g., sewers, basements, and tanks) Keep out of these areas. Stay upwind.

Health: 4

Flammability: 0

Reactivity: 0

Special: OX

NFPA 704 Signal

Storage Area

Store Containers in a dedicated, well marked, secure area that allows full access to containers.

Ideal temperature is between 60°F and 80°F and away from direct heat sources.

Detector equipped (low level mounting).

Adequate ventilation.

Secure container in position when necessary.

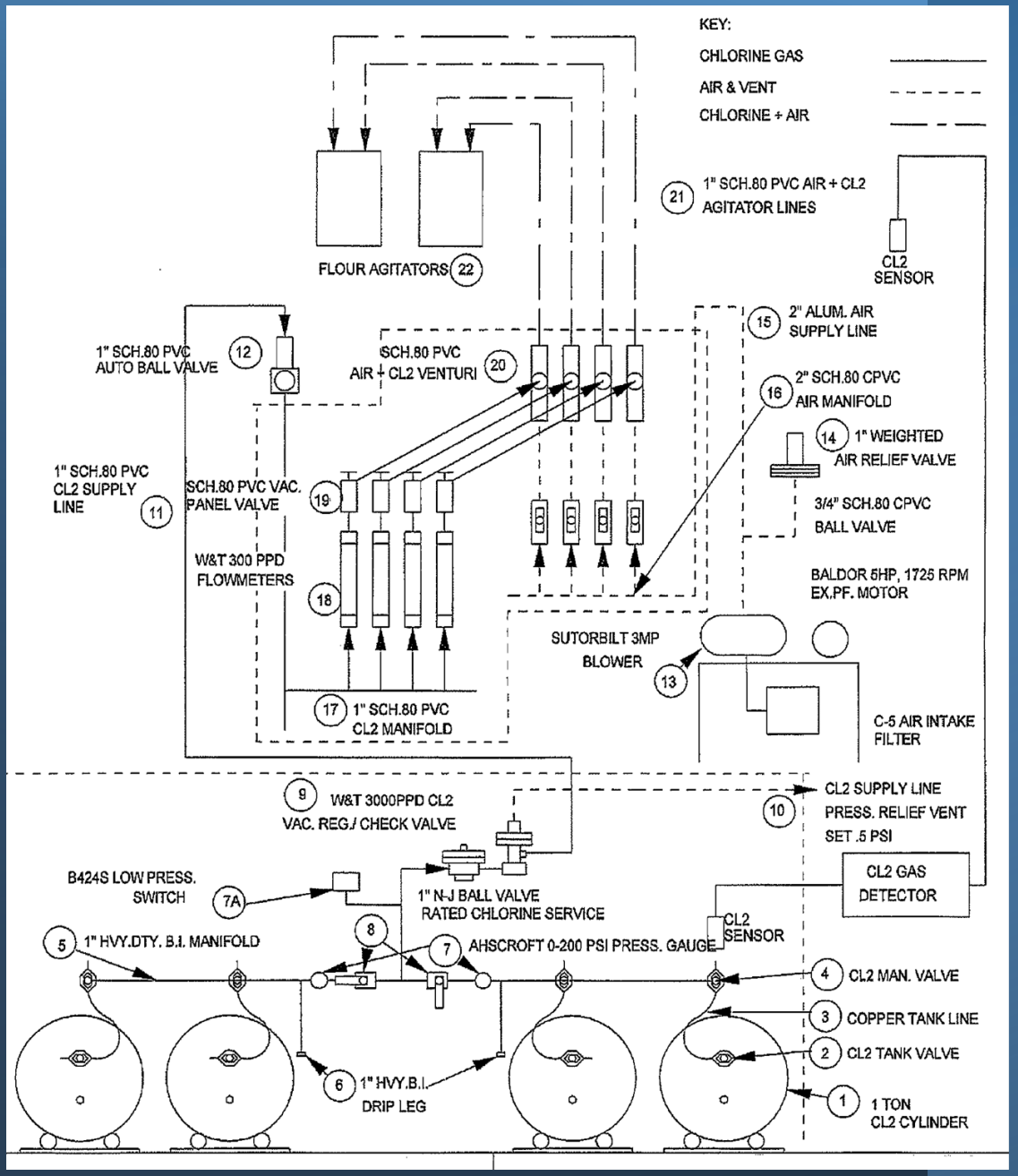
Personal Protective Gear

Changing Bottles	Low risk of contact – local rules govern
	Eye protection recommended (No contact lenses)
	Gloves to protect hands from impact and dirt
	Respirator fitted for corrosive gas readily accessible
	Steel toes shoes or boots
Emergency Gear Minor Leaks	Full face respirator plus equipment above
Emergency Gear Major Leaks	SCBA and possibly fully contained chemical suit

Tonner Features & Design

3/8” steel package with approximate tare weight of 1,400lbs
Capacity of 2,000lbs/907kg
Protective valve cover (bonnet)
Capable of dispensing liquid (bottom valve) or gas (top valve)
6 High Temperature Pressure relief devices in tonner (fuse plugs)
Emergency Capping Kit B

Chlorinator Design



Chlorine Safety – Standard Op Procedures

Safety is Number One Priority - Follow Company SOP's

Initial System Start-up

Single-pass arrangements are recommended when treatment rates do not exceed 1 oz of chlorine per cwt.

(0.6 g/kg). Double-pass arrangements are recommended for rates above 2 oz of chlorine per cwt (1.2 g/kg).

Rates between 1 and 2 oz of chlorine per cwt should be reviewed with Agitator provider prior to final equipment selection.

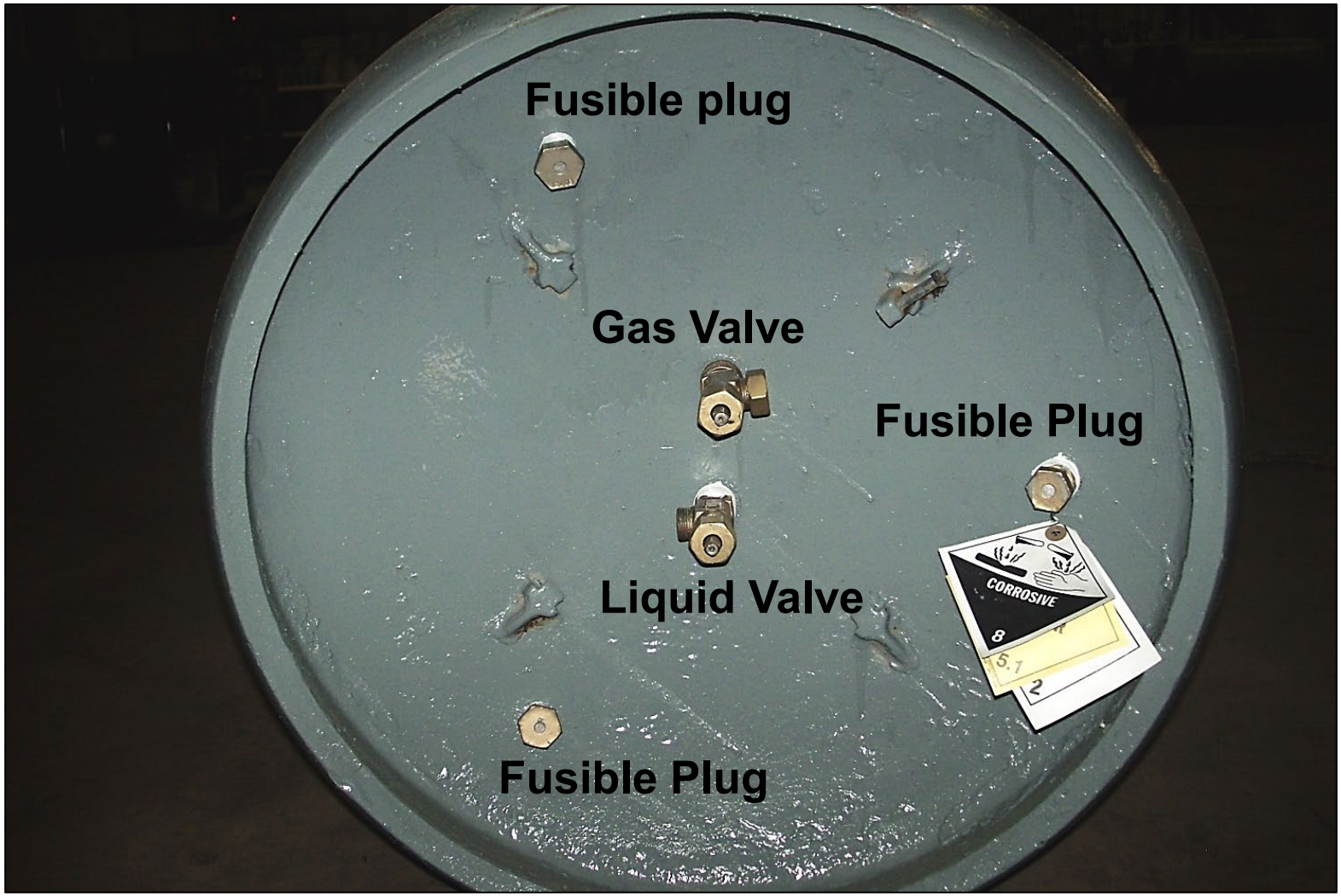
Normal System Start up / Shut Down SOP's

Emergency Shut down SOP

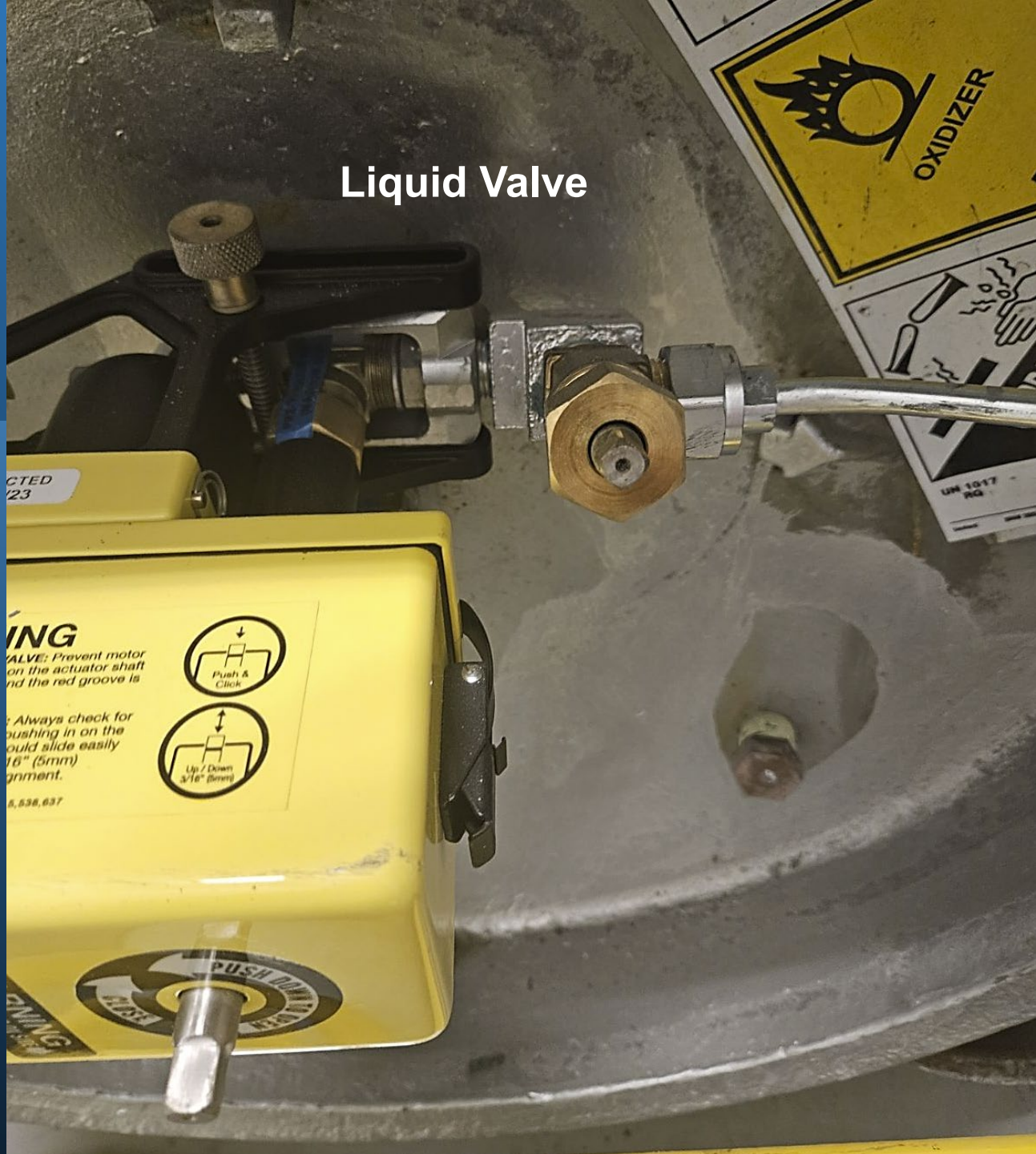
Start Up after Emergency Temporary Shut Down SOP

Changing Tank/ Yoke Valve, Rotors, Clean out- SOP's

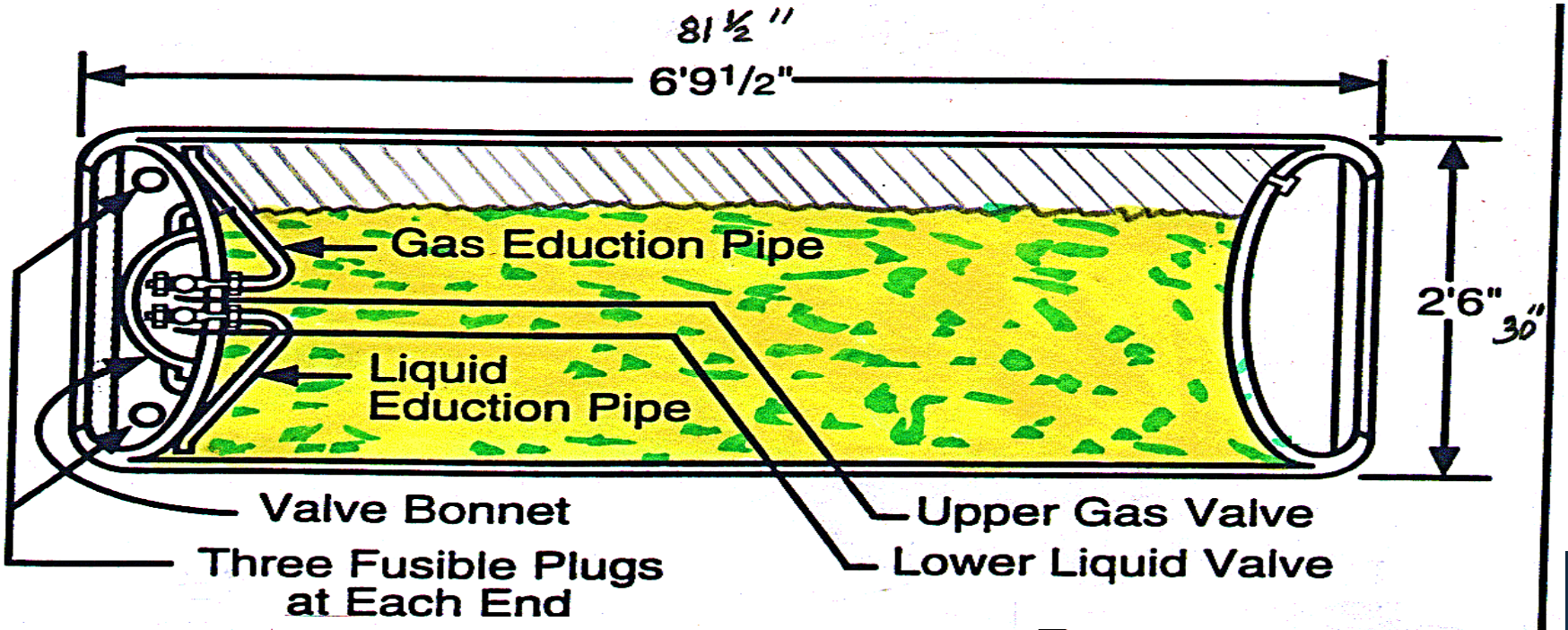
Chlorine Ton Container Head



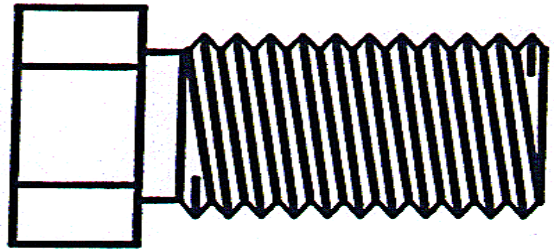
Chlorine Ton Container Head-Connection



Tonner Features & Design



3 Fusible plugs on each end (158 °F)



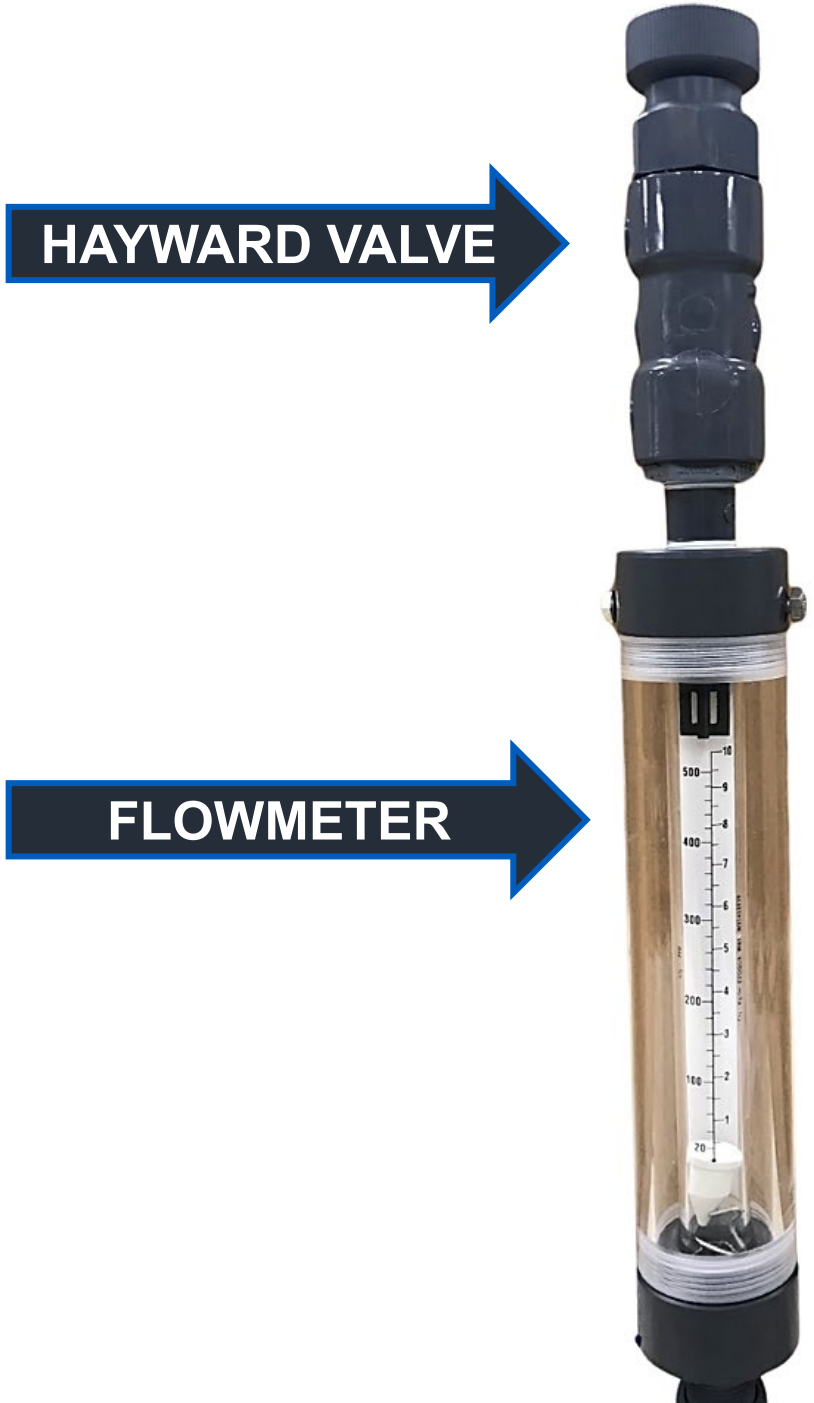
Detail of Fusible Plug

Tare wt. - 1,500 lbs.
Net wt. - 2,000 lbs
Gross wt.- 3.500 lbs.


CHLORINATOR
Components

Chlorinator Valves

Hayward Valve & 500PPD Flowmeter



GF Auto Ball Valve

Pressure Gauge

Low Pressure Switch

Auto Ball Valve

Auto Ball Valve

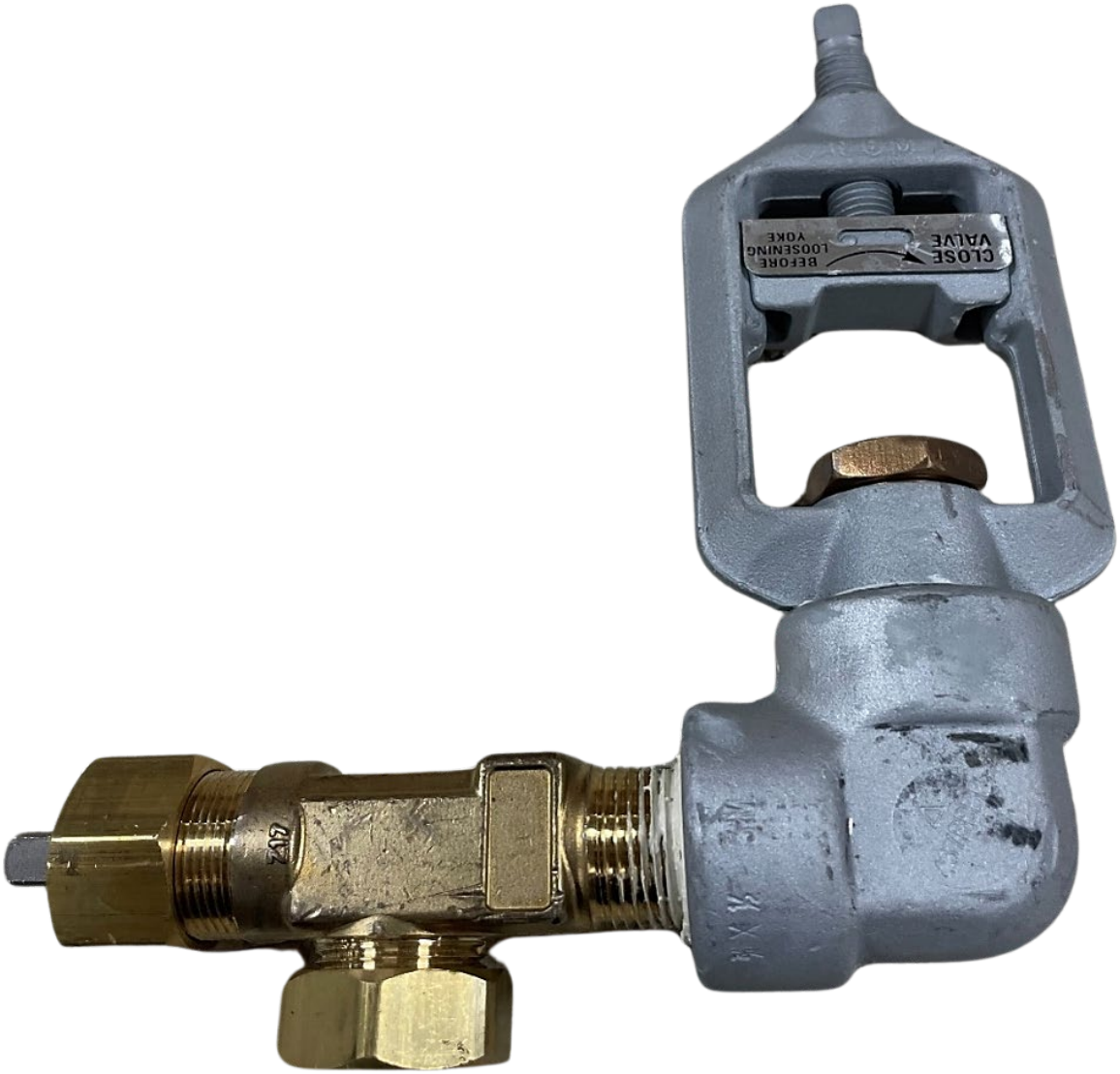
Temperature Switch

VAC. Regulator

Check Valve

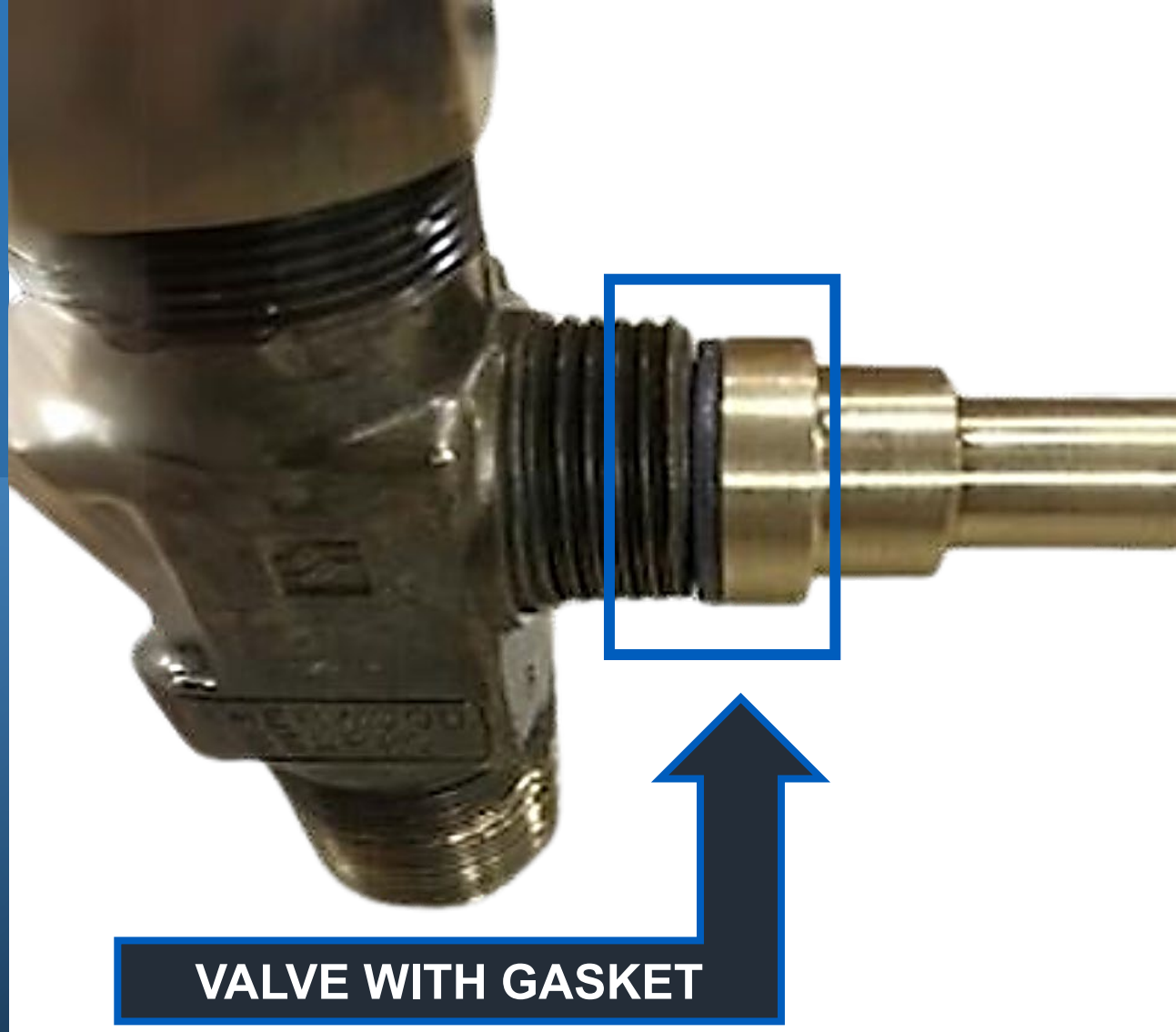
Valve Yoke

AUX. Yoke Valve

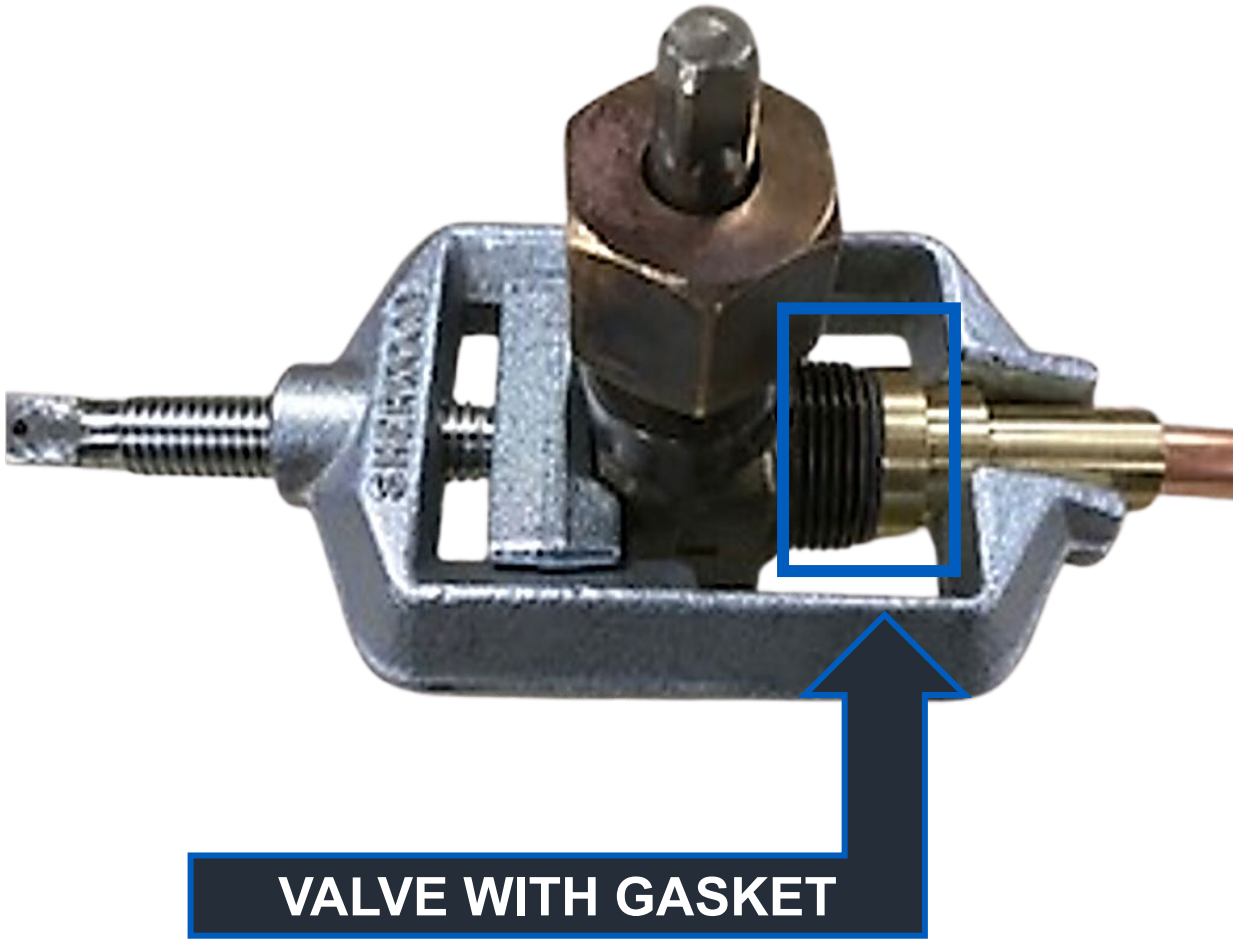


Flanged Tank Line

Tank Valve with Flanged Tank Line



Tank Valve with Tank Line & Yoke



ORIENT VERTICALLY

Remove the value cover bonnet, taking care not to damage tank valves or pressure relief plugs.

Note: When the container is in position, the two valves must be oriented vertically. Only the top valve can be used.

The bottom valve, if opened will deliver LIQUID CHLORINE potentially causing immediate equipment failure and creating a dangerous situation.

Before removing the valve nozzle cap, check to make sure that the valve is fully closed by applying CLOCKWISE PRESSURE to the valve stem using the Chlorine Cylinder Wrench.

Remove the Brass Valve Nozzle Cap

Position a NEW LEAD GASKET onto the inlet nipple of the flexible tank line as shown in Figure 4.1.5 below.

Fig. 4.1.5

Position the container valve yoke and the flexible line as shown in Figure 4.1.6 below.

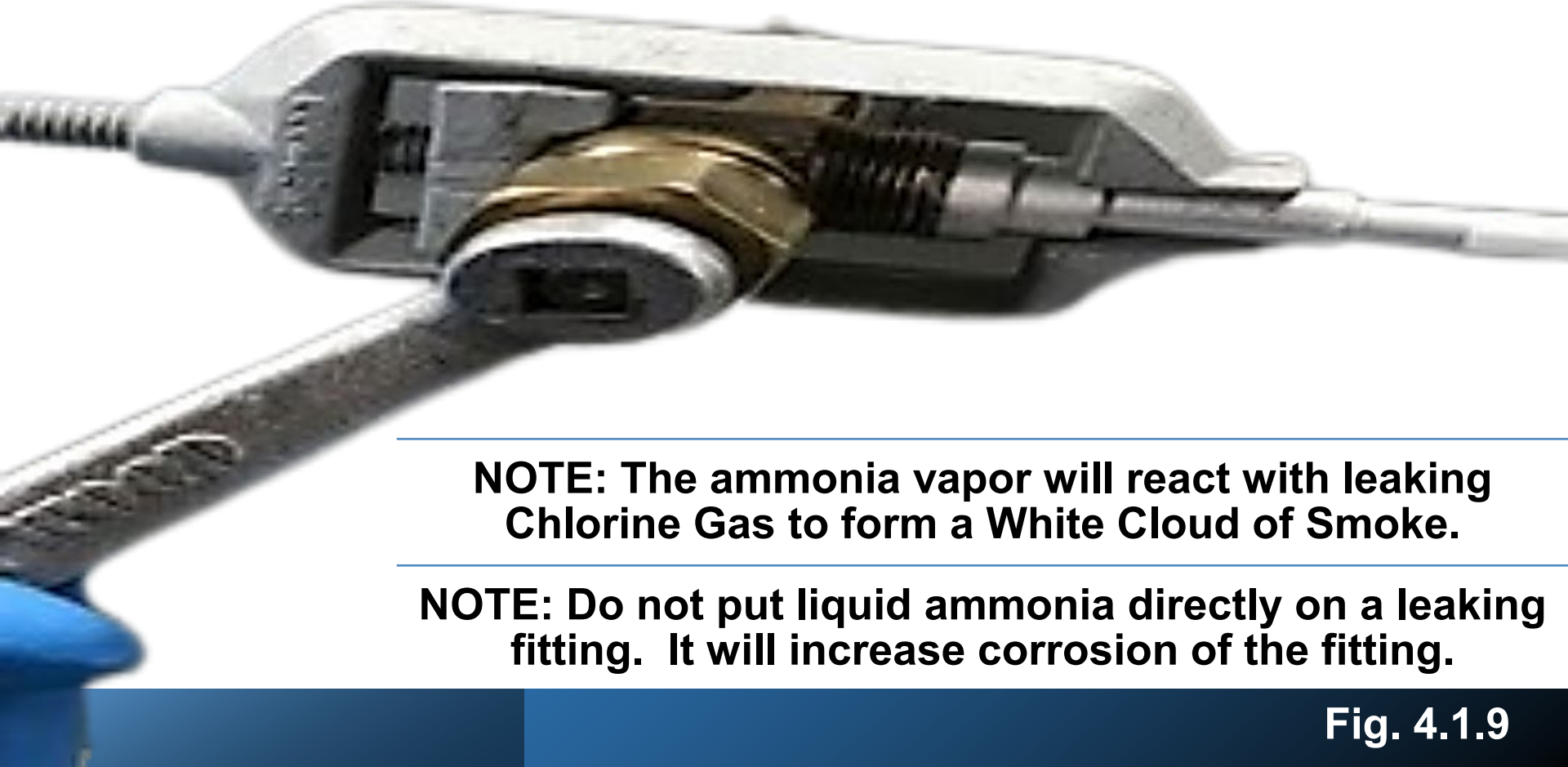
Fig. 4.1.6

Turn the yoke adjusting screw in a CLOCKWISE direction to pull the flexible line nipple into the container valve as shown in Figure 4.1.7

Fig. 4.1.7

NOTE: Always discard the used gasket and replace it with a new gasket before making connections. Flexible lines should be replaced annually or if there is any visible damage.

Once all connections have been secured and seated, they must be tested for any leaks. Momentarily open the container valve and *quickly close*. The flexible copper line will now be under pressure from tank to manifold. Using ammonia vapor check all connections shown in Figure 4.1.9.



NOTE: The ammonia vapor will react with leaking Chlorine Gas to form a White Cloud of Smoke.

NOTE: Do not put liquid ammonia directly on a leaking fitting. It will increase corrosion of the fitting.

Fig. 4.1.9

Checking for Leaks

A plastic squeeze bottle containing a 10-30% solution of aqua ammonia can be used to check for leaks.

Direct vapors from the squeeze bottle at the potential leak source – Do not squirt liquid out of the squeeze bottle.

Ammonia in household cleaners is not suitable for this purpose.

Inspections Maintenance- Quality Assurance Procedures for Agitators

Follow Shut Down SOP's

Rotor Inspections- Chlorine loves metal and overtime the rotors need to be replaced based on your plants SOP's and Maintenance Schedule.

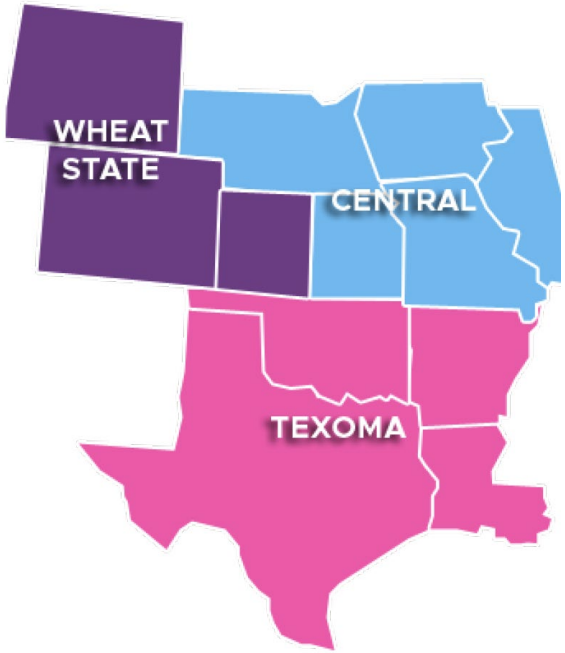
Check Seals

Check Clamping Mechanisms

Agitator clean out- Scrape out Flour

Re-Start based on Company SOP's

Questions & Answers



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