



Chemical Injection Technologies

Installation/Service Bulletin

CHLOR-CLEAR™ -- LIQUID CHLORINE EDUCTOR TUBE EVACUATOR FOR TON CONTAINERS

Patent Pending

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1.0 - PURPOSE

The **CHLOR-CLEAR™** device is intended to evacuate (remove) liquid Chlorine which may be trapped in the UPPER Eductor Tube of a Chlorine Ton Container prior to changing containers. This is to help prevent the introduction of liquid Chlorine into a chlorinator system whenever a new Ton Container is brought into service.

Whenever a Chlorine Ton Container is rotated into the use position, it is highly likely that some amount of liquid Chlorine is trapped in the upper eductor tube inside the container (see **FIGURE 1.1**). When the Ton Container is attached to a chlorinator system, this liquid Chlorine must pass out of the eductor tube and into the chlorinator system. Normally, heated drip legs or traps are installed to collect this liquid Chlorine and allow it to evaporate harmlessly. However, when a chlorinator system is operating at high flow rates, liquid Chlorine can bypass the drip legs or traps and enter the chlorinator system, possibly causing serious damage.

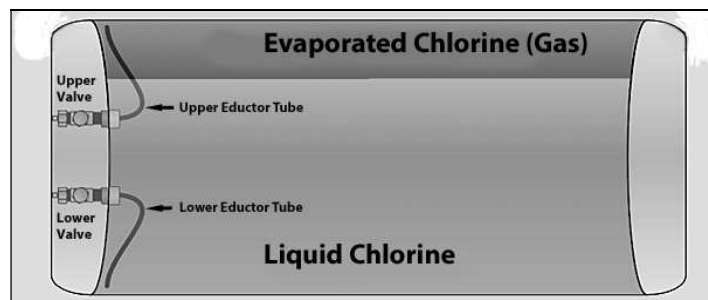


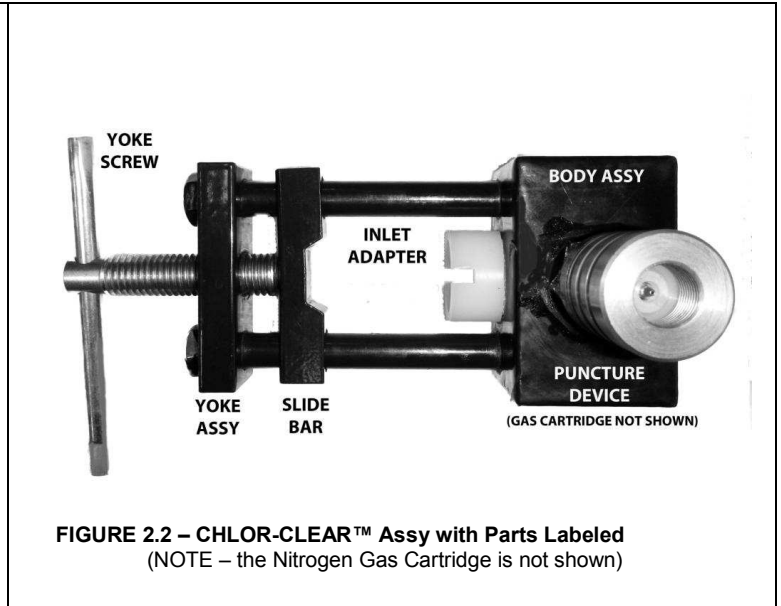
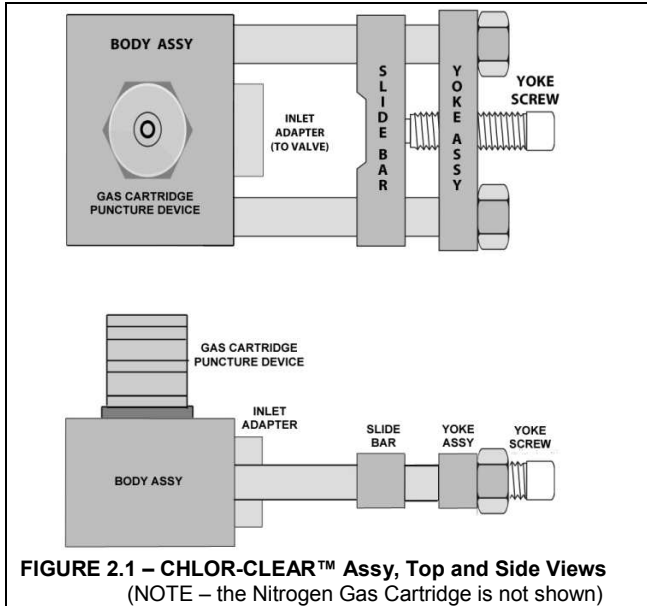
FIGURE 1.1 – Cutaway View of Chlorine Ton Container

THE CHLOR-CLEAR™ DEVICE REMOVES LIQUID CHLORINE FROM THE TON CONTAINER EDUCTOR TUBE PRIOR TO SERVICE, HELPING PROTECT YOUR CHLORINATOR SYSTEM FROM DAMAGE DUE TO LIQUID CHLORINE EXPANSION.

1.1 DESCRIPTION AND FEATURES

- The CHLOR-CLEAR™ device attaches to a Chlorine Ton Container with a standard Chlorine yoke inlet and lead washer.
- A disposable Nitrogen gas cylinder (cartridge) attaches to a puncture device on the CHLOR-CLEAR™ assy.
- The Ton Container valve is opened briefly, allowing pressurized Nitrogen gas to flow through the upper eductor tube.
- Any trapped liquid Chlorine is forced back into the Ton Container, where it will evaporate and be used by the system.
- After use of the CHLOR-CLEAR™ device, the Chlorine Ton Container is immediately ready to be placed into service.
- A safety check valve prevents the escape of Chlorine gas if the Nitrogen gas cartridge is detached inadvertently.
- The amount of Nitrogen gas introduced is negligible, provided that the Ton Container is filled within specification.

2.0 – DRAWINGS AND PHOTOGRAPHS



3.0 - WARNINGS AND CAUTIONS

WARNING

ALWAYS FOLLOW THE PROPER SAFETY PROCEDURES WHENEVER CHANGING CHLORINE TON CONTAINERS.

BE CERTAIN YOU FULLY UNDERSTAND THE INFORMATION PRESENTED IN THIS PROCEDURE AS WELL AS THE INSTRUCTIONS SUPPLIED BY YOUR DISTRIBUTOR BEFORE HANDLING CHLORINE EQUIPMENT. BE SURE TO FOLLOW YOUR CHLORINE SUPPLIER'S ADVICE WHEN HANDLING CHLORINE EQUIPMENT OR CONTAINERS.

IF THERE ARE ANY PROBLEMS WITH YOUR EQUIPMENT OR IF YOU HAVE ANY QUESTIONS, CONTACT CHEMICAL INJECTION TECHNOLOGIES OR YOUR LOCAL DISTRIBUTOR. IF THERE IS ANY PROBLEM WITH THE CHLORINE CONTAINER OR VALVE, CONTACT YOUR CHLORINE SUPPLIER IMMEDIATELY.

WHENEVER CHANGING CONTAINERS, CHEMICAL INJECTION TECHNOLOGIES, INC. STRONGLY RECOMMENDS THAT A GAS MASK (A PRESSURE-DEMAND TYPE AIR PACK IS PREFERRED) BE AVAILABLE AND ALL OPERATING PERSONNEL SHOULD BE PROPERLY TRAINED IN ITS USE. CHLORINE GAS OR THE FUMES FROM CHLORINE SOLUTIONS CAN BE LETHAL IN LARGE ENOUGH DOSES. YOU SHOULD ALWAYS HAVE A CO-WORKER OBSERVE FROM A SAFE LOCATION WHEN YOU ARE WORKING ON ANY TYPE OF CHLORINATION EQUIPMENT.

CHLORINE GAS LEAKS ARE EASILY DETECTED WITH AMMONIA FUMES. A WHITE SMOKE, LIKE CIGARETTE SMOKE, WILL FORM WHEN AMMONIA FUMES COME IN CONTACT WITH CHLORINE GAS. USE A PLASTIC SQUEEZE BOTTLE PARTIALLY FILLED WITH AMMONIA SOLUTION TO SQUEEZE AMMONIA FUMES AROUND THE VALVE TO DETECT LEAKS. DO NOT POUR LIQUID AMMONIA ONTO THE CYLINDER VALVE OR CHLORINATOR TO TEST FOR LEAKS.

THERE IS ALWAYS THE POSSIBILITY OF LIQUID CHLORINE BEING PRESENT WHEN OPENING CONTAINER VALVE, EVEN AFTER THE USE OF THE CHLOR-CLEAR™. NEVER ALLOW LIQUID CHLORINE TO BE TRAPPED BETWEEN TWO VALVES IN A CHLORINATION MANIFOLD AS EXPANSION MAY CAUSE DAMAGE OR LEAKS TO OCCUR.

CAUTION

Use of the CHLOR-CLEAR™ device DOES NOT replace the need for heated drip tubes and liquid traps (evaporators) in a chlorinator system, as gaseous Chlorine may re-liquefy due to temperature changes. The CHLOR-CLEAR™ device is intended to help prevent introduction of liquid Chlorine into chlorinator systems when changing Ton Containers only.

4.0 - OPERATING PROCEDURES

4.1 REMOVE THE EMPTY TON CONTAINER FROM SERVICE

WARNING

NEVER USE A HAMMER OR OTHER TOOL TO FORCE THE VALVE STEM TO MOVE OPEN OR CLOSED.

When it is time to change the Chlorine Ton Container, **CLOSE** the Ton Container valve tightly by turning **clockwise**. If the valve stem does not turn easily, you may use the heel of your hand to tap the Container wrench.

IF the valve stem still does not turn, it **MAY** already be closed, but it may also have been opened too far and be stuck in the OPEN position. If you are not sure that the valve is closed, try to open the valve to see if the stem moves freely.

WARNING

IF YOU CANNOT MOVE THE VALVE STEM IN EITHER DIRECTION ASSUME THAT THE VALVE IS OPEN. BE SURE THE VALVE IS FULLY CLOSED BEFORE LOOSENING THE CHLORINATOR MOUNTING YOKE. IF YOU ARE NOT CERTAIN, CALL YOUR CHLORINE SUPPLIER FOR FURTHER INSTRUCTIONS.

BEFORE LOOSENING THE CHLORINATOR MOUNTING YOKE, STAND WITH YOUR FACE AS FAR AWAY AS POSSIBLE FROM THE CONTAINER VALVE AND BE PREPARED FOR ESCAPING GAS IF THE VALVE IS NOT CLOSED. IF YOU ARE NOT WEARING A GAS MASK AND CHLORINE GAS STARTS ESCAPING FROM THE VALVE, IMMEDIATELY LEAVE THE AREA. DO NOT ATTEMPT TO HOLD YOUR BREATH AND CLOSE THE VALVE OR PLACE THE PROTECTIVE CAP ON THE VALVE. SEEK ASSISTANCE TO CONTAIN THE LEAK.

FOLLOW all approved local procedures at your facility while removing the chlorinator mounting yoke – these procedures may include, but are not limited to:

1. **TURN-OFF** the ejector water supply (if possible).
2. **DO NOT CLOSE** the chlorinator rate control valve.
3. **VERIFY** that the gas flowmeter and other indicators show NO Chlorine flow.
4. **PROCESS** the empty Ton Container according to the approved local procedures at your facility.

4.2 PLACE THE NEW TON CONTAINER INTO SERVICE POSITION

WARNING

BEFORE REMOVING THE PROTECTIVE HOOD AND VALVE CAP, STAND WITH YOUR FACE AS FAR AWAY AS POSSIBLE FROM THE CONTAINER VALVE AND BE PREPARED FOR ESCAPING GAS IF THE VALVE IS NOT CLOSED. IF YOU ARE NOT WEARING A GAS MASK AND CHLORINE GAS STARTS ESCAPING FROM THE VALVE, IMMEDIATELY LEAVE THE AREA. DO NOT ATTEMPT TO HOLD YOUR BREATH AND CLOSE THE VALVE OR PLACE THE PROTECTIVE CAP ON THE VALVE. SEEK ASSISTANCE TO CONTAIN THE LEAK.

NOTE

The following guidelines DO NOT replace the existing procedures at your facility. FOLLOW all local approved procedures for positioning and securing the new Ton Container PRIOR to attaching the CHLOR-CLEAR™ Assy.

POSITION the Ton Container so that one of the two valves is located vertically above the other – the uppermost valve will be the GAS valve (see **FIGURE 4.2.1**).

SECURE the Ton Container in position using the proper handling equipment so that it will not move.

REMOVE the protective hood and the valve cap from the new Ton Container.

CHECK for leaks with Ammonia fumes per approved facility procedures.

CLEAN the Ton Container valve outlet to remove any dirt in the valve opening.

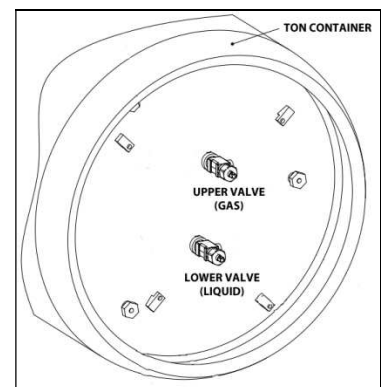


FIGURE 4.2.1 - Ton Container with Hood and Valve Caps Removed

4.2.1 PREPARE THE CHLOR-CLEAR™ ASSY FOR INSTALLATION

Refer to **FIGURE 2.1** and **FIGURE 2.2 CHLOR-CLEAR™ Assy** before proceeding.

CAUTION

DO NOT RE-USE LEAD GASKETS. A used gasket will not properly seal the connection and may cause leaks. Use **ONLY** lead gaskets. Other types may contract with temperature variations and cause leaks.

- 4.2.1.1 **REMOVE** any tape or covers and inspect the CHLOR-CLEAR™ Assy for visible damage.
- 4.2.1.2 **VERIFY** that no dirt or contamination is visible in the INLET ADAPTER or PUNCTURE DEVICE (remove using a clean cloth or clean, dry compressed air).
- 4.2.1.3 **REMOVE** the old lead gasket from the INLET ADAPTER, discard it, and **REPLACE** it with a new one (see **FIGURE 4.2.3**).

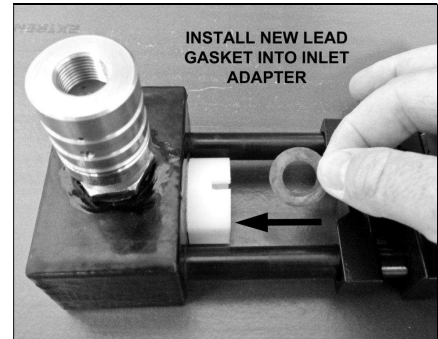


FIGURE 4.2.3 – Lead Gasket Installation

4.2.2 ATTACH THE CHLOR-CLEAR™ ASSY TO THE TON CONTAINER VALVE

CAUTION

DO NOT INSTALL the Nitrogen GAS CARTRIDGE until the CHLOR-CLEAR™ YOKE ASSY is securely attached to the Ton Container valve, otherwise the Nitrogen Gas will escape and render the GAS CARTRIDGE useless.

See **FIGURE 4.2.4** below

- 4.2.2.1 **POSITION** the YOKE ASSY over the **UPPER** Ton Container valve.
- 4.2.2.2 **VERIFY** that the lead gasket stays in the correct position.
- 4.2.2.3 **ENGAGE** the INLET ADAPTER to the valve outlet.
- 4.2.2.4 **TIGHTEN** the YOKE SCREW securely, **HAND-TIGHT ONLY**.
- 4.2.2.5 The YOKE SCREW should be tightened only enough to squeeze and seal the lead gasket – excessive tightening may force the gasket out of the joint.

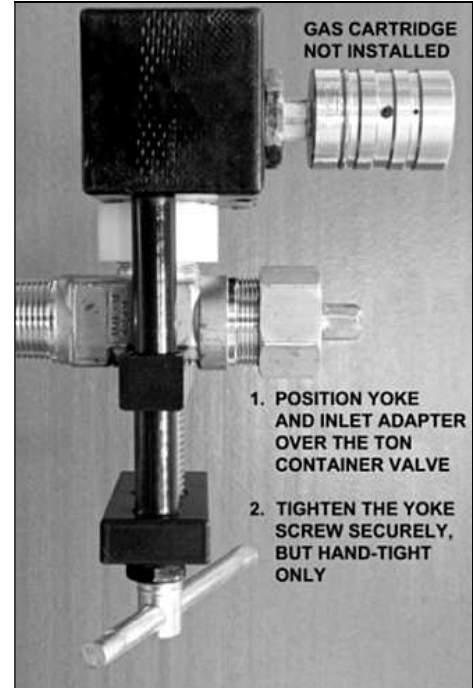


FIGURE 4.2.4 – CHLOR-CLEAR™ Attachment to the Ton Container Valve

WARNING

DO NOT OPEN THE TON CONTAINER VALVE AT THIS TIME. CONTINUE WITH STEP 4.2.3 TO INSTALL THE NITROGEN GAS CARTRIDGE INTO THE CHLOR-CLEAR™ ASSY.

4.2.3 INSTALL THE NITROGEN GAS CARTRIDGE INTO THE CHLOR-CLEAR™ ASSY

WARNING

USE ONLY NITROGEN GAS CARTRIDGES SUPPLIED BY CHEMICAL INJECTION TECHNOLOGIES FOR THE CHLOR-CLEAR™ ASSY. USE OF OTHER GAS TYPES (CO₂, ETC.) OR IMPROPERLY-SIZED CARTRIDGES MAY DAMAGE THE CHLOR-CLEAR™, THE CHLORINATOR SYSTEM, OR PRODUCE HARMFUL CHEMICALS WHEN COMBINED WITH CHLORINE GAS INSIDE THE TON CONTAINER.

Refer to **FIGURE 4.2.5**:

- 4.2.3.1** INSERT the threaded Nitrogen GAS CARTRIDGE into the PUNCTURE DEVICE threaded opening and tighten clockwise **HAND-TIGHT ONLY**.

NOTE: THE PUNCTURE DEVICE WILL SELF-SEAL AS IT IS TIGHTENED.

- 4.2.3.2** IF any prolonged “hissing” of escaping gas is heard, then **VERIFY** the integrity of the seal at the lead gasket and ensure there are no leaks.

IF the GAS CARTRIDGE has been expended, then remove it and **REPEAT Section 4.2.2** using a NEW lead gasket.

REPEAT Step 4.2.3.1 using a NEW Nitrogen GAS CARTRIDGE.

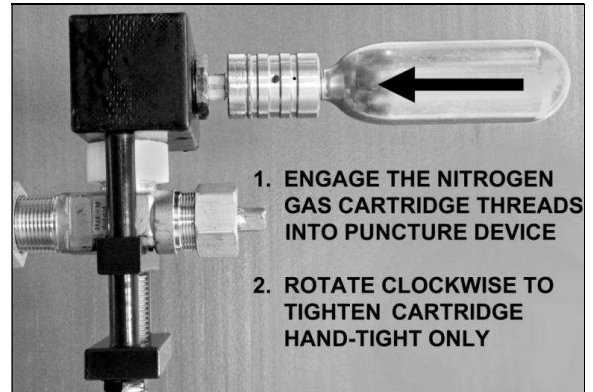


FIGURE 4.2.5 – Nitrogen Gas Cartridge Installation

4.2.4 OPERATE CHLOR-CLEAR™ TO EVACUATE TON CONTAINER EDUCTOR TUBE

Refer to **FIGURE 4.2.6**:

- 4.2.4.1** OPEN the Ton Container valve **counterclockwise** one-quarter ($\frac{1}{4}$) to one-half ($\frac{1}{2}$) turn to allow Nitrogen gas to flow into the Ton Container.

IF any gas is noted escaping the INLET ADAPTER, then **CLOSE** the valve immediately.

- 4.2.4.2** WAIT approximately **THREE (3) seconds** (count - “one-two-three”) for the pressure to equalize).

NOTE: THE “HISSING” SOUND OF THE NITROGEN GAS FLOWING INTO THE TON CONTAINER MAY NOT ALWAYS BE AUDIBLE.

- 4.2.4.3** CLOSE the Ton Container valve **clockwise** fully.

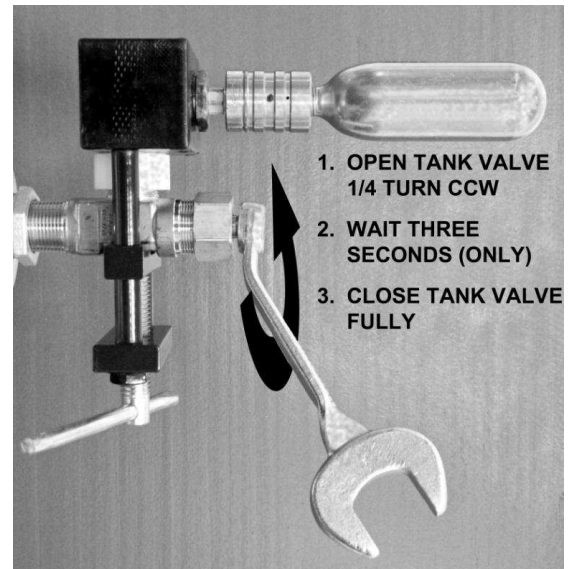


FIGURE 4.2.6 CHLOR-CLEAR™ Assy Operation

WARNING

DO NOT UNSCREW THE NITROGEN GAS CARTRIDGE UNTIL AFTER THE YOKE ASSY HAS BEEN REMOVED FROM THE TON CONTAINER VALVE IN THE NEXT STEP (STEP 4.2.5).

4.2.5 REMOVE THE CHLOR-CLEAR™ ASSY FROM THE TON CONTAINER VALVE

WARNING

THERE MAY BE A SLIGHT RELEASE OF NITROGEN GAS AS THE PRESSURE EQUALIZES. THIS GAS MAY CONTAIN A SMALL AMOUNT OF CHLORINE VAPOR. STAND SO THAT YOUR FACE IS AS FAR AWAY AS POSSIBLE WHILE REMOVING THE CHLOR-CLEAR™ ASSY.

4.2.5.1 **VERIFY** that the Ton Container valve is **CLOSED**.

4.2.4.2 **REMOVE** the YOKE ASSY from the Ton Container valve by loosening the yoke clamp.

4.2.4.3 **REMOVE** the depleted Nitrogen GAS CARTRIDGE from the PUNCTURE DEVICE and discard locally.

The GAS CARTRIDGE is a single-use item and is recyclable when empty.

4.2.4.4 **VERIFY** that the threaded end cap of the GAS CARTRIDGE is punctured (see **FIGURE 4.2.7**).

IF the end of the GAS CARTRIDGE has not been punctured, then contact Chemical Injection Technologies for assistance.

FOLLOW all local approved procedures at your facility for placing the new Ton Container into service (see **WARNING**).



FIGURE 4.2.7 – GAS CARTRIDGE end cap punctured

4.2.4.5 **STORE** the removed **CHLOR-CLEAR™ Assy** and any spare GAS CYLINDERS in a clean, dry, container or location for future use.

Install tape or covers over the INLET ADAPTER and PUNCTURE DEVICE openings to keep them clean

WARNING

NEVER ALLOW LIQUID CHLORINE TO BE TRAPPED BETWEEN TWO VALVES IN A CHLORINATOR SYSTEM. THERE IS ALWAYS THE POSSIBILITY OF LIQUID CHLORINE BEING PRESENT WHEN OPENING THE TON CONTAINER VALVE, EVEN AFTER THE USE OF THE CHLOR-CLEAR™ ASSY.

NOTE

All approved local facility procedures should be followed to place the Ton Container into service by attaching a Ton Container Adapter, Regulator, or other chlorination equipment.

Refer to Chemical Injection Technologies Publication No. 993-21 for further information on the use of Ton Containers and Ton Container Adapters.

Additional information about Chlorine, Chlorine handling, chlorination equipment and emergency equipment, is also available from The Chlorine Institute, Inc., 2001 L Street, N.W., Washington, DC 20036.



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