



# Chlorine Piping & Cleaning Nitrogen Purging

## Chlorine Gas & Liquid Pressure Piping

As recommended by The Chlorine Institute Inc. Pamphlet 6—Piping Systems for Dry Chlorine, all pressurized chlorine gas and chlorine liquid piping should be Seamless Carbon Steel, Schedule 80, ASTM A-106, Grade B. All fittings should be Forged Steel, Class 3000, ASTM A-105. All pressure piping threads should be wrapped with PTFE Teflon tape or sealed with a mixture of litharge and glycerin. Note that applying a mixture of litharge and glycerin will create a more permanent joint not allowing for easy disassembly.

Pressurized chlorine vent piping (e.g. from the vents of pressure reducing valves and pressure relief valves) should be constructed of the same materials mentioned above. Vent piping should be terminated at a scrubber intake or to a safe, unoccupied area outside of the building. Vent lines should never be manifolded together. Vent lines should be unobstructed and slope down and away to prevent moisture from collecting in the line. A screen should be installed on the outside end of the vent piping to prevent unwanted entry of insects and/or animals.

## Cleaning, Drying & Purging of Chlorine Pressure Piping

Before any assembly or operation with chlorine is performed, all piping, valves, fittings, etc. should be inspected for damage and all oils, moisture and/or other contaminants removed. Each manifold component should be cleaned prior to assembly. Chlorine will support combustion of hydrocarbons and will corrode pipes in the presence of moisture including ambient humidity. Once inspected and assembled, the pipes must be thoroughly cleaned and dried before any chlorine is passed through the system. The best method for removing unwanted contaminants can be site specific, however cleaning the piping with hot steam is the most common method. Steam should be introduced through the highest point in the piping and all pipe ends and drip legs should be open to allow condensate and other materials to drain out. If steam is not available, other options include aqueous cleaning with an appropriate solvent (though extra measures must be taken to remove moisture afterward) or abrasive cleaning using sand or dry ice. A detailed cleaning and assembly plan should be laid out and strictly followed. Refer to The Chlorine Institute Inc. Pamphlet 6 for additional information on this topic.

Following the completion of steam cleaning; drying the pressure piping must be performed according to the recommendations found in The Chlorine Institute Inc. Pamphlet 6. Nitrogen gas, dry air or another inert gas can be pushed through to the piping to dry it out. If using high pressure gases such as Nitrogen, pressure reducing valves and relief valves must be installed to control the pressure to about 150 PSI (10 Bar) and ensure that higher pressures cannot enter the manifold. Higher pressures could damage rupture discs, pressure gauges, vacuum regulators, etc. If using air, the air should be dry, having a dew point of -40°F (-40°C) or below, and should be blown through the pressure piping until the discharging air is also at -40°F or below.

## Pressure Testing After Purging

After the pressure piping has been dried and purged of contaminants, they should be pressure tested with Nitrogen or dry air to approximately 100-150 PSI (7-10 Bar).

Once the pressure piping is under pressure the Nitrogen or air supply should then be sealed off from the piping system. Take note of the pressure gauge readings throughout the system at this time. After a period of 24 hours check that the pressure gauge readings have not dropped. If there has been any significant pressure loss, then this indicates that there are one or more leaks in the piping system. Search for and correct all leaks. After all leaks have been corrected, repeat the leak test. Once approved, relieve the lines of Nitrogen or dry air and remove the pressure testing assembly. Make sure to try and prevent moist air from entering the pressure piping during this process.



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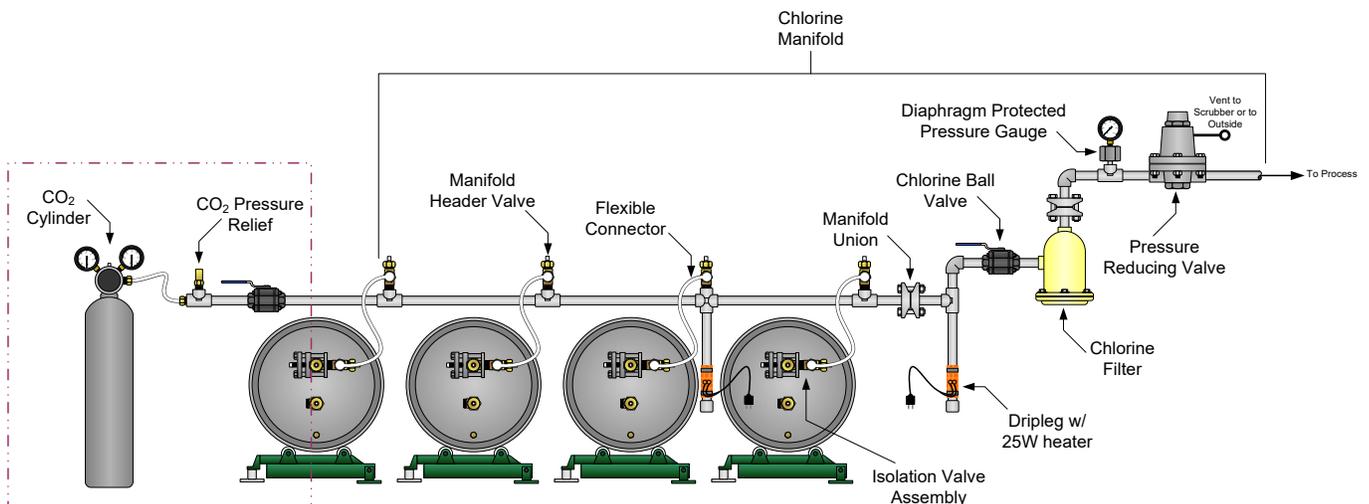
## Chlorine Gas Leak Testing

Only after completing a successful pressure test with Nitrogen or dry air should you proceed to testing with chlorine.

These instructions assume that the pressure piping is connected to a vacuum feed system and that it has been correctly checked for vacuum tightness and proper operation. Ensure that the vacuum feed system ejector (or other vacuum source) is operational prior to opening any chlorine container valves. Connect the chlorine container(s) to the pressure piping. With the ejector off or isolated, open one chlorine container valve (a 1/4 turn is sufficient) briefly until the pressure within the piping rises to approximately 45 PSI (3 bar) and then close the chlorine container valve. Using a plastic squeeze bottle partially filled with Ammonia, check the pressure piping joints and all gasket seals for leaks. Direct the ammonia fumes (not the liquid) toward each joint or gasket seal. If a leak is present, the leaking chlorine gas contacting the ammonia fumes will create a visible white vapor similar in appearance to smoke. If a leak is found, use the vacuum system ejector to evacuate all chlorine from all piping in the system and immediately address the leaking joint and/or gasket seal. Only after the pressure piping has been thoroughly checked and no leaks have been found should the chlorine container valves be opened and chlorine feed through system.

For more information on chlorine pressure piping and cleaning, refer to the [Chlorine Manual](#) and [Pamphlet 6—Piping Systems for Dry Chlorine](#) by *The Chlorine Institute Inc.*

**FIGURE 1: Example of Nitrogen Purging Installation**



After cleaning & purging and pressure testing the pressure piping with Nitrogen, evacuate the lines, close the ball valve and remove the Nitrogen cylinder. The connection should then be sealed and the ball valve locked into the closed position.

**NOTE:** This design should not be construed as an approval for Nitrogen gas cleaning/purging. Only after proper engineering consideration may this design be used as a reference.