

Manual Section 3	Issue Date 03/17/16	Revision Date 06/15/21	Policy Number LLCP-024
	<b>Gaseous Chlorine</b>		

### **Purpose**

To provide employees with information regarding properties of gaseous chlorine.

### **Scope**

All LLC Companies including, Blanchard Industrial, LLC, GIS Engineering, LLC, Grand Isle Shipyard, Inc., and GWIS, Mack Steel, NuWave, Sun Industries; hereafter identified as “Company”.

### **Chlorine**

Chlorine (Cl<sub>2</sub>) is among the ten highest volume chemicals manufactured in the United States. It is produced commercially by electrolysis of sodium chloride brine. Chlorine is used in industry and in household cleaning products.

Some of the chemical/physical properties of chlorine include:

- Chlorine is a yellow-green gas at room temperature.
- Chlorine has a pungent, irritating odor similar to bleach that is detectable at low concentrations.
- The density of chlorine gas is approximately 2.5 times greater than air, which will cause it to initially remain near the ground in areas with little air movement.
- Chlorine is not flammable, but may react explosively or form explosive compounds with many common substances (including acetylene, ether, turpentine, ammonia, natural gas, hydrogen, and finely divided metals).
- Chlorine is slightly water soluble, and reacts with moisture to form hypo-chlorous acid (HClO) and hydrochloric acid (HCl).
- Chlorine is commonly pressurized and cooled for storage and shipment as an amber-colored liquid.

### **Chlorine Uses**

Chlorine has a variety of uses. It is used to disinfect water such as water treatment facilities, chlorine injection facilities and water pre-treatment areas. It is part of the sanitation process for sewage and industrial waste. During the production of paper and cloth, chlorine is used as a bleaching agent. It is also used in cleaning products, including household bleach which is chlorine dissolved in water. Chlorine is used in the preparation of chlorides, chlorinated solvents, pesticides, polymers, synthetic rubbers, and refrigerants.

### **How can people be exposed to chlorine?**

Given the ubiquity and volume of chlorine in industrial and commercial locations, widespread exposures could occur from an accidental spill or release, or from a deliberate terrorist attack.

Because chlorine is a gas at room temperature, exposure occurs via inhalation. People may also be exposed to chlorine through skin or eye contact, or through ingestion of chlorine-contaminated food or water.

### **Health Effects of Chlorine Exposure**

The health effects resulting from most chlorine exposures begin within seconds to minutes. The severity of the signs and symptoms caused by chlorine will vary according to amount, route and duration of exposure.

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**Inhalation:** Most chlorine exposures occur via inhalation. Low level exposures to chlorine in air will cause eye/skin/airway irritation, sore throat and cough. Chlorine's odor provides adequate early warning of its presence, but also causes olfactory fatigue or adaptation, reducing awareness of one's prolonged exposure at low concentrations. At higher levels of exposure, signs and symptoms may progress to chest tightness, wheezing, dyspnea, and bronchospasm. Severe exposures may result in non-cardiogenic pulmonary edema, which may be delayed for several hours.

**Ingestion:** Since chlorine is a gas at room temperature, it is unlikely that a severe exposure will result from ingestion. However, ingestion of chlorine dissolved in water (e.g., sodium hypochlorite or household bleach) will cause corrosive tissue damage of the gastrointestinal tract.

**Eye/Dermal Contact:** Low level exposures to chlorine gas will cause eye and skin irritation. Higher exposures may result in severe chemical burns or ulcerations. Exposure to compressed liquid chlorine may cause frostbite of the skin and eyes.

High concentrations of chlorine can be fatal.

### **Treatment**

There is no antidote for chlorine poisoning. If contact with liquid chlorine occurs, immediate decontamination of skin and eyes with copious amounts of water is important. This should be done cautiously for patients whose exposure has resulted in frostbite. Chemical burns which result from chlorine exposure should be treated as thermal burns.

Inhalational chlorine poisoning is treated with supportive care and can include administration of humidified oxygen, bronchodilators and airway management. Pulmonary edema may be delayed and, therefore, patients should be monitored for up to 24 hours following severe inhalation exposures. It is important to maintain ventilation and oxygenation, monitor arterial blood gases and/or pulse oximetry, and consider positive airway pressure as a treatment option.

Most people recover following exposure to chlorine gas.

### **Emergency Plans**

Employees should be aware of Customer contingency plans and provisions. Employees must be informed where chlorine is used in the facility and aware of additional plant safety rules.