

Technical Data - Safe Handling Of Chlorine Gas



Disinfection Products

General

The safe handling of chlorine gas and a safe chlorination system includes a proper facilities design, an operation and maintenance program, the proper safety equipment, and an emergency action plan. This bulletin will cover some of these elements and some data about the chemical and physical characteristics of chlorine.

A. Chlorine Data

Chlorine is a greenish-yellow gas under ambient conditions, non-flammable, and about 2.5 times heavier than air. Chlorine is toxic, irritating to skin, eyes, nose, and mucus membranes. Liquid chlorine, amber in color, causes severe irritation and blistering of skin.

Chlorine should only be used in a well ventilated area with easy access to an eye wash and showers.

Exposure to low concentrations of chlorine gas will cause burning nose, throat, redness in the face and coughing. Higher concentrations will cause tightness in the throat and chest; and pulmonary edema. Concentrations of 1000 ppm are rapidly fatal.

OSHA/EPA Data

Permissible Exposure Level (PEL): 0.5 ppm/v

Short Term Exposure Limit (STEL) 15 minutes: 1.0 ppm/v

Immediately Dangerous to Life or Health (IDLH): 50 ppm/v

Effects Data

Slight symptoms after several hours exposure: 1 ppm

Least detectable odor: 0.02-0.2 ppm
Maximum amount that can be inhaled for one hour without serious disturbances: 4 ppm

Noxiousness, difficulty in breathing after several minutes: 5 ppm

Irritation of the throat: 15 ppm

Causes coughing: 30 ppm

System and Facility Design - Chlorine Containers

1. Never expose a container to direct heat.
2. Never tamper with a fusible plug.
3. Always keep the shipping hood in place except when the container is being used.
4. Never lift a cylinder by its hood.
5. When discharging liquid to a common manifold, the containers must have a separate gas equalization manifold..
6. Do not move ton containers with equipment rated under two tons capacity.
7. Store containers in marked areas protected from direct heat.
8. Use and store containers above ground level.
9. Secure all containers with chocks, trunnions, chains, etc.

Chlorine Room Layout

1. Provide chlorine storage and equipment rooms with doors opening outward to the outdoors, and equipped with panic hardware.
2. Provide visual and audible emergency alarms at the chlorine room entrance.
3. Exhaust fans should have sufficient rating to changeover the air every minute.
4. Provide a chlorine gas detector to alarm when a leak occurs, and an ammonia bottle to help locate a leak.
5. Provide a proper emergency kit to repair leaking containers.
6. Provide a lifting bar and electric hoist for ton containers rated for 4000 lbs.
7. Provide cylinder hand trucks with chains for 150 lbs. cylinders.

Safety Equipment

1. Provide
 - a. Two (2) pressure-demand type air masks for working in a leak area. Locate one (1) at a prominently marked, easily accessible location outside the chlorine room. Locate the second

at a location remote to permit access in time of need. Provide spare 30-minute air tanks at a remote location.

- b. Escape respirators.
- c. Protective clothing.

2. Have available:

- a. Colored vests.
- b. Flash lights.
- c. Safety helmets, goggles.
- d. Life lines.
- e. Audio paks.

Equipment Requirements

1. Use only equipment with remote vacuum regulators to eliminate pressure lines.
2. Use remote ejectors to reduce the number and length of chlorine solution lines.
3. Do not manifold equipment vent lines. Run individual vent lines for each component to be vented.
4. Terminate vents where a discharge of chlorine can be tolerated without exposure to personnel or equipment.
5. Install an insect screen over the discharge of the vent lines. Discharge the vent downward.

Emergency Action Plan

1. Ensure that community fire, medical and Haz Mat personnel are trained in chlorine emergency procedures.
2. Train plant emergency crew.
3. Prepare a written emergency control plan.
 - a. List do's and don'ts.
 - b. Training responsibilities.
 - c. Conduct classroom training.
 4. Conduct Training Program:
 - a. Duplicate excitement.
 - b. Simulate gas with smoke bombs.
 - c. Enact worst case, day/night.
 - d. Conduct unscheduled drills.
 - e. Critiques drill.
 - f. Record on video tape.

5. Use Chlorine Institute Pamphlet #64 - "Emergency Control Planning" as a guide.
6. Schedule regular drills.
7. Establish fast access and exit routes.
8. Contact CHEMTREC at 800-424-9300.

Safety Check List

The following guidelines should be used to check a chlorine facility:

1. Provide proper instructions and supervision to workers .
2. Provide proper and approved self-contained breathing apparatus.
3. Prepare escape plans from areas where there might be a chlorine emission. (Move uphill and upwind of a chlorine leak).

4. Install safety showers and eye wash stations near the chlorine equipment.
5. Provide Chlorine Institute Emergency Kits or coffins.
6. Two persons should make the repairs on a leak. Never repair the equipment alone.
7. Spray water on containers only if there is a fire hazard (water will cool the container to prevent the fusible plug from melting). Water sprayed on a leaking container will make the leak worse.
9. Position a leaking container so the chlorine escaping is gas, not liquid.

First Aid For Chlorine Exposure

1. Inhalation
 - a. Remove the victim from the contaminated area.
 - b. Keep the victim warm in a reclined position with the head and shoulders elevated.
 - c. Give artificial respiration if necessary.
 - d. Administer oxygen as soon as possible.
 - e. Call a physician immediately.
2. Skin Contact
 - a. Shower victim, removing all contaminated clothing.
 - b. Wash affected area with soap and water.
 - c. Call physician immediately.
3. Eye Contact
 - a. Irrigate eyes with water for 15 minutes holding the eye lids wide apart.
 - b. Call physician immediately.
 - c. Irrigate for a second 15 minute period if the physician is not immediately available.

Design improvements may be made without notice.

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