Chapter 40: Chemical Lifecycle Management

Compressed Gas Cylinder Storage and Handling Requirements

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1 Purpose

The purpose of these requirements is to ensure the safe handling and use of compressed gas cylinders (cylinders). They cover storage and handling, labeling, and removal. They apply to workers and supervisors.

2 Requirements

The following are the storage and handling requirements for compressed gas cylinders (cylinders) throughout their lifecycle at SLAC.

Note In addition to the following requirements adhere to the equipment manufacturer’s instructions and complete applicable training with an experienced equipment user.

When a cylinder is connected to a gas system, the cylinder becomes a part of the compressed gas system. (See Chapter 14, “Pressure Systems”, for the design, procurement, installation, use, inspection, and maintenance of compressed gas systems.)

For information on the safe use of gases, see Chemical Safety: Safe Handling Guidelines.

2.1 Storing Cylinders

- Store adequately secured cylinders upright on solid, dry, level footing, preferably outside of occupied buildings and away from traffic lanes.
- Shade cylinders stored in the sun during the summer, whenever possible.
- Store cylinders away from sources of intense heat (furnaces, steam lines, radiators).
- Do not stockpile gas, especially flammables, poisons, or corrosives, beyond the amount required for immediate use.
- Ensure that containers stored or used in public areas are protected against tampering and damage. Furthermore, containers stored inside or outside must not obstruct exits routes or other areas that are normally used or intended for the safe exit of people.
- Always store cylinders with the protective caps in place.
2.2 Securing Cylinders

All compressed gas cylinders in service or storage at the user’s location must be secured to prevent them from falling. Gas cylinders with a water volume of less than 5 L (305 cubic inches) may be stored in a horizontal position, as long as they are prevented from rolling, and will be considered adequately secured.

2.2.1 Individual Cylinders

- Use appropriate material, such as chain or commercially available straps.
- Use two restraints to secure cylinders that are four or more feet in height. Place one restraint around the cylinder body above the cylinder's center of gravity; place the second restraint around the cylinder body below the cylinder’s center of gravity. (A good rule of thumb is to place the restraints at one third and two thirds the length of the cylinder).
- Smaller cylinders can be secured in cages, ventilated cabinets, or stands.

2.2.2 Cylinders in Six-unit Stands

- When storing six-unit stands (*six-packs*), individually secure each gas cylinder to the stand using a single restraint.
- Restrain the stand itself in a cage, or secure it to a wall or to the ground.

2.3 Handling Cylinders

- Ensure that the protective valve cover is in place when a cylinder is not connected to a regulator or manifold.
- Always assume a cylinder is pressurized: handle it carefully and avoid bumping or dropping. Never drop cylinders to the ground from trucks or any raised surface.
- Lifting a standard cylinder, or any cylinder weighing more than 50 pounds, requires two people.
- Never lift a cylinder by the cylinder cap.
- Do not handle oxygen cylinders with greasy, oily hands or gloves. The reaction between oxygen and hydrocarbons can be violent, even when small quantities are involved.
- Secure cylinders in suitable cradles or skid boxes before raising them with cranes, fork trucks, or hoists. Do not use ropes or chain slings alone for this purpose.
- Never use a gas cylinder as a roller for moving materials or for supporting other items.

2.4 Empty Cylinders

2.4.1 Handling

- Handle empty cylinders with the same care accorded to full ones.

For additional information on storage, see [Chemical Lifecycle Management: Chemical Storage Asset Requirements](#).
Do not completely empty a cylinder; always leave some residual pressure (a minimum of 20 psig) to prevent “suck-back” and contamination.

Once a cylinder is nearly empty, replace the cap and store it in a compressed gas cylinder storage area, segregated from filled cylinders.

Label all empty cylinders with tags or write EMPTY or MT along with the date it was emptied using chalk or durable marker. If the cylinder has a yellow tag, be sure to tear off the IN SERVICE section to identify the cylinder for removal.

Mark any unidentifiable cylinder CONTENTS UNKNOWN.

Do not refill a cylinder: only gas suppliers can refill cylinders.

### 2.4.2 Return to Vendor

Once any SLAC-owned or return-to-vendor cylinder is empty, or once the gas in such a cylinder is of no further use, the cylinder must be returned to the vendor through chemical management services (CMS). Contact the CMS coordinator to initiate removal.

*Note* Cylinders labeled EMPTY with the vendor-supplied yellow tag will be removed automatically.

### 2.4.3 Damaged, Unidentifiable, or Abandoned Cylinders

To dispose of any damaged, unidentifiable, or abandoned cylinders, contact Waste Management (WM).

### 2.5 Tags

Cylinders are delivered with a yellow tag, as shown here. If a tag is missing, contact the chemical coordinator.
The tag is used to indicate the status of the cylinder by tearing off successive tabs. Make sure the tag identifies the status of the cylinder accurately by ripping off the appropriate tab each time the status changes.

- **FULL**
  The original tag, which includes all status options, indicates that no gas has been discharged. If you discharge any gas, be sure to tear off the FULL tab.

- **IN SERVICE**
  IN SERVICE indicates that gas has been discharged. The cylinder is ready to be returned to the vendor when a small amount of pressure remains. (Do not discharge completely.) Tear off the IN SERVICE portion of the tag when the pressure is low.

- **EMPTY**
  The cylinder is ready for removal by the gas vendor.

### 3 Forms

The following are forms and systems required by these requirements:

- [Chemical Management System](#), System used for ordering and tracking chemicals and storing safety data sheets
4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- None

5 References

**SLAC Environment, Safety, and Health Manual** (SLAC-I-720-0A29Z-001)

- Chapter 40, “Chemical Lifecycle Management”
  - Chemical Lifecycle Management: Management and Use Requirements (SLAC-I-730-0A09S-038)
  - Chemical Lifecycle Management: Chemical Storage Asset Requirements (SLAC-I-730-0A09S-018)
  - Chemical Management Services (CMS)
  - Chemical Management Services Program Site (SharePoint)

- Chapter 14, “Pressure Systems”
- Chapter 53, “Chemical Safety”
  - Chemical Safety: Hazard Communication Requirements (SLAC-I-730-0A09S-042)
  - Chemical Safety: Safe Handling Guidelines

Other Documents

- Compressed Gas Association (CGA)
  - CGA-P-1, “Safe Handling of Compressed Gases in Containers” (CGA P-1)