

**HANFORD MISSION SUPPORT CONTRACT**

# **Compressed Gas Operations**

**MSC-PRAC-30483**

**Revision 0**

**Effective Date: January 15, 2010**

**Topic: Safety and Health**

## Compressed Gas Operations

### PURPOSE

This practice identifies a key aspect of the Safety and Health (S&H) program, and defines the requirements for use, storage, and handling of compressed gas cylinders.

### SCOPE

This practice includes the following major sections:

- General Requirements
- Use and Handling
- Storage
- Inspection
- Transportation
- Manifolds

The requirements of this practice are consistent with the requirements published in the Hanford Mission Support Contract (MSC) Safety and Health virtual manual.

### APPLICATION

This practice applies to Mission Support Alliance (MSA) construction personnel where compressed gas cylinders are used, stored, transported, or handled, except the following:

- Fire extinguishers.
- Self-contained breathing apparatus cylinders.
- Chlorine cylinders.
- Air receivers/pressure vessels.
- Installation or modification of bulk compressed gas systems (permit from the fire marshal).

### GENERAL REQUIREMENTS

Records generated during the performance of this activity are to be included in the Construction Work Package and will be managed in accordance with [MSC-PRAC-30374](#), *Construction Work Package* and [MSC-PRAC-30376](#), *Project Document Control*.

Equipment is used only for operations that it is approved for, and as recommended by the manufacturer. Faulty or defective equipment is not used.

Workers assigned to operate or maintain oxygen/fuel-gas supply equipment and resistance welding equipment are instructed in the safe use of such equipment.

## Compressed Gas Operations

Engineering controls are implemented to control hazards to the extent feasible.

Secure gas cylinders in an upright, vertical position, whether in service or storage, to prevent falling. Place restraint within the upper third of the cylinder. Use a suitable cylinder truck (cart), chain, or other steadying method to prevent cylinders from being knocked over while in use or storage.

**NOTE:** *This requirement does not apply to cylinders as follows (as prescribed in Compressed Gas Association (CGA) and National Fire Protection Association (NFPA) standards):*

- Cylinders designed to remain stable without being secured (for example, Liquefied petroleum gas (LPG) cylinders commonly used with gas grills and weed burners).

Cylinders with a maximum water capacity of  $\leq 2.7$  pounds.

Required forms generated during the performance of this activity are to be included in the Construction Work Package.

### **PROCUREMENT SPECIFICATIONS AND LIMITS**

Requisitions for cylinders and hardware include the following specifications when applicable:

- Portable cylinders used to store and ship compressed gas are constructed and maintained in accordance with U.S. Department of Transportation (DOT) regulations, [Title 49 Code of Federal Regulations, Parts 171–179](#).
- Devices used on compressed gas cylinders comply with applicable CGA Standards.

### **EMERGENCY RESPONSE PLANS**

Emergency response plans cover compressed gas cylinders.

Only authorized personnel operating under an approved emergency response plan respond to an emergency involving compressed gas cylinders.

## Compressed Gas Operations

### USE AND HANDLING

Consider cylinders full and handle accordingly.

Use approved reducers and regulators; do not use gas directly from cylinders without pressure being reduced through specifically approved regulators. Do not tamper with safety devices on regulators or on cylinder valves.

Protect cylinders from damage; do not drag, drop, or strike. Do not use cylinders with signs of damage.

Do not use cylinders as rollers or supports, or for any purpose other than to store and dispense the original contents.

Keep oxygen cylinders and fittings away from oil, grease, and other combustible/flammable materials. Keep cylinders, cylinder caps and valves, couplings, regulators, hoses, and apparatus free from oil and greasy substances, and do not handle with oily hands or gloves. Do not direct oxygen at oily surfaces or greasy clothes.

Equip gaseous hydrogen systems with pressure relief devices and protect from tampering. Arrange relief devices so that if actuated, they have an unobstructed upward vent path to open air.

Check to verify that compressed gas cylinders indicate the following:

- Date the last hydrostatic test was performed (stamp)
- Cylinder contents (label with either chemical or trade name)

Do not remove or alter cylinder tags or markings.

Mixing gases, transferring them from one cylinder to another, or refilling cylinders is prohibited.

Keep valve protective caps on the cylinder except when the cylinder is secured and connected to dispensing equipment.

Open cylinder valves slowly.

Ensure reverse-flow gas check valves and flash-back arrestors are installed on both lines of all oxygen and fuel-gas setups.

## Compressed Gas Operations

Leave special wrench, when required, in position on the stem of the valve while the cylinder is in use. In the case of coupled cylinders or cylinders connected with a manifold, at least one such wrench is available for immediate use.

When the work is completed, or at the end of the shift, close valves and regulators; drain gas lines and regulators; “back out” the adjusting screw.

**NOTE:** *This does not apply to cylinders connected with a manifold.*

Use regulators and pressure gauges only for the gases that they are designed and intended for. Repair, modification, or alteration on cylinders, valves, or attachments can be performed only by the manufacturer/authorized service center.

Do not force difficult connections. Match threads on regulators to those on the cylinder valve outlet.

“Crack” the cylinder valve for an instant before connecting to a cylinder valve outlet, to clear any dust, dirt, or foreign body from the opening and then shut the valve.

**NOTE:** *Direct the valve nozzle away from personnel before “cracking” the valve.*

Do not drag, strike, drop, or roll cylinders in horizontal position, or allow them to strike each other or another surface violently.

When transporting cylinders, use a suitable hand truck, forklift, or similar handling device with the cylinder properly secured to the device and the valve cap on.

Roll cylinders, only for short distances, using the curved bottom edge of the cylinder.

Do not lift cylinders using the protective cap or with a magnet.

Do not use ropes, chains, or slings to suspend cylinders unless the cylinder has appropriate lifting attachments. If appropriate lifting attachments have not been provided, use suitable cradles or platforms to hold the cylinder for lifting.

## Compressed Gas Operations

### STORAGE

Store compressed gas cylinders in areas that are safe, dry, well-ventilated, and protected from direct sun and weather conditions. Do not expose cylinders to temperatures above 51 C (125 F).

Clearly identify compressed gas cylinder storage areas, and post with the name(s) of the gas(es) stored in the area.

The quantity of gas in cylinders allowed in storage (inside or outside) will be in accordance with NFPA Standards 51 and 55.

Do not store cylinders near elevators, gangways, stairwells, or any other place where they are likely to be knocked down or interfere with traffic.

Segregate empty cylinders from other cylinders and label or tag "Empty" or "MT."

Do not store oxygen cylinders not in use within 6.1 meters (20 feet) of cylinders containing flammable gases unless separated by a fire wall at least 1.5 meters (5 feet) tall and having a fire-resistance rating of at least 1/2 hour.

Store cylinders containing oxidizing gases away from flammable substances such as oil and volatile liquids.

Smoking is prohibited within 6.1 meters of flammable gas cylinder storage areas. Post NO SMOKING signs in storage areas containing flammable gases.

Close and cap valves on empty cylinders.

Construct storage areas so that they are dry, well-ventilated, and made with noncombustible materials. Ensure shelves are able to support cylinders.

Clear dry vegetation and combustible materials for a minimum distance of 4.6 meters (15 feet) from around the storage area.

Provide physical protection (barriers) to prevent damage from vehicles.

### INSPECTION

The supervisor or building manager inspects compressed gas cylinder storage areas at least semiannually and documents on form [A-6004-303](#) or equal.

## Compressed Gas Operations

**TRANSPORTATION** Remove regulators, and when provided for, put valve-protection caps in place before moving cylinders unless cylinders are secured on a special hand-truck.

Provide proper support racks to all vehicles used to transport cylinders.

When cylinders are transported by crane or hoist, use a cradle or suitable platform. Do not use slings or electromagnets for this purpose.

Ensure cylinders filled for transportation (bulk loads) comply with DOT regulations on the following subjects:

- Ownership and authorization to fill
- Type of shipping cylinders for each gas
- Charging cylinders – amount of gas and conditions of filling
- Marking and labeling requirements for transporting
- Qualifying, maintaining, and requalifying requirements
- Transporting cylinders and placarding transport vehicles
- Type(s) of pressure relief devices, where required

Do not transport compressed gas cylinders in automobiles or in closed-bodied vehicles.

Ensure that shipping compartments are adequately ventilated.

### MANIFOLDS

Use manifolds and manifold parts only for the gas or gases they are designed for.

Cylinder manifolds are installed under the supervision of a person-in-charge who is familiar with the uses of the gas at that facility. Installations comply with proper practices in construction and use.

Ensure compressed gas manifolds are designed to meet NFPA Standard 51.

Ground and bond flammable-gas piping systems in accordance with NFPA Standard 51.

When acetylene cylinders are connected by a manifold, approved flash arrestors are installed between each cylinder and the coupler block. One flash arrestor installed between the coupler block and regulator is acceptable only for outdoor use or if the number of cylinders coupled does not exceed 3.

## Compressed Gas Operations

### FORMS

*Gas Cylinder Storage Area Inspection Checklist, [A-6004-303](#)*

### RECORDS IDENTIFICATION

**Records Capture Table**

<b>Name of Document</b>	<b>Submittal Responsibility</b>	<b>Retention Responsibility</b>
<i>Gas Cylinder Storage Area Inspection Checklist, <a href="#">A-6004-303</a></i>	Construction Supervisor/Superintendent	Project Document Control

### REFERENCES

[MSC-PRAC-30374](#), *Construction Work Package*

[MSC-PRAC-30376](#), *Project Document Control*

National Fire Protection Association (NFPA)

NFPA Standard 51, *Design and Installation of Oxygen and Fuel Gas Systems for Welding, Cutting, and Allied Processes*

NFPA Standard 55, *Compressed and Liquefied Gases in Portable Cylinders*

*MSC Safety and Health*, virtual manual