Hard copy of this document, if not marked "CONTROLLED" in red,
is by definition uncontrolled and may be out of date.

Standard Operating Procedure
for

Gas Cylinder Handling

REVISION

Rev No.	DCN No.	Change Summary	Release Date	DCN Initiator	Document Owner
3	DCN0974	Update Logo	9-6-13	B. Borden	R. Segura

Prior revision history, if applicable, is available from the Document Control Office.

1 PURPOSE AND SCOPE

1.1 This procedure establishes minimum rules to protect the health and safety of workers required to handle gas cylinders, and to minimize the potential for personal injury and environmental risk.

1.2 This procedure is intended to provide more detailed procedures to be taken when shipping, receiving, transporting, or installing gas cylinders.

1.3 Although this practice describes specific safety measures to be taken for handling gas cylinders, it is not intended to prevent the use of any additional measures that may be deemed necessary for a particular situation.

1.4 All additions or deletions to this specification shall be under a Document Change Notice, coordinated by Document Control with sign-off required by but not limited to the EHS Department.

2 HAZARDS

2.1 The potential hazards which may be encountered when handling gas cylinders are as follows:

2.1.1 **PRESSURE** - When the cylinder valve is opened the released gas will expand rapidly, whether it is purposely opened or accidentally as in a leaking cylinder. Such expansion, if rapid enough and uncontrolled, can result in the release of tremendous amounts of energy. It is known that cylinders with sheared valves can penetrate masonry walls under the force of the escaping gas.

2.1.2 **TOXICITY** - Some compressed gases can cause physiological harm to personnel exposed to them. The extent of the adverse health effects is dependent on the gas, its concentration, and the duration of exposure

2.1.3 **FLAMMABILITY** - A leaking or otherwise mishandled cylinder may present situations where a concentration of the gas may become in excess of its lower explosive limit.

2.1.4 **REACTIVITY** - Under certain conditions, heat, etc., the leaking gases may combine with incompatible materials to form toxicants.

3 REQUIREMENTS FOR PERSONNEL HANDLING GAS CYLINDERS

3.1 Personnel who are required to receive transport, or install gas cylinders shall receive the following safety training. It is the responsibility of the employee's supervisor to ensure that they receive this training, certification and are updated at least annually.

- Chemical safety training
- Respirator clearance, fit test and training
- Gas cylinder handling training
- Gas panel operation training

3.2 Personnel who are required to receive, transport, or install gas cylinders must wear the appropriate personal protective equipment (PPE). The type of equipment required depends upon the classification of the gas as listed. See Table 1 for Gas Classification and refer to EHS specification (EHS-00010) for Required Personal Protective Equipment.

4 LEAK TESTING GAS CYLINDERS

4.1 Most cylinder leaks occur in the area of the valve. A suspected leak should be confirmed by performing a leak test.

4.1.1 Removing cylinder, from storage area or cabinet, if applicable - (after proper purging procedures have been followed)

4.1.1.1 Ensure cylinder valve is fully closed.

4.1.1.2 Apply (a leak checking fluid such as Snoop) around cylinder outlet connection and/or use a leak-checking device.

4.1.1.3 If bubbles are observed or a reading is detected on the leak-checking device, attempt to further tighten the cylinder valve.

4.1.1.4 Repeat steps 1 and 2.

4.1.1.5 If bubbles are still observed or a reading is detected, **STOP**. Call Ext 7-8600 for ERT response and also contact your Supervisor. DO NOT DISCONNECT AT THIS TIME. (See section 10.2)

4.1.1.6 Apply (a leak checking fluid such as snoop) and/or use a leak checking device around the valve release device and valve neck. If bubbles are observed, **STOP**. Contact your Supervisor. (See section 10.0)

4.1.1.7 If no bubbles or reading is detected on the leak-checking device, disconnect the cylinder.

4.1.1.8 Replace the cylinder valve safety cap while the cylinder is still within the exhausted cabinet. Check again with Snoop.

4.1.1.9 Once you are satisfied that there is no leakage, remove the cylinder from the cabinet.

4.1.2 <u>After cylinder installation in gas cabinet</u>

4.1.2.1 Attach pressure gauge and distribution lines and tighten.

4.1.2.2 Once you have observed that the cylinder pressure gauge indicates a full cylinder, apply Snoop around the cylinder valve outlet connections.

4.1.2.3 If the Snoop shows signs of bubbling, the fitting requires further tightening and re-Snooping.

4.1.2.4 If there are no signs of bubbles, the fitting is tight enough.

4.1.2.5 If you are unable to correct the leak, shut off the cylinder valve and contact your supervisor.

4.1.2.6 For pyrophorics, corrosive, or toxic gases, leak check the pressure regulator and gas line connections using helium purge gas and a helium detector.

5 RECEIVING GAS CYLINDERS

5.1 All personnel receiving compressed gas cylinders must wear the appropriate PPE (see Section 3).

5.2 A compressed gas cylinder shall be accepted only if its contents are legibly identified by name. Cylinders are identified in several ways:

5.2.1 Stenciling, labels, or decals on the cylinder body/shoulder.

5.2.2 Tags attached to the cylinder valve and or valve protection cap.

5.3 The receiver shall confirm that all of these forms of identification agree and correspond to what was ordered. If they do not, the cylinder shall not be accepted.

5.4 Under no circumstances shall identification markings or tags be obliterated or removed from any compressed gas cylinder.

5.5 All compressed gas cylinders must be inspected prior to acceptance. All toxic, flammable, corrosive, and pyrophoric gases must be leak tested upon receipt. Below is a list to be used when receiving cylinders. If the answer to any of the questions is no, then the cylinder shall not be accepted.

5.5.1 Is the valve cap in place?

5.5.2 Upon removal of the cylinder cap, are the tamper seals (shrink wrap) and / or valve cap securely in place?

5.5.3 If the cylinder is identified as having a restrictive flow orifice (RFO), remove the valve cap to visually verify that one is in place (after leak checking). Do not look directly into the valve, but view from an angle or utilize a mirror to observe.

5.5.4 Is the cylinder leak tight, giving off no odors, issuing no visible vapors or hissing sounds?

5.5.5 Is the product identified by name?

5.5.6 Do all forms of identification on the cylinder agree?

5.5.7 Is the cylinder and valve free from damage in the form of dents, gouges, burn marks or corrosion?

5.6 Once accepted, a cylinder status tag (Figure 1) shall be affixed to the cylinder(s) and the cylinder(s) shall then be transported with care to prevent damage to the cylinder or the cylinder valve. The cylinder status tag would go on the valve. Cylinders should be segregated for empty and full.

5.6.1 The cylinder cap must be kept tightly in place at all times except when in use.

5.6.2 Cylinders shall be moved by means of an approved hand truck or cart. Cylinders shall never be dragged, rolled, or slid even for short distances. (Hand movement is allowed between the cart and cabinet)

5.6.3 Properly designed hand trucks have rear wheels and braces to support the cylinder, and a strap or chain to restrain the cylinder.

5.7 Once at its designated storage area, the cylinder(s) must be secured by a restraint system (i.e. strap, rack, chain). The restraint system must be designed to prevent the cylinder(s) from falling and subsequently striking the floor or other object. In some situations, multiple sets of restraints may be necessary (i.e. cylinders of varying heights stored in the same storage bay). In some situations, it may be necessary to provide adjustable restraints (i.e. partially full storage bays).

5.7.1 At the discretion of the EHS Department, cylinders with height: diameter aspect ratio equal to or less than 2.1:1 may be exempted from complying with paragraph 5.7.

5.7.2 Dollied cylinders (DOT 4L and similar) which are used to contain and transport liquid nitrogen are exempted from complying with paragraph 5.7.

5.7.3 Gas cylinders which are less than 25" in height (i.e. acetylene, MAP gas, oxygen, SCBA) are exempted from 5.7 provided that they are stored upright and in such a manner to prevent tipping over.

5.8 SCBA cylinders may be stored on their sides provided that they are restrained from rolling.

5.9 The cylinder valve cover must remain in place at all times during storage.

5.10 If at any time a cylinder is found to be or suspected of leaking, refer to Section 10.

6 SAFETY TRANSPORTING COMPRESSED GAS CYLINDERS

6.1 All HPM gas cylinders must be leak tested prior to being transported from their storage area to their area of use. (Refer to section 4.1.1.1 through 4.1.1.4)

6.2 Cylinder valve covers must remain in place at all times during transportation.

6.3 Personnel transporting the cylinders are required to wear all of the appropriate protective equipment for the task and type of gas (see Section 3.0).

6.4 Cylinders shall be transported by carts or carriers approved by the Environmental, Health, and Safety Department (EHS).

6.5 Individuals may only handle one cart at a time and the carts shall be pushed ahead rather than pulled by the employee.

6.6 The gas cylinder is not to be removed from its cart until the cylinder that it is replacing is leak checked and disconnected.

6.7 If the disconnected cylinder is found to be leaking, STOP, refer to Section 10.

6.8 When removing Dichlorosilane cylinders from a shipping crate, the crate must be moved to the chemical dock for storage until the next Dichlorosilane cylinder is returned to that crate for shipping.

6.9 Gas cylinders which are less than 25" in height are exempted from Section 6.4 above, provided that all the following conditions are met:

6.9.1 The person transporting the cylinder is wearing the appropriate PPE, as described in Section 3.0 above,

6.9.2 The cylinder is not handled in a rough manner,

6.9.3 The cylinder is not too heavy for the transporter to easily lift, and

6.9.4 Only one cylinder is carried at a time.

6.10 Gas Cylinders which are affected by this section include, but are not limited to: small welding gas cylinders, MAP gas cylinders, propane cylinders and refrigerant cylinders. If a cart is used to transport these cylinders, care needs to be taken to ensure that the cylinder is properly restrained in/on the cart. In the case of SCBA cylinders, a maximum of 2 SCBA cylinders may be carried at one time.

6.11 Toxic or Corrosive gases are forbidden to be transported in an elevator with personnel. Two people are requires for transporting toxic or corrosive gases in an elevator. One person is designated as the loader and the second person is designated as the unloader. The loader secures the cylinder in the elevator and designates the floor for delivery. Prior to loading the unloader person is required to be in place and wearing the appropriate PPE.

6.12 If at any time a cylinder begins to tip over to fall, DO NOT ATTEMPT TO CATCH IT AS IT WILL RESULT IN SERIOUS INJURY. Let it fall.

7 RETURNING THE USED CYLINDER

7.1 After leak testing and replacing its valve outlet cover, the used cylinder shall be secured onto an approved cart.

7.2 The "IN SERVICE" section of the cylinder status tag shall be removed, so only the "EMPTY" section remains. The cylinder status tag shall be attached to the outside of the cylinder cap so that the tag is visible.

7.3 Follow the same procedures as specified in Section 6.0 (TRANSPORTING COMPRESSED GAS CYLINDERS) and safely return the empty cylinder to the CUB for return to the appropriate vendor.

8 INSTALLATION OF COMPRESSED GAS CYLINDERS

8.1 Whenever installing or removing a gas, which is either toxic, corrosive, flammable, pyrophoric, or an irritant, the "Buddy System" (refer to section 13.0) must be used.

8.2 Personnel installing or removing compressed gas cylinders (and the Buddy) are required to wear the appropriate PPE (see Section 3.0)

8.3 Only those personnel who have been trained on cylinder changes are to change cylinders.

8.4 Notify your supervisor immediately and obtain the correct installation instructions.

8.4.1 When installing a gas cylinder which is toxic, corrosive, flammable, pyrophoric or an irritant, proper precautions must be taken to restrict unauthorized access in the immediate area. Only employees performing the cylinder change are allowed in the restricted area.

8.4.1.1 When performing a cylinder change in a laboratory that can be restricted by closing a door(s), the door(s) shall be closed and a sign posted on the door(s) that states that there is a gas cylinder change in progress and entrance is not permitted

8.4.1.2 When performing a cylinder change in an area which cannot be restricted by use of a door, the area must be roped off with caution tape and a sign indicating gas cylinder change in progress to restrict access to the cylinder change area. The size of the restricted area shall be based upon the judgment of the persons performing the cylinder change. Factors which are to be considered include: physical layout of the area, associated hazards of the gas, space needed to perform the cylinder change, and general room ventilation.

8.4.1.3 All signs and caution tape shall be removed after the cylinder change has been completed.

8.5 **Changing the Compressed Gas Cylinder**

8.5.1 Obtain gas cylinder change sheet from the gas cylinder storage area

8.5.2 Properly fill out gas change sheet and attach identification flag to gas cylinder (See figures 3 - 7 for typical gas change sheets/tags)

8.5.3 Perform gas cylinder change according to proper procedures for gas specified.

8.5.4 Once the gas cylinder change is completed, remove the identification flag from cylinder and return it to its storage area.

8.5.5 Turn in gas cylinder change sheet at the supervisor's office.

8.6 The cylinder valve covers are to be stored with the cylinder inside the gas cabinet.

8.7 No installation is complete until the cylinder is secured within the cabinet (or designated location) and the gas panel/connection has been thoroughly leak tested, the "FULL" portion of the cylinder status tag removed (so that only the "IN SERVICE" and "EMPTY" portions remain), and the Change has been documented in the gas cylinder change log.

8.7.1 At this time, the cylinder status tag shall be removed from the cylinder cap and attached to either the cylinder or on the manifold line (or pigtail) next to the installed cylinder.

8.8 If the cylinder is found to be leaking, refer to Section 10.

9 SHIPPING COMPRESSED GAS CYLINDERS

9.1 Personnel required to ship gas cylinders are required to wear the appropriate PPE (see section 3.0).

9.2 The following procedures shall be followed for all Toxic, Corrosive, Flammable, and/or Pyrophoric gas cylinders:

9.2.1 Remove the cylinder valve cover and check the valve to assure that it is closed hand tight and that the valve outlet cap is wrench tight.

9.2.2 Check the valve, valve stem, and valve cap with Snoop to be sure that the cylinder is not leaking.

9.2.3 Replace cylinder valve cover hand tight

9.2.4 Using approved method (see Section 6.0) assist vendor in transporting cylinder to vehicle.

10 LEAKING GAS CYLINDERS

10.1 **Basic steps to follow in all cases:**

10.1.1 Do not remove a leaking cylinder from a vented cabinet.

10.1.2 If the leaking cylinder is not already in a vented cabinet, attempt to place it in one, or;

10.1.3 Attempt to locate the cylinder under an exhausted hood, or;

10.1.4 ONLY AS A LAST RESORT, bring the cylinder out of doors to vent.

IMPORTANT: Insure that the gas will not be allowed back into the facility by air intake or by a pressure gradient flowing into the facility. If this step is taken EHS must be notified immediately.

10.1.5 Gas cabinets specifically designated for leaking flammable gas cylinders are located inside the flammable (Hydrogen) Gas Cylinder Storage Room in the CUB.

10.2 **Reporting Leaking Gas Cylinders**

10.2.1 <u>Receiving</u>

10.2.1.1 DO NOT ACCEPT. If it is safe to do so, locate the cylinder within an exhausted cabinet. If the gas is toxic, or corrosive, an SCBA and

additional PPE must be used when handling the cylinder (refer to Section 3.0).

10.2.1.2 Call extension 7-8600, state your name, problem, gas type, location, beeper or telephone number that you can be reached. Tell Security to contact ERT.

10.2.1.3 Security will contact the Emergency Response Team (ERT).

10.2.1.4 Remain in the nearest safe area to be contacted by the ERT.

10.2.1.5 The ERT will handle and dispose of the leaking cylinder.

10.2.2 Transporting

10.2.2.1 There should be no reason to transport a leaking cylinder beyond the Gas Storage Room. All cylinders shall be leak tested prior to removal from the room.

10.2.2.2 If a cylinder is found to be leaking, attempt to relocate it into an exhausted gas cabinet within the room, if it is safe to do so.

10.2.2.3 Wear the appropriate PPE as specified in Section 3.0.

10.2.2.4 Call extension X78600, state your name, problem, gas type, location, beeper or telephone number that you can be reached. Tell Security to contact ERT. Receptionist/Security will contact the Emergency Response Team (ERT)

10.2.3 Installing

10.2.3.1 Do not remove the cylinder from the exhausted cabinet.

10.2.3.2 If the leak cannot be corrected by tightening a loose fitting, close the cabinet door.

10.2.3.3 Call extension X78600, state your name, problem, gas type, location, beeper or telephone number that you can be reached. Tell Receptionist/Security to contact ERT.

10.2.3.4 Receptionist/Security will contact the Emergency Response Team (ERT).

10.2.3.5 Remain in the nearest safe area to be contacted by the ERT.

10.3 Handling and Disposal of Leaking Gas Cylinders

10.3.1 All handling and disposal of leaking gas cylinders shall be performed by trained ERT personnel only. NOTE: All leaking or defective cylinders shall be tagged with the "Defective Cylinder Tag" (Figure 2) and the Chemical Clerk (Air Liquide) contacted.

10.3.2 In all cases the following people must be notified PRIOR to the disposal and venting of leaking cylinders:

10.3.2.1 Environmental Health & Safety Manager.

10.3.3 The "Buddy System" (See section 13.0) shall be utilized, with both persons wearing the appropriate PPE: (See section 3)

10.3.4 See Basic Steps (Section 10.1) if the leaking cylinder is not already in an area for venting.

10.3.5 Follow instructions posted at dedicated leaking gas cylinder cabinet (Flammable Gas Cylinder Storage Room, CUB).

10.3.6 Once the cylinder is empty, close the valve. Replace the valve outlet cap and leak test using Snoop.

10.3.7 Tag the cylinder "Defective", list action taken (i.e. "Discharged"), record time and date, and print your name clearly.

10.3.8 Contact the EHS Department to arrange for cylinder storage.

10.3.9 The ERT Leader shall complete an "Emergency Response Report" immediately and submit it to the EHS Department.

11 CLEAN-UP

11.1 Once the leaking gas cylinder has been addressed and returned to gas storage, it is necessary to perform decontamination and/or disposal of all PPE, and other materials that may have been contaminated.

If there has been skin exposure to the chemical, rinse thoroughly with cold water for 15 minutes and seek medical attention by contacting Security at extension 7-8600.

12 DISPOSAL OF CALIBRATION GAS CYLINDERS

12.1 DOT 39 Non-Refillable Cylinders regardless of chemical contents are to be disposed by the user in the following manner:

12.1.1 Verify that the cylinder is either labeled or stamped with the DOT 39 designation.

12.1.2 Release the remaining pressure in the cylinder while either placing the cylinder underneath an exhausted hood or taking it outdoors.

12.1.3 Dispose of the cylinder in a general trash Dumpster.

13 BUDDY SYSTEM

13.1 The buddy system is a process in which a second trained individual is utilized to assist in the completion of a compressed gas cylinder change. Both the buddy and the primary individuals are equally responsible for the safe completion of the task. In order to perform this task, both individuals must meet the following criteria:

13.1.1 Must wear the proper PPE, as stated in this specification

13.1.2 Read, understand and follow all proper procedures

13.1.3 Interact with each other to ensure proper procedures are being followed

13.1.4 Must be gas safety and chemical safety trained

13.1.5 If respirators are required, both individuals must be respirator trained and certified

13.1.6 Perform verification of correct gas bottle to be changed

13.1.7 Must remain within sight and sound of each other for the duration of the task and CAN NOT BE PERFORMING any other task, during this time.

14 APPENDICES

14.1 **Appendix 1** - Gas Classifications

14.2 **Appendix 2** – Required Personal Protective Equipment

14.3 **Appendix 3** – Cylinder Status Tag

14.4 **Appendix 4** – Defective Cylinder Tag

14.5 **Appendix 5** – Toxic Gas Cylinder Change Documentation

14.6 **Appendix 6** - Corrosive Gas Cylinder Change Documentation

14.7 **Appendix 7** – Pyrophoric Gas Cylinder Change Documentation

14.8 **Appendix 8** – Flammable Gas Cylinder Change Documentation

14.9 **Appendix 9** – Inert Gas Cylinder Change Documentation

Appendix 1

GAS CLASSIFICATIONS TABLE

GAS NAME	SYMBOL	TOXIC	CORROSIVE	OXIDIZER	PYROPHORIC	FLAMMABLE	CRYOGNIC	INERT
Acetylene	C2H6					X		
Ammonia	NH3		X			X		
Argon	Ar							X
Arsine	AsH3	X				X		
Boron Trichloride	BCI3		X					
Boron Trifluoride	BF3		X					
Carbon Dioxide	CO2							X
Carbon Monoxide	CO	X				X		
Carbon Tetrafluoride	CF4							X
Chlorine	CI2	X	X	X				
Chloroform	CHCI3	X						
Diborane	B2H6	X			X	X		
Dichlorosilane	H2SiCI2	X	X			X		
Difluoromethane	CH2F2					X	X	
Disilane	Si2H6				X	X		
Decacarbonyldirhenium	Re-2(CO)10	X						
Dodecacarbonyltriruthenium	Ru3(CO)12	X						
Ethylene	C2H4					X	X	
Fluorine (5% in Helium)	F2	X	X					
Forming Gas (Hydrogen/Nitrogen mixture)	H2N2							X
Freon 11 (Trichlorofluoromethane)	CCl3F							X
Freon 12 (Dichlorodifluoromethane)	CC12F2							X
Freon 14 (Tetrafluoromethane)	CF4							X
Freon 22 (Chlorodifluoromethane)	CHCIF2							X
Freon 23 (Trifluoromethane)	CHF3							X
Freon 113 (Trichlorotrifluoromethane)	CCI2FCCIF2							X
Freon 115 (Chloropentafluoroethane)	C2CIF5							X
Freon 116 (Hexafluoroethane)	C2F6							X
Germane	GeH4	X			X	X		
Helium	He							X
Hexafluoro-1,3-butadiene	C4F6	X				X		

GAS NAME	SYMBOL	TOXIC	CORROSIVE	OXIDIZER	PYROPHORIC	FLAMMABLE	CRYOGNIC	INERT
Hydrogen	H2					X		
Hydrogen Bromide	HBr	X	X					
Hydrogen Chloride	HCl		X					
Hydrogen Fluoride	HF		X					
Hydrogen Sulfide	H2S	X				X		
Liquid Nitrogen	LN2						X	X
Liquid Oxygen	LO2			X			X	
Methane	CH4					X		
Methyl Chloride	CH3Cl					X		
Methylene Fluoride	CH2F2					X		
Methyl Fluoride	CH3F					X		
Methylsilane	CH3SiH3				X	X		
Neon	Ne							X
Nitrogen	N2							X
Nitrogen Trifluoride	NF3		X	X				
Nitrous Oxide	(NO)			X				X
Octafluorocyclobutane	C4F8	X						
Octafluorocyclopentene	C5F8	X						
Octane	C8H16					X		
Oxygen	O2			X				X
Ozone	O3	X	X	X				
PDE-100	CF4 & O2							X
Phosphine	PH3	X			X	X		
Propane	C3H8					X		
Silane	SiH4				X	X		
Silicon Tetrafluoride	SiF4		X					
Silicon Tetrachloride	SiCl4		X					
Sulfur Hexafluoride	SF6							X
Tetramethylcyclotetrasiloxane	C4H16O4Si4					X		
Trimethylsilane	C3H10Si					X		
Tungsten Hexafluoride	WF6	X	X					
Xenon	Xe							X

Appendix 2

REQUIRED PERSONAL PROTECTIVE EQUIPMENT

REQUIRED PPE	SHIPPING/RECEIVING	TRANSPORTING	INSTALLING
Toxics (OSHA permissible Exposure Limit (PEL) <500 ppb)	Safety glasses / steel-toes shoes / gloves, leather	Safety glasses / steel-toes shoes	SCBA or airline respirator w/SKA-PAK / steel-toes shoes / gloves, chemical-resistant / arm-guards / apron or chemical resistant smock.
Corrosives	Safety glasses / steel-toes shoes / gloves, leather	Safety glasses / steel-toes shoes	SCBA or airline respirator w/SKA-PAK / steel-toes shoes / gloves, chemical-resistant / arm-guards / apron or chemical resistant smock.
Pyrophorics	Safety glasses / steel-toes shoes / gloves, leather	Safety glasses / steel-toes shoes	SCBA or airline respirator w/SKA-PAK / steel-toes shoes /flame retardant gloves / Nomex flame resistant hood/ flame resistant coat
Flammables	Safety glasses / steel-toes shoes / gloves, leather	Safety glasses / steel-toes shoes	SCBA or airline respirator w/SKA-PAK / steel-toes shoes /flame retardant gloves / Nomex flame resistant hood/ flame resistant coat
Cryogenics	Safety glasses / steel-toes shoes / gloves, leather	Safety glasses / steel-toes shoes / gloves, cold-retardant	Safety glasses / steel-toes shoes / gloves, cold-retardant gloves, cold-retardant / apron, cold retardant / face-shield
Inerts	Safety glasses / steel-toes shoes / gloves, leather	Safety glasses / steel-toes shoes	Safety glasses / steel-toes shoes

Appendix 3
Cylinder Status Tag

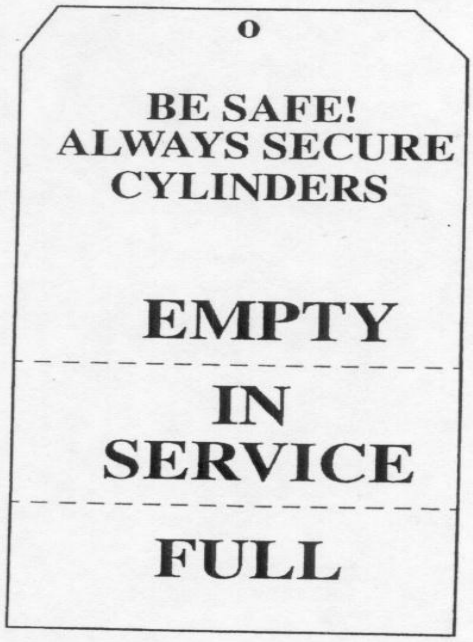
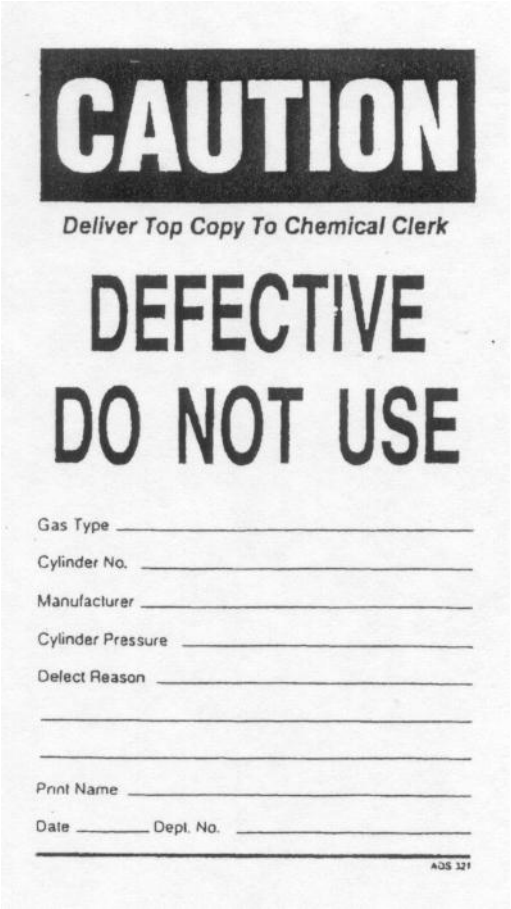


FIGURE 4

Appendix 4
Defective Cylinder Tag



CAUTION

Deliver Top Copy To Chemical Clerk

DEFECTIVE

DO NOT USE

Gas Type _____

Cylinder No. _____

Manufacturer _____

Cylinder Pressure _____

Defect Reason _____

_____

_____

Print Name _____

Date _____ Dept. No. _____

ADS 321

Appendix 5

TOXIC GAS CYLINDER

Minimum Safety Gear Required

Transporting: Safety glasses, chemical-resistant gloves, steel toes-shoes
Installing: SCBA or airline respirator w/SKA-PAK, chemical-resistant gloves, arm guards, apron or chemical-resistant smock, steel-toes shoes

Name of technician performing cylinder change: _____

Name of "Buddy" performing cylinder change: _____

Gas being changed: _____ Equipment ID: _____

Date: _____ Time: _____

Name of procedure for gas cylinder change:
_____
Did you review the procedure? Yes or No

Technician's signature: _____

"Buddy's signature: _____

TOXIC GAS CYLINDER

Appendix 6

CORROSIVE GAS CYLINDER

Minimum Safety Gear Required

Transporting: Safety glasses, chemical-resistant gloves, steel toes-shoes
Installing: SCBA or airline respirator w/SKA-PAK, chemical-resistant gloves, arm guards, apron or chemical-resistant smock, steel-toes shoes

Name of technician performing cylinder change: _____

Name of "Buddy" performing cylinder change: _____

Gas being changed: _____ Equipment ID: _____

Date: _____ Time: _____

Name of procedure for gas cylinder change:
_____
Did you review the procedure? Yes or No

Technician's signature: _____

"Buddy's signature: _____

CORROSIVE GAS CYLINDER

Appendix 7

PYROPHORIC GAS CYLINDER

Minimum Safety Gear Required

Transporting: Safety glasses, flame retardant gloves, steel toes-shoes
Installing: SCBA or airline w/SKA-PAK, flame retardant gloves, Nomex flame resistant hood, flame resistant coat, steel toes-shoes

Name of technician performing cylinder change:
_____

Name of "Buddy" performing cylinder change:
_____

Gas being changed: _____ Equipment ID:
_____

Date: _____ Time: _____

Name of procedure for gas cylinder change:
_____
Did you review the procedure? Yes or No

Technician's signature: _____

"Buddy's signature: _____

PYROPHORIC GAS CYLINDER

Appendix 8

FLAMMABLE GAS CYLINDER

Minimum Safety Gear Required

Transporting: Safety glasses, flame retardant gloves, steel toes-shoes
Installing: SCBA or airline w/SKA-PAK, flame retardant gloves, Nomex flame resistant hood, flame resistant coat, steel toes-shoes

Name of technician performing cylinder change:
_____

Name of "Buddy" performing cylinder change:
_____

Gas being changed: _____ Equipment ID:
_____

Date: _____ Time: _____

Name of procedure for gas cylinder change:
_____
Did you review the procedure? Yes or No

Technician's signature: _____

"Buddy's signature: _____

FLAMMABLE GAS CYLINDER

Appendix 9

INERT GAS CYLINDER

Minimum Safety Gear Required

Transporting: Safety glasses, steel toes-shoes
Installing: Safety glasses, steel toes-shoes

Name of technician performing cylinder change: _____

Name of "Buddy" performing cylinder change: _____

Gas being changed: _____ Equipment ID: _____

Date: _____ Time: _____

Name of procedure for gas cylinder change: _____
Did you review the procedure? Yes or No

Technician's signature: _____

"Buddy's signature: _____

INERT GAS CYLINDER