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Compressed Gas Cylinder Handling at AMF

I. Purpose:

The purpose of this procedure is to provide general guidelines to the Observers at the ARM Mobile Facility (AMF) about the proper and safe handling of compressed gas cylinders. Compressed gas cylinders that could be encountered at an AMF site are helium and nitrogen.

II. Cautions and Hazards:

Hazards generally associated with compressed gas cylinders are flammability, corrosion, reactivity, toxicity, oxygen depletion, and mechanical injury if not handled, operated and stored properly. Because only helium and nitrogen are expected to be encountered at an AMF site, the only hazards from the above list applicable are oxygen depletion and mechanical injury.

III. Requirements:

- Safety glasses
- 1 1/8-inch open-end wrench (for changing gas regulator position)
- 5/16-inch Allen wrench (for changing gas regulator position)

IV. Procedure:

A. General Handling:

- Leave cylinders in place on the rack to prevent the cylinders from falling or damaging the valves and the regulator.
- Keep cylinder valve caps in place at all times, except when the cylinder is installed and connected to a pressure system.
- Replace the valve cap when cylinder is empty and mark "X."
- Never force a valve open, and always open cylinder valves slowly.
- Maintain cylinders in good condition and maintain all cylinder labels.
- Cylinders shall be legibly marked with labels that identify the operating pressure, temperature, material of construction and contents.
- No maintenance or repair work on a cylinder shall be performed.

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- Any cylinder with supplied protective cap shall have its cap removed and the mating threads be given a liberal coating of general purpose grease. This shall be carried out every three months or until the cylinder is used.
- Cylinders with damaged valves SHALL NOT be used and shall be returned to the supplier as is, noting the defect.
- Moving cylinders:
 - ⇒ Before moving cylinders from its secured “in-use” position, remove regulator and secure protective cap.
 - ⇒ Move cylinders on cylinder carts with forklift or with other approved cylinder transporting devices.
 - ⇒ Never roll or drop cylinders. If a cylinder falls while being rolled, severe foot injury or damage to the cylinder itself could result.
 - ⇒ Never lift cylinders by their protective caps or valves.
 - ⇒ Wear safety shoes or toe protection when moving cylinders.

B. Storage of Cylinders:

- Store cylinders containing flammable, corrosive, toxic, or otherwise hazardous gases outside buildings and away from doors, windows, and building air intakes. Inert gases may be stored inside if there is sufficient space and ventilation to preclude asphyxiation hazards.
- Protect stored cylinders against heat, corrosive atmospheres, rain, snow accumulation, and full sunlight. The storage area should be paved and easily accessible to delivery trucks and users with cylinder carts. Cylinder storage areas should drain readily, which may require that cylinders be placed on pallets or otherwise raised above surrounding surfaces.

C. Valves and Regulators in General:

- All cylinders shall have a shutoff valve designed according to the Compressed Gas Association standards. This valve cannot be used to control the discharge rate; therefore a regulator must be connected to the cylinder while it is in use.
- Use only a regulator that has been approved for the gas in use.
- Never attempt to repair a regulator. Expert repair and calibration of regulators is necessary for continued reliability and safety. Never use an adapter.
- Each part of a compressed gas system that can be pressurized separately must be protected by a pressure relief device set to operate at pressure equal to or less than the Maximum Allowable Working Pressure (MAWP).

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D. Moving Regulator Gauge Apparatus from Empty Cylinder to Full Cylinder:

- 1. Put on safety glasses.**
- 2. On a full cylinder, remove outer cap, and then remove outlet plug using Allen wrench.**
- 3. Close the cylinder valve of the empty cylinder, and open the red hose valve.**
- 4. Remove regulator gauge apparatus from the empty cylinder using open-end wrench.**
- 5. Put on outlet plug loosely and mark the empty cylinder with "X" to indicate that it is empty.**
- 6. Attach regulator gauge apparatus to the full cylinder using open-end wrench.**
- 7. Close the red hose valve.**
- 8. Open the valve on the full cylinder completely, and then turn it back ¼ turn. (Note: Put your ear near the hose connection to listen for leaks.)**
- 9. The pressure on the gauge (the one closest to the cylinder) should read approximately 2,200 psi (15,000 kPa).**
- 10. The cylinder is now ready for balloon filling.**

E. Inspection:

- Visually inspect all cylinders annually, and report their condition.
- Return all empty cylinders to the manufacture as soon as possible.
- Relief devices shall be checked and calibrated for the required setting and operation and for corrosive service at least every 3 years.
- Do not use any cylinder (whether full or empty) that has remained on site over 5 years. Return it immediately to the manufacturer. Cycle in cylinder use so that the oldest cylinders are used first.

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V. References:

1. BBSS Launch Operations, PRO(BBSS)-022.
2. Pressure, Vacuum, and Cryogenic Systems, LANL LIR 402-1200-01-0
3. Compressed Gasses, LANL Technical Bulletin 1402

VI. Attachments:

None