WORKING SAFELY WITH COMPRESSED GAS CYLINDERS

PROGRAM SYNOPSIS:
Safety must be a worker's number one priority when handling, using and storing compressed gas cylinders. They present some very specific hazards that can be the source of serious injury. With the average cylinder weighing about 80 pounds, unsafe handling techniques result in thousands of sprains, strains, bruises and broken bones each year. In addition, various contents of gas cylinders can pose additional hazards: flammable or explosive gases, substances that displace breathable air or create a toxic atmosphere or gases that may be corrosive or toxic to the skin and eyes. This program reviews the safe work practices that can help workers prevent injuries and property damage when working with or around compressed gas cylinders.

Topics include preparing to handle cylinders, safe transportation and handling, securing cylinders, proper hook up, responding to leaks and cylinder storage.

PROGRAM OUTLINE:

PREPARING TO HANDLE CYLINDERS

- There are some precautions that should be taken before handling or using a compressed gas cylinder. First, you must start by donning the appropriate personal protective equipment for the task you intend to perform.

- Everyday shoes are no match for an 80-pound cylinder. Because of the danger that toes or feet could be crushed by a heavy tank, steel-toed boots or shoes are the minimum level of necessary foot protection.

- Even better and highly recommended is the addition of metatarsal guards. These guards help protect the delicate bones of the upper foot.

- Next, safety glasses with side shields are a minimum level of necessary eye protection when working with gas cylinders.

- When valves are opened, bled or discharged, the gas can be expelled with great force. Any debris or obstacles near the valve can become harmful projectiles that could cause an eye injury.

- Help protect hands from injury by donning leather gloves prior to handing a compressed gas cylinder.

- The contents of the cylinder will determine the ultimate level of protection required. For example, some cylinders contain super-cooled cryogenic liquids and some gases such as propane can be extremely cold when released.

- When handling cylinders containing these types of substances, goggles, a face shield and thermal gloves should be worn to prevent burns and frostbite.

- Always check the label to verify a cylinder's contents, its hazards and its safe handling procedures.

- For more detailed information such as any special transporting requirements, specific PPE or storage considerations; consult the substance's Safety Data Sheet.

- Do not use containers whose labels have been removed or are not legible. Follow your organization's policy for removing and replacing improperly labeled cylinders.

- Also, don't rely on a container's color to verify its contents. Different manufacturers may use different color-coding systems. Always read the label to accurately identify the contents of a compressed gas cylinder before use.

SAFE TRANSPORTATION & HANDLING

- One common reason for transporting a cylinder is to replace an empty cylinder with a full one. When this is the case, it's a good idea to disconnect and move the empty cylinder to its proper storage location before arriving with a full cylinder.

- This ensures that an open location is ready and available to immediately receive the newly arriving full cylinder.

• When preparing to move a cylinder, even for just a short distance, make sure its protective cap is on securely.

• The cap should also be in place anytime the cylinder is not in use, even when it's empty. This protects the cylinder's valve from damage should it fall or be struck accidentally.

• Valves damaged from falling or being struck by other objects may cause gas to leak or connecting devices to fit improperly.

• An unprotected valve may also be sheered off, causing a sudden release of gas under extreme pressure. So again, always install the valve's protective cap when a tank is not in use.

• A common mistake made by people wishing to move a heavy cylinder is to drag it along the ground while pulling it by the protective cap. This is a big mistake and should never be done.

• The threads can easily be damaged and are not designed to support the weight of the cylinder. The cap can suddenly pull loose and strike your face with great force.

• In addition, dragging a cylinder along the ground can damage it, causing uneven wear along the base. This type of uneven wear can cause a cylinder to be unstable and wobbly, making it more likely to fall over.

• To safely move a heavy compressed gas cylinder, a specially designed hand truck, cart or dolly that has been designed for this purpose should be used.

• When preparing to move a cylinder, the cylinder hand truck should be placed as close to the cylinder as practical to limit the distance the cylinder must be hand-rolled.

• Before maneuvering a tank onto or off of movable equipment, chock the wheels to ensure the equipment does not move during the process.

• Tilting a cylinder slightly while maintaining a firm grip can allow a cylinder to be safely moved a few feet by using your hands to create a rolling motion.

• Rolling the tank in this manner, instead of lifting it or sliding it, requires much less force and greatly reduces the risk of overstraining your back. Be sure to keep the tank close to your body while maintaining good posture with your knees slightly bent.

• You should only hand-roll a cylinder a very short distance. The heavy cylinder can be hard to control and is easy to drop.

• Use this method to carefully maneuver and place the tank onto the cart and then be sure to properly secure the tank to the cart before moving it.

• Connect the safety chain or strap as tightly as possibly to best limit any movement of the tank. Failing to secure a tank during transport can quickly lead to a serious injury and property damage.

• Attempting to catch a falling cylinder is a common cause of injury. Do not attempt to catch a falling tank. Instead, move away quickly to avoid being struck.

• Of course, every precaution should always be taken to ensure that a tank will not fall over.

• When traveling with a compressed gas cylinder, go slow and keep a constant watch for any hazards in your path as well as other moving equipment.

SECURING A CYLINDER

• When you arrive at your destination with a cylinder, it must be safely transferred to its intended location and then

immediately secured in place.

- Stop the cart as near to the destination as possible and then use the hand-rolling method to maneuver the tank into its intended location.

- Moving a tank over the lip or edge of various types of equipment and storage locations can be challenging. By using small movements and some patience, the tank can be placed into a position where it can be safely tilted into place.

- Always avoid deadlifting the full weight of the tank; it is simply too heavy to lift without risking injury. If you have trouble placing the tank, seek out assistance from your co-workers.

- Once in place, cylinders should be secured by straps or chains.

- A common mistake made when securing cylinders with chain is letting the chain hang loose. Loose chains allow too much movement of the tank.

- If you choose to use chains, make sure they are as snug as possible around the cylinder.

- Leave the safety cap in place until it is time to place the tank into service.

PROPER HOOK UP

- When a compressed gas cylinder is in place and ready for use, its safety cap may be removed so that the tank may be connected the operating system of the intended application. It's important that this connecting process be done properly to avoid any damage or injury.

- Remember that the safety cap and the tank are threaded. This means that the cap must twist off in order to remove it.

- Never use a pry bar to try and force off a stuck cap. This may damage the threads and may also damage or open the valve. Instead, use an adjustable strap wrench to apply more force to the cap.

- Before attaching anything to the valve, remove the plastic cap from the valve opening if one is present.

- If the cylinder contains a non-toxic gas, you may wish to make sure that the valve is free of dust or debris by briefly cracking it open to blow it out and then quickly closing it again.

- Most applications use a regulator to reduce the pressure of the compressed gas to a lower pressure that is safe to use within the operating system.

- Attach the regulator to the inlet connection and tighten appropriately.

- This connection should be tested for leaks with a non-petroleum based product. A common choice is a petroleum-free soap and water solution.

- Be aware that regulators can explode under pressure when they fail. It's a good idea to stand to the side and away from the regulator face when first opening the valve.

- Prior to removing a regulator from a cylinder, close the cylinder valve and bleed the pressure from the regulator.

CGA FITTINGS

- The various types of compressed gas connection fittings are marked with a number provided by the Compressed Gas Association or (CGA).

- The CGA designates certain gas fittings to be either left-hand threaded or right-hand threaded. The purpose of this is to prevent incompatible gas equipment from being connected to the wrong gas supply.

• Right-hand threaded fittings can be identified easily because they will have a smooth nut surface. Also, the second digit of their CGA number will always be an even number.

• Left-hand threaded fittings can also be identified easily. They will have a notched groove in the nut surface. Also, the second digit of their CGA number will always be an odd number.

• Never try to force a gas connection to fit. If you are having trouble with the connection, stop and seek out additional information before proceeding.

VALVES

• The tank valve provides a high-pressure connection directly to the compressed gas. As such, the valve itself and any connections to it must be properly installed and maintained to prevent leaks.

• Valves should be kept clean and free of obvious dirt and debris.

• Inspect valves before use. Do not open a valve that appears to be damaged or corroded. Damaged and corroded valves may not reseal properly once opened.

• Many valves, but not all, can be opened and closed by hand using the valve wheel.

• Always close the valve before transporting a cylinder, when work is complete and when the cylinder is empty.

LEAKS

• Gas leaks are a major safety concern when it comes to the use of compressed gas cylinders.

• Corroded, rusty and damaged cylinders can easily develop leaks and should be removed from service immediately.

• If you detect a leak while you're handling a cylinder, notify your supervisor and follow your organization's policy for having the leak repaired or the cylinder removed from service.

• Keep in mind that most valve-related leaks can be halted by a proper tightening of the connections using a properly-sized wrench or tightening tool.

• If you are unable to halt the flow of leaking gas, follow the protocols outlined in your facility's Emergency Action Plan. This may include notifying co-workers in the area to stay clear.

• If a leaking gas contains health hazards or is an explosion hazard, an evacuation of the area will be required.

STORAGE

• The proper storage of compressed gas cylinders is an important part of the safety process. Improperly stored cylinders can lead to worker asphyxiation, fire or explosion and high-pressure ruptures due to overheating.

• Cylinders should be stored in accordance with ISO Standard 11625 or CGA Pamphlet P-1. These are the recognized authorities on the safe storage of compressed gas cylinders.

• Cylinders should be secured and stored in areas specifically designated for that purpose. Storage areas should be protected from the weather and a safe distance away from any combustible materials.

• Cylinder storage areas must provide adequate access for workers to safely move and handle the cylinders.

• The temperature in these areas should never be allowed to exceed 125 degrees F.

• Also, cylinders should be stored upright with valve outlet seals and safety caps in place.

• Empty and full cylinders should be kept in separate areas.

- Storage areas should be inspected once or more each week for any indication of leaks or other problems.
- Flammable gases should also be separated from oxidizers, either by a wall or a distance of at least 20 feet.
- When storing LPG cylinders, they must not be transported or stored within 25 feet of any hot work operation.
- Never allow smoking or open flames in oxidizer or flammable gas storage areas.
- If you have any questions about how to properly store a certain type of compressed gas, refer to section 7 of its Safety Data Sheet for detailed storage information.

PREPARE FOR THE SAFETY MEETING
Review each section of this Leader's Guide as well as the program. Here are a few suggestions for using the program:

Make everyone aware of the importance the company places on health and safety and how each person must be an active member of the safety team.

Introduce the program. Play it without interruption. Review the program content by presenting the information in the program outline.

Copy the review questions included in this Leader's Guide and ask each participant to complete them.

Make an attendance record and have each participant sign the form. Maintain the attendance record and each participant's test paper as written documentation of the training performed.

Here are some suggestions for preparing your video equipment and the room or area you use:

Check the room or area for quietness, adequate ventilation and temperature, lighting and unobstructed access.

Check the seating arrangement and the audiovisual equipment to ensure that all participants will be able to see and hear the program.

CONDUCTING THE PRESENTATION
Begin the meeting by welcoming the participants. Introduce yourself and give each person the opportunity to become acquainted if there are new people joining the training session.

Explain that the primary purpose of the program is reviews the safe work practices that can help workers prevent injuries and property damage when handling, using or storing compressed gas cylinders.

Introduce the program. Play it without interruption. Review the program content by presenting the information in the program outline.

Lead discussions about specific compressed gas cylinders and their contents that are handled, used and stored at your facility and the precautions workers must take to prevent injuries and property damage.

After watching the program, the viewer should be able to explain the following:

- How to prepare for handling compressed gas cylinders;
- How to safely transport and handle cylinders;
- How to secure a cylinder properly;
- What to do if a leak has been detected;
- How to properly store cylinders.

WORKING SAFELY WITH COMPRESSED GAS CYLINDERS
REVIEW QUIZ

Name_____Date_____

Please provide answers to the following to show how well you understand the information presented during this program.

1. Safety glasses with side shields are a minimum level of necessary eye protection when working with gas cylinders.

a. True
b. False

2. Why should you refrain from dragging a cylinder by its protective cap to move it?

a. The threads can be easily damaged
b. The cap can suddenly pull loose and strike your face
c. It can cause uneven wear along the cylinder's base
d. All of the above

3. You should only hand roll a cylinder a very short distance.

a. True
b. False

4. You should only attempt to catch a falling cylinder if it is falling toward you.

a. True
b. False

5. You should always avoid deadlifting the full weight of a cylinder.

a. True
b. False

6. The second digit of a right-hand fitting's CGA number will always be _____.

a. Even
b. Odd

7. Damaged or corroded valves should only be opened if the contents of a cylinder are both nonflammable and nontoxic.

a. True
b. False

8. If a leaking gas from a cylinder contains health hazards or is an explosion hazard, an evacuation of the area is required.

a. True
b. False

9. Flammable gases should be separated from oxidizers by a wall or a distance of at least 10 feet.

a. True
b. False

10. If you have questions about the storage of a compressed gas, you should refer to _____ of its Safety Data Sheet.

a. Section 3
b. Section 7
c. Section 11

ANSWERS TO THE REVIEW QUESTIONS

1. a

2. d

3. a

4. b

5. a

6. a

7. b

8. a

9. b

10. b