WORKING SAFELY WITH COMPRESSED GAS CYLINDERS

This easy-to-use Leader’s Guide is provided to assist in conducting a successful presentation. Featured are:

INTRODUCTION: A brief description of the program and the subject that it addresses.

PROGRAM OUTLINE: Summarizes the program content. If the program outline is discussed before the video is presented, the entire program will be more meaningful and successful.

PREPARING FOR AND CONDUCTING THE PRESENTATION: These sections will help you set up the training environment, help you relate the program to site-specific incidents, and provide program objectives for focusing your presentation.

REVIEW QUESTIONS AND ANSWERS: Questions may be copied and given to participants to document how well they understood the information that was presented. Answers to the review questions are provided separately.

ATTENDANCE RECORD: Document the date of your presentation as well as identify the program participants. The attendance record may be copied as needed.

INTRODUCTION

Stored compressed gases are used in many industrial, manufacturing, medical and scientific applications. Safety procedures and precautions must be followed and observed to prevent stored gas hazards from turning work environments into safety and health disaster areas.

This program reviews the types of hazards pose by different types of gases; the methods of compressing and storing gases; handling compressed gas cylinders, regulating the release of gas; connecting cylinders to service lines and fixtures; and, controlling gas leaks.

PROGRAM OUTLINE

COMPRESSION METHODS
1) Standard Compression: Substances such as oxygen are kept in their gaseous form.

2) Liquid Compression: Gases such as pro-pane are compressed into liquids.

3) Dissolved in Solvent: Acetylene is the only gas stored in this manner.

4) Cryogenic Liquid Gases: Gases such as argon are super-cooled into a liquid.

DETERMINING HAZARDS
• Reading warnings and labels is the only sure way to determine the contents of gas cylinders.

• Toxic gases such as carbon monoxide and phosphine can lead to poisoning.

• Flammable gases such as hydrogen and propane can be ignited by sparks and flames.

• Oxidizing gases react violently with other materials or sources of ignition leading to fires and explosions.

• Corrosive gases can burn skin and damage materials.
• Gases such as nitrogen, argon and helium can rapidly displace breathable air and cause suffocation.

• Exposure to extremely cold cryogenic gases can cause severe skin burns and make valve washers brittle.

• Cryogenic gas greatly expands when released into environmental air; exposure prevention methods are provided in Material Safety Data Sheets.

STORING COMPRESSED GASES
• Cylinders must be chained securely to prevent them from falling or slipping, which may damage the cylinders.

• Store cylinders out of direct sunlight, especially in high temperature areas.

• Separate cylinders containing flammables and oxidizers with a wall or by a distance of 20 feet.

• Store flammables and combustibles away from potential ignition sources, including smoking materials.

HANDLING GAS CYLINDERS
• Use a sturdy hand cart to move cylinders more than a few feet.

• Secure the safety cap to protect the cylinder valve. Always wear safety shoes and don’t attempt to catch a falling cylinder.

• Take the safety cap off only when the cylinder is ready to be connected.

• Don’t pry the cap off; you might damage the valve with the prying instrument you use.

WITHDRAWING GAS
• Regulators reduce the flow rate of gas out of the cylinder to safe levels.

• CGA fittings are matched with specific gases to connect the regulator to the system in order to deliver the right gas.

• The Pressure Relief Device (PRD) bleeds off excess cylinder pressure in a controlled manner; cylinders containing toxic or poisonous gas are not equipped with a PRD.

• Flame arrestors are used on cylinders to prevent flashback that can result in ignition of cylinder contents.

PREVENTING/CONTROLLING LEAKS
• Check for leaks using the soap bubble test.

• Tightening fittings with a wrench will stop most leaks.

• Alert workers in the area of a leak; do not unplug electrical equipment if leaking gas is flammable. This could lead to a spark that ignites an explosion.
• Enter a leak area while wearing self-contained breathing apparatus if you are authorized to do so; have a backup crew standing by.

• Use one of two planned escape routes to evacuate a leak area. Always follow your organization’s emergency plan and consult the MSDS for information about the leaking gas.

**SUMMARY**
• Check the hazards of compressed gases you use.

• Read compressed gas cylinder tags and labels.

• Check for leaks while connecting compressed gas cylinders. Prevent flashback that can result in ignition of cylinder contents.

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PREPARE FOR THE SAFETY MEETING OR TRAINING SESSION
Review each section of this Leader's Guide as well as the videotape. 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 videotape program. Play the videotape 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.

Copy the attendance record as needed 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 videotape 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 videotape program.

Place or secure extension cords to prevent them from becoming a tripping hazard.

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 to review proper procedures and techniques for the safe handling, storage and use of compressed gases in cylinders.

Introduce the videotape program. Play the videotape without interruption. Review the program content by presenting the information in the program outline. Lead discussions about job-related accidents that have resulted from improper handling, storage or use of compressed gas cylinders. Use the review questions to check how well the program participants understood the information.

After watching the videotape program, the viewer will be able to identify the following:

• The nature of the safety and health hazards posed by commonly-used compressed gases.

• Techniques for controlling and preventing potential hazards of compressed gases;

• How to safely store and handle cylinders, withdraw gas from them and control their leaks.
WORKING SAFELY WITH COMPRESSED GAS CYLINDERS

REVIEW QUESTIONS

Name ____________________________ Date ______________________

The following questions are provided to determine how well you understand the information presented in this program.

1. The method for compressing acetylene is _____________________.
   a. standard compression
   b. dissolved in solvent
   c. cryogenic
   d. liquid compression

2. The only accurate way to determine a gas cylinder’s contents without chemical testing is to _____________________.
   a. check the cylinder color
   b. check the MSDS that comes with the cylinder
   c. check the cylinder’s warning labels and tags
   d. perform a “sniff” test

3. A compressed gas that reacts violently with other materials or ignition sources to cause fires and explosions is considered _________________.
   a. flammable
   b. oxidizing
   c. corrosive
   d. toxic

4. A cylinder must be ________________ securely to keep it from falling or slipping.

5. When moving a cylinder more than a few feet, _________________________.
   a. use a forklift
   b. roll the cylinder on its end
   c. secure the cylinder to a hand cart

6. Which of the following regulates gas flow out of a cylinder?
   a. flame arrestor
   b. CGA fitting
   c. regulator
   d. pressure relief device

7. The simplest yet most effective way to test for gas leaks on the cylinder valve is _________________.
   a. using an electronic monitoring device
   b. a swatch test
   c. to feel for the gas against your hand
   d. a soap bubble test

8. The best source of information about hazard prevention and health effects of a compressed gas is _________________.
   a. cylinder warnings and tags
   b. MSDS for specific gas
   c. your supervisor
   d. co-workers
ANSWERS TO THE REVIEW QUESTIONS

1. b
2. c
3. b
4. chained
5. c
6. c
7. d
8. b