

## (8) Chemicals

### (8.1) Air Contaminants

- **Purpose and Scope**

This section of the safety manual aims to protect all employees at [Your Company Name] from exposure to harmful air contaminants. It applies to all activities where air contaminants may be released.

- **Identification of Air Contaminants**

Air contaminants include, but are not limited to, dust, fumes, mist, vapors, and gases. The specific contaminants present in our workplace are listed in [specific document/section of the manual], with their associated hazards, permissible exposure limits (PELs), and control measures.

- **Permissible Exposure Limits**

All employees' exposure to any substance listed per Osha's standard in Table Z-1, Z-2, or Z-3 of 29 CFR 1910.1000 will not exceed the limits specified in these tables.

[1910.1000 TABLE Z-1 - --ABLE Z-1 Limits for Air Contaminants | Occupational Safety and Health Administration \(osha.gov\)](#)

- **Exposure Monitoring**

Regular monitoring of air quality will be conducted in all areas where exposure to air contaminants is possible. Results of monitoring will be documented and kept on record.

- **Engineering and Administrative Controls**

Engineering controls (e.g., local exhaust ventilation) and administrative controls (e.g., rotating jobs to limit exposure time) will be used to keep air contaminant levels below the PELs. If these controls are not sufficient, appropriate respiratory protection will be provided.

- **Personal Protective Equipment**

When necessary, suitable respiratory protection will be provided and used. Employees required to use respiratory protection will be trained in its proper use, care, and limitations. This will be covered in more detail in the respiratory protection section within PPE.

- **Employee Training and Information**

Employees will receive training on the hazards of air contaminants, the results of exposure monitoring, the correct use of PPE, and procedures for emergencies.

- **Medical Surveillance**

Employees exposed to air contaminants at or above the action level for a specified substance will be included in a medical surveillance program.

- **Recordkeeping**

Records of exposure monitoring, medical surveillance, and training will be maintained as required by OSHA standards.

## **(8.2) Compressed Gases**

- **Purpose and Scope**

The purpose of this section is to set forth procedures for the safe handling, storage, and use of compressed gases at [Your Company Name] to protect employees and property.

- **Compressed Gas Classification**

Detailed information on the types of gases in use (flammable, non-flammable, toxic, etc.) and their specific hazards will be provided.

- **Cylinder Handling**

### Proper Transporting

When transporting cylinders, always use a hand truck or cart designed for cylinder transport. Do not attempt to carry or manually transport a cylinder. Do not drag, roll, slide or drop cylinders. When moving, always keep the valve protection cap in place and ensure the cylinder is secured on the hand truck or cart.

### Securing the Cylinders

When not in use, or if being stored, cylinders should always be secured. This can be achieved using a rack, strap, chain or stand designed to prevent the cylinder from falling. The cylinders should always be stored upright.

### Use the Correct Equipment

Always use the correct regulator for the cylinder. Do not attempt to force a connection that doesn't fit. The regulator and valve fittings are gas-specific and not interchangeable.

### Open Valves Safely

Open the valve slowly and carefully. Standing to the side of the valve while opening it can prevent injury in case of an unexpected release of high pressure.

### Regular Inspection

Always check for leaks when installing a new cylinder. Never use a cylinder that appears damaged, is leaking or has a faulty valve or regulator.

#### Personal Protective Equipment

Wear safety glasses with side shields whenever handling or using compressed gases. Depending on the specific gas, other PPE such as gloves, lab coats, or respiratory protection may be required.

#### Empty Cylinders

Label or tag empty cylinders as "Empty". Close the cylinder valve and replace protective caps.

#### Training

Training is essential for any employee who handles compressed gases. They should understand the risks and the correct procedures for handling, transporting, and storing cylinders.

- **Cylinder Storage**

##### Storage Location

Compressed gas cylinders should be stored in a well-ventilated, dry, and secure area. The storage area should be kept at a cool and consistent temperature, away from sources of heat, ignition, or direct sunlight.

##### Securing Cylinders

Cylinders should be stored upright and always secured to prevent tipping, falling, or rolling. Secure cylinders with chains, straps, or a suitable cylinder rack.

##### Cylinder Separation

Different types of gas cylinders should be stored separately. Flammable gases should be stored at least 20 feet away from combustible materials or separated by a non-combustible barrier at least 5 feet high. Oxygen cylinders should be stored at least 20 feet away from flammable or combustible materials.

##### Cylinder Caps

When not in use, full or empty, cylinder valve protection caps should always be in place.

#### Empty Cylinders

Empty cylinders should be stored separately from full cylinders and should be marked as "Empty".

#### Access and Signage

The storage area should be clearly marked with appropriate hazard signage and easily accessible in case of emergency. Access to cylinders should be restricted to authorized personnel.

#### Inspection

Regularly inspect the storage area for any potential hazards including leaks, rust, dents, or other forms of cylinder damage.

#### Ventilation

Indoor storage rooms should be appropriately ventilated to prevent the accumulation of gas in case of a leak.

#### Compliance with Local Fire Codes

Always comply with local fire codes when storing compressed gas cylinders

- **Cylinder Use**

#### Pre-Use Inspection

Before use, all cylinders should be inspected for any sign of damage, corrosion, leakage, or defective valve. Never attempt to repair a cylinder or valve; if you identify any issues, tag the cylinder as faulty and inform your supervisor or the Safety Manager immediately.

#### Identification

Always check the label on the cylinder to verify the type of gas and its hazards. Never rely on the color of the cylinder for identification.

#### Regulator Attachment

Attach the appropriate regulator to the cylinder. Ensure that the regulator is in good condition and is the correct one for the specific type of gas being used. Never force connections that do not fit.

## Valve Operation

When opening the cylinder valve, stand to the side of the regulator and open it slowly. Never open a gas cylinder valve quickly or fully; this can damage the regulator and cause an uncontrolled release of gas.

## Equipment Connection

After opening the valve, check the connection to the equipment to ensure that it's secure and there are no leaks. Use a leak-detection solution to check for leaks; never use a flame.

## Cylinder Use

Always use cylinders in an upright position unless they are designed for other positions. Do not expose cylinders to temperatures above 50°C (122°F) or any ignition source.

## Gas Release

When you have finished using the gas, close the cylinder valve before disconnecting the equipment. Release any residual gas in the regulator in a well-ventilated area and away from any ignition sources.

## Cylinder Change-Out

When a cylinder becomes empty (never fully empty a gas cylinder, leave a small positive pressure), close the cylinder valve, release the pressure from the regulator, disconnect the regulator, and then replace the cylinder cap.

## Personal Protective Equipment (PPE)

Always use the appropriate PPE when handling and using compressed gas cylinders. This can include safety glasses, gloves, and safety shoes. For some gases, respiratory protection may also be necessary.

- **Inspection and Maintenance**

### Regular Inspections

Conduct regular inspections of compressed gas cylinders and their accompanying equipment. These inspections should be carried out by

competent personnel and the frequency of inspections should be determined based on the specific usage and environment.

#### Cylinder Inspection

Inspect the cylinder for any signs of leaks, corrosion, dents, bulges, or other signs of damage. Check that the safety cap is in place when the cylinder is not in use. Always make sure that the gas label is clear and intact. A cylinder should not be used if any of these checks fail.

#### Valve Inspection

Inspect the valve for signs of damage, dirt, or debris. Check for leaks using a soapy water solution. Never use a flame to check for leaks as this can lead to an explosion. The valve should operate smoothly; if it does not, the cylinder should not be used.

#### Regulator Inspection

Inspect the regulator for signs of damage, wear, or oil/grease. Oil and grease are potential sources of combustion with some gases. Check the regulator's pressure gauges to ensure they are functioning correctly. If a regulator is faulty, it should be replaced immediately.

#### Maintenance

Maintenance should be carried out by competent personnel only. This includes repairing any minor damage, replacing worn-out parts, and regularly testing equipment for functionality. Never attempt to repair a cylinder or valve yourself; this should only be done by the gas supplier or a qualified repair service.

#### Storage Area Inspection

Regularly inspect the storage area for compliance with safety regulations. This includes checking for adequate ventilation, proper cylinder segregation, good housekeeping, and appropriate safety signage.

#### Documentation

Keep detailed records of all inspections and maintenance activities. This documentation can be important for identifying recurring problems, demonstrating compliance with safety regulations, and providing evidence of due diligence in the event of a workplace incident.

- **Training and Education**

Basic Awareness Training:

The initial part of training should be basic awareness about the nature of compressed gases, the types of gases used in your workplace, their potential hazards (flammability, toxicity, corrosiveness, etc.), and the safety measures required.

Cylinder Handling and Storage:

Training should cover correct handling and storage procedures for compressed gas cylinders, including how to safely move cylinders, the importance of keeping cylinders upright and secured, and the correct methods for storing full and empty cylinders.

Use of Compressed Gases:

Employees should be trained on how to correctly use compressed gases, including how to safely open cylinder valves, attach and adjust regulators, and check for leaks. They should also learn how to correctly shut down and disconnect cylinders.

Personal Protective Equipment (PPE):

Training should include information on the necessary PPE when handling and using compressed gases. This can include safety glasses, gloves, and safety shoes. For some gases, respiratory protection may also be necessary. Employees should be trained in the correct use, maintenance, and limitations of any PPE they are required to use.

Emergency Procedures:

Employees need to know what to do in case of an emergency involving compressed gases, such as a major leak or a fire. This includes knowing evacuation procedures, how to use fire extinguishers, and how to report incidents.

Inspection and Maintenance:

Those responsible for inspection and maintenance should receive specific training for these tasks. This can include how to inspect cylinders and regulators for damage or leaks, how to safely replace regulators, and the procedures for tagging and removing faulty equipment.

Regular Refresher Training:

Finally, training should not be a one-time event. Regular refresher courses should be held to ensure that employees' knowledge remains up-to-date, especially when new gases or equipment are introduced, or when procedures are updated.

- **Emergency Procedures**

- Leak or Release

- Immediate Actions: If a leak or release of a compressed gas is detected, immediately notify your supervisor and the site safety officer. Do not attempt to repair a leak unless you have been trained to do so.

- Evacuation: If the leak poses an immediate threat (flammable, toxic, etc.), evacuate the area and activate the nearest fire alarm pull station. Follow established evacuation routes to move to a safe area.

- Ventilation: If it's safe to do so, increase ventilation to the area to disperse the gas, but only if this will not pose a risk of explosion.

- Fire Involving Compressed Gases

- Immediate Actions: If a fire involves compressed gas cylinders, activate the nearest fire alarm pull station and evacuate the area immediately. Call 911 or your local emergency response number.

- Information for Responders: Inform emergency responders about the presence and type of compressed gases involved in the fire.

- Cylinder Damage or Failure

- Immediate Actions: If a compressed gas cylinder is damaged or fails (e.g., valve break), evacuate the area and notify your supervisor and the site safety officer. Do not attempt to repair or move damaged cylinders.

- Emergency Contacts

- Internal: Have a list of internal emergency contacts (e.g., safety officer, facilities manager).

- External: Have a list of external emergency contacts (e.g., local fire department, local hospital, gas supplier).

## Training



All personnel who work with or near compressed gases must receive training on these emergency procedures. They must know how to respond to a leak or release, a fire involving compressed gases, or cylinder damage/failure. This training must be documented and refreshed on a regular basis.

#### Drills

Periodic emergency drills involving scenarios with compressed gases will help ensure that all employees know what to do in an actual emergency.

As always, consult with a safety professional to ensure your emergency procedures are comprehensive and in compliance with OSHA and other relevant safety regulations.

### **(8.3) Flammable Liquids**

- **Overview**

This section of the safety manual addresses the safe handling, storage, and use of flammable liquids, as governed by OSHA regulations.

- **Definition of Flammable Liquids**

Flammable liquids are those with a flashpoint of not more than 199.4°F (93°C). They are classified as Class I liquids, subdivided into Class IA, IB, and IC.

- **Safe Handling Procedures**

Transportation: Use safety cans or an approved closed container when transporting flammable liquids.

Dispensing: When transferring flammable liquids from one container to another, bond and ground containers to prevent static electricity sparks.

Usage: Use flammable liquids in a well-ventilated area, away from ignition sources, and only use the minimum amount needed for the task.

- **Storage Procedures**

Flammable liquids must be stored in approved containers that meet the requirements of OSHA regulations and the National Fire Protection Association (NFPA). Containers should be clearly labeled with the type of liquid and the hazard it presents.

#### **Storage Cabinets**

**Design:** Flammable liquid storage cabinets must meet design specifications according to OSHA standards. This includes a double-walled steel body and doors, three-point door latch, and a spill containment sump.

**Capacity:** The total capacity of flammable liquids within a cabinet must not exceed the maximum capacity for which the cabinet is designed.

**Location:** Cabinets should be located at a safe distance from ignition sources and in areas with adequate ventilation.

### **Storage Rooms**

When the quantity of flammable liquids exceeds the amount allowed in storage cabinets, a dedicated storage room is required. This room must be constructed to meet OSHA regulations, be properly ventilated, and equipped with automatic fire-suppression systems.

### **Storage Practices**

**Segregation:** Flammable liquids must be segregated from incompatible substances.

**Sealing:** Containers should be kept sealed when not in use to prevent the release of flammable vapors.

**Quantity:** Keep only the minimum necessary quantity of flammable liquids at the workplace.

- **Personal Protective Equipment (PPE)**

PPE for handling flammable liquids may include flame-resistant clothing, safety glasses, and chemical-resistant gloves. Specific PPE requirements will depend on the task and the specific liquid being handled.

- **Training and Education**

All employees who handle flammable liquids must receive training on their hazards, handling procedures, and emergency procedures. This training must be documented.

- **Emergency Procedures**

In the event of a spill or fire involving flammable liquids, employees should follow the company's established emergency procedures, which may include evacuation, fire alarm activation, and notification of emergency responders.

- **Spill or Leak**

**Immediate Actions:** If a spill or leak of a flammable liquid occurs, the individual discovering the spill should immediately alert their supervisor

and the designated safety officer. Do not attempt to clean a large spill unless you are trained to do so.

**Evacuation:** If the spill poses a significant threat, such as a large quantity or highly flammable substance, evacuate the area following the company's' evacuation procedure.

**Containment:** If it's safe and you are trained to do so, use appropriate absorbent materials to contain the spill, preventing it from spreading to drains or other areas.

- **Fire Involving Flammable Liquids**

**Immediate Actions:** If a fire involves flammable liquids, activate the fire alarm, and evacuate the area immediately. Call the emergency response number (911 or your designated number).

**Extinguishing:** Do not attempt to extinguish the fire unless you are trained to do so and it's safe. Flammable liquid fires require specific types of fire extinguishers (typically Class B).

- **Emergency Contacts**

**Internal:** Have a list of internal emergency contacts (e.g., safety officer, facilities manager).

**External:** Have a list of external emergency contacts (e.g., local fire department, local hospital, chemical supplier).

- **Training**

All personnel who work with or near flammable liquids must receive training on these emergency procedures. This training must be documented and refreshed on a regular basis.

- **Drills**

The company will conduct periodic emergency drills involving scenarios with flammable liquids to ensure all employees know what to do in an actual emergency.

- **Inspections and Maintenance**

Regular inspections should be conducted to identify potential safety hazards, such as leaking containers or improper storage. Maintenance activities should also be carried out as needed to keep safety equipment in good working order.

- **Routine Inspections**

Frequency: Conduct routine inspections of all areas where flammable liquids are stored and used. These should occur weekly, with more thorough inspections occurring on a monthly basis.

Checklist: Inspections should follow a detailed checklist that includes condition of storage containers and cabinets, condition of safety equipment (e.g., fire extinguishers), proper labeling of containers and storage areas, and signs of leaks or spills.

Documentation: All inspections should be documented, noting any deficiencies and the steps taken to correct them.

- **Maintenance Activities**

Scheduled Maintenance: Regularly scheduled maintenance activities should be carried out on all equipment used in the handling, storage, and use of flammable liquids. This includes pumps, ventilation systems, and safety equipment.

Repairs: Any deficiencies identified during inspections or regular use should be repaired promptly by qualified personnel. Any equipment awaiting repair should be taken out of service until the repairs are completed.

Replacement: Any equipment or containers that cannot be repaired should be replaced.

- **Training**

Inspection Training: All staff involved in the inspections must be adequately trained on what to look for, how to assess the condition of equipment, and what constitutes a deficiency.

Maintenance Training: Maintenance staff should be thoroughly trained on the proper procedures for maintaining and repairing all equipment associated with flammable liquids.

- **Record Keeping**

Maintain records of all inspections and maintenance activities. These records must be kept for a minimum of three years or as dictated by your local regulations or internal policies.

#### **(8.4) Process Safety Management (PSM) for Chemical Handling**

- **Employee Participation**

Employees must be involved in all aspects of process safety management, with clear lines of communication established between management and employees.

- **Process Safety Information**

Comprehensive information about the chemicals, process technology, and process equipment should be compiled and accessible to employees. This includes chemical data (toxicity, reactivity, etc.), safety systems, and equipment information.

- **Process Hazard Analysis (PHA)**

Conduct regular PHA studies to identify and analyze potential hazards associated with the processing or handling of highly hazardous chemicals.

- **Operating Procedures**

Written procedures outlining steps for safely conducting activities associated with each covered process must be developed, updated, and communicated to employees.

- **Training**

Employees involved in operating the process must receive training on their role in safety procedures and an understanding of the process itself.

- **Contractors**

Contractors performing work on or near a covered process must be informed of the nature of the process, potential hazards, and the process elements for which they will be responsible.

- **Pre-Startup Safety Review (PSSR)**

Before a new process or a change in a process is implemented, a PSSR is necessary to ensure safety features, procedures, personnel, and equipment are prepared and adequate.

- **Mechanical Integrity**

Procedures must be established to maintain the ongoing integrity of process equipment.

- **Hot Work Permit**

A permit system for hot work (work that could provide a source of ignition) must be developed and implemented.

## HOT WORK PERMIT

### Job Details:

1. **Work Order Number:** \_\_\_\_\_
2. **Description of Job:** \_\_\_\_\_
3. **Date and Time of Work:** \_\_\_\_\_
4. **Location of Work:** \_\_\_\_\_
5. **Type of Hot Work (welding, grinding, cutting, etc.):** \_\_\_\_\_

### Pre-Work Safety Checks:

1. **Are flammable materials and ignitable debris removed from the area?** (Yes/No)
2. **Have flammable liquids, dust, and gases within 35 ft been removed?** (Yes/No)
3. **Is fire-resistant shielding in place to protect remaining flammables?** (Yes/No)
4. **Have walls, floors, and ceilings been checked for fire hazards?** (Yes/No)
5. **Have arrangements been made for a fire watch during and after hot work?** (Yes/No)
6. **Is appropriate fire extinguishing equipment available and ready?** (Yes/No)

### PPE & Equipment:

1. **Is required personal protective equipment available and in good condition?** (Yes/No)
2. **Is hot work equipment in good repair?** (Yes/No)

### Signatures:

1. **Person Conducting Hot Work:** \_\_\_\_\_ (Sign and date)
2. **Work Area Supervisor:** \_\_\_\_\_ (Sign and date)
3. **Safety Officer:** \_\_\_\_\_ (Sign and date)

### Upon completion of the hot work

1. **Fire Watch Verification:** (Signature, time, and date after a minimum 30-minute watch post work)
2. **Work Completion:** \_\_\_\_\_ (Sign and date when work is complete)

Note: This permit is valid only for the work, date, and time specified above. Post this permit in the work area during the entire operation.

- **Management of Change**

Written procedures to manage changes in process chemicals, technology, equipment, and facilities must be in place.

- **Incident Investigation**

Investigate any incident that resulted in, or could have resulted in, a catastrophic release of a highly hazardous chemical.

- **Emergency Planning and Response**

Establish and implement an emergency action plan for dealing with accidental releases of hazardous chemicals.

- **Compliance Audits**

Regular audits must be conducted to verify that the provisions of PSM are being implemented.

- **Trade Secrets**

Employers must make all information necessary to comply with the standard available to those persons responsible for compiling the process safety information, those assisting in the development of the process hazard analysis, those responsible for developing the operating procedures, and those involved in incident investigations, emergency planning and response, and compliance audits.

## **(8.5) Silica**

- **Policy Statement:**

At [Your Company Name], we are committed to ensuring the health and safety of our employees. We adhere strictly to all regulatory standards set forth by OSHA, including those for respirable crystalline silica, to minimize exposure and potential health risks.

- **Scope and Application:**

This policy applies to all employees who are potentially exposed to respirable crystalline silica as a part of their work processes at [Your Company Name].

- **Hazard Identification:**

Crystalline silica is a common mineral found in materials like sand, stone, concrete, and mortar. When these materials are cut, ground, drilled, or otherwise disturbed, they can generate tiny particles known as respirable crystalline silica, which can be harmful if inhaled.

- **Exposure Control Plan:**

Engineering Controls: [Your Company Name] will implement engineering controls, such as water delivery systems or ventilation systems, to reduce and maintain employee exposure to respirable crystalline silica below the permissible exposure limit (PEL).

Work Practices: [Your Company Name] will establish and enforce good work practices to minimize silica dust generation and limit exposure. This includes practices like avoiding dry sweeping where possible and using HEPA-filtered vacuuming systems.

Housekeeping: [Your Company Name] will implement regular housekeeping practices to remove silica dust from the workplace.

- **Personal Protective Equipment (PPE):**

When engineering and administrative controls are not enough to limit exposure, [Your Company Name] will provide appropriate respiratory protection and protective clothing to further reduce the risk of exposure.

- **Training and Education:**

All employees who may be exposed to respirable crystalline silica will receive training on the health hazards associated with silica exposure, workplace tasks that can result in exposure, and proper use and care of protective equipment.

- **Medical Surveillance:**

[Your Company Name] will make available medical exams, including chest X-rays and lung function tests, to all employees who are required to wear a respirator for 30 or more days per year due to silica exposure.

- **Recordkeeping:**

[Your Company Name] will maintain records of all air monitoring data, medical surveillance data, and training documentation as required by the OSHA standard.