31. MATERIALS HANDLING

Table of Contents

31.1. INTRODUCTION 1
31.1.1. Purpose 1
31.1.2. Awareness 1
31.2. GENERAL 2
31.2.1. Potential Hazards 2
31.2.2. Moving Materials Mechanically 2
31.2.3. Storage Hazards 2
31.2.4. Manual Lifting and Material Handling 3
31.3. CYLINDERS AND CONTAINERS 3
31.3.1. General 3
31.3.2. Handling Cylinders 4
31.3.3. Operating Cylinders 4
31.4. MATERIALS HANDLING 7

31.1. INTRODUCTION

NOTE

For additional information pertaining to requirements regarding Materials Handling reference the following sources:

a. 29 CFR 1910.101, Compressed Gases
b. NFPA 45 – Fire Protection for Laboratories Using Chemicals
c. NFPA 55 – Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders

31.1.1. Purpose

This section establishes the requirements for materials handling and storage, which are vital to the operations of the SPR. The improper handling and storing of materials can result in personally and financially costly injuries. Handling and storing materials involve operations such as:

a. hoisting with a crane,
b. driving a truck loaded with materials,
c. loading and carrying bags or materials manually, and
d. stacking palletized bricks or other materials such as drums, lumber, etc.

31.1.2. Awareness

All MOC employees and subcontractors will be trained in proper materials handling procedures during their safety and orientation training. They should be aware of the following:

a. Proper work practices,
b. Equipment and controls,
c. When to move materials mechanically or manually, and
d. Potential hazards associated with material handling.
e. Proper lifting techniques

31.2. GENERAL

31.2.1. Potential Hazards

a. The majority of back injuries result from improperly carrying heavy or bulky materials
b. All employees should be trained in the proper lifting techniques in order to prevent injury.
c. Ensure materials are properly stacked to prevent falling materials which contribute to fractures, bruises, and cuts
d. Recognize potential hazards when conducting the PPE Hazard Assessment.
e. Upon completion of the PPE Hazard Assessment, ensure PPE is worn and other potential hazards not noted are annotated.

31.2.2. Moving Materials Mechanically

Using mechanical equipment to move and store materials may increase the potential for employee injuries.

a. Never operate a mechanical lifting device without proper pre-use training and/or certification.
b. Be aware of both manual handling safety concerns and safe equipment operating techniques.
c. Avoid overloading equipment when moving materials mechanically by letting the weight, size, and shape of the material being moved dictate the type of equipment used.
d. All materials-handling equipment has rated capacities that determine the maximum weight the equipment can safely handle and the conditions under which it can handle that weight.
e. Ensure that the equipment-rated capacity is displayed on each piece of equipment and is not exceeded except for load testing.

NOTE
All crane, forklift, and rigging operations must follow the DOE Hoisting and Rigging Manual, OSHA, applicable ANSI standards, and MOC operating requirements.

f. The list below provides some general information employees should follow.
   1. Center the load on the forks as close to the mast as possible to minimize the potential for the lift truck tipping or the load falling,
   2. Avoid overloading a lift truck because it impairs control and causes tipping over,
   3. Do not place extra weight on the rear of a counterbalanced forklift to allow an overload,
   4. Adjust the load to the lowest position when traveling,
   5. Follow the truck manufacturer’s operational requirements.
   6. Pile and cross-tier all stacked loads correctly when possible.

31.2.3. Storage Hazards

a. Be aware of factors such as height and weight of the materials to be stored.
b. To prevent storage hazards:
   1. Keep storage areas free from accumulated materials that cause tripping, fires, or explosions, or that may contribute to the harboring of rats and other pests,
   2. Place stored materials inside buildings that are under construction and at least 6 feet from hoist ways, or inside floor openings and at least 10 feet away from exterior walls,
   3. Separate non-compatible material,
   4. Wear appropriate fall protection if needed,

5. Consider placing bound material on racks, and secure it by stacking, blocking, or interlocking to prevent it from sliding, falling, or collapsing.

31.2.4. Manual Lifting and Material Handling

Employees assigned to job tasks requiring manual lifting and material handling shall use the buddy system or appropriate lifting devices for excessive, frequent, or awkward loads, as well as for loads weighing 50 pounds and greater.

NOTE
The 50 pound lifting rule does not apply to personnel during a rescue situation (i.e. carrying a stretcher, moving victim to safety, etc.)

31.3. CYLINDERS AND CONTAINERS

31.3.1. General

a. Compressed gas cylinders shall be legibly marked with either the chemical or the trade name of the gas.
   1. Marking will be by stenciling, stamping, or labeling, and will not be readily removable.
   2. Whenever practical, labeling will be located on the shoulder of the cylinder.
b. Cylinders shall be kept away from operations that create sparks, heat, or fire, as well as electrical circuits.
c. Inside buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location at least 20 feet (6.1 m) from highly combustible materials such as oil or excelsior.
   1. Cylinders should be stored in assigned places away from elevators, stairs, or gangways.
   2. Assigned storage spaces shall be located where cylinders will not be knocked over or damaged by passing or falling objects, or be subject to unauthorized tampering.
   3. Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.
d. Valves shall be closed on empty cylinders.
e. Valve protection caps, where the cylinder is designed to accept a cap, shall always be in place, hand-tight, except when cylinders are in use or connected for use.
f. Inside a building, fuel-gas cylinders, except those in actual use or attached ready for use, shall be limited to a total gas capacity of 2,000 cubic feet (56 m3) or 300 pounds (135.9 kg) of liquefied petroleum gas.
g. Acetylene cylinders shall always be stored valve end up.
h. Oxygen cylinders shall not be stored near highly combustible material (especially oil and grease), nor near reserve stocks of carbide and acetylene or other fuel-gas cylinders, nor near any other substance likely to cause or accelerate fire, nor in an acetylene generator compartment.
i. Stored oxygen cylinders shall be separated from fuel-gas cylinders or combustible materials by 20 feet (6.1 m) or by a noncombustible barrier at least 5 feet (1.5 m) high having a fire-resistance rating of at least one-half hour.
j. Cylinders shall be transported in upright (vertical) position and shall not be laid down in the truck bed.
k. Cylinders that are being stored or transported shall be secured by a nonflammable material like chain or cable and shall have protective caps on while not in use.

l. Empty cylinders shall be marked with soap stone or chalk so that the mark may be removed when being refilled.
m. Cylinders shall not be stored in buildings along emergency exit routes.
n. Cylinders shall not be used if damaged or defective.

31.3.2. Handling Cylinders

a. Serious accidents may result from misuse, abuse, or mishandling compressed gas cylinders.
b. Employees assigned to handle cylinders under pressure shall be properly trained and work only under competent supervision.
c. The following work practices shall be used to help control hazards associated with the handling of compressed gas cylinders.
    1. Accept only cylinders approved for use in interstate commerce for transportation of compressed gases.
    2. Do not remove or change numbers or marks stamped on cylinders.
    3. Roll cylinders on their bottom edge.
        a) Never drag cylinders.
        b) Cylinders weighing more than 40 pounds total (18.2 kg) shall be transported on a hand or motorized truck, suitably secured to keep them from falling.
    4. Protect cylinders from external damage.
    5. Do not lift compressed gas cylinders with an electromagnet.
        a) Where cylinders must be handled by a crane or derrick, as on construction jobs, carry them in a cradle or suitable platform and take extreme care that they are not dropped or bumped.
        b) Do not use slings.
    6. Do not drop cylinders or let them strike each other violently.
    7. Do not use cylinders for rollers, supports, or any purpose other than to contain gas.
    8. Do not tamper with safety devices in valves or on cylinders.
    9. When in doubt about the proper handling of a compressed gas cylinder or its contents, consult the supplier of the gas.
    10. When empty cylinders are to be returned to the vendor, mark them “EMPTY” or “MT” with chalk. Close the valves and replace the valve protection caps, if the cylinder is designed to accept a cap.
    11. Load cylinders to be transported to allow as little movement as possible. Secure them to prevent violent contact or upsetting.
    12. Always consider cylinders as being full and handle them with care.
        a) Accidents have resulted when containers under partial pressure were thought to be empty.
        b) The fusible safety plugs on acetylene cylinders melt at about the boiling point of water. If an outlet valve becomes clogged with ice or frozen, it should be thawed with warm (not boiling) water, applied only to the valve.
        c) A flame should never be used.
    13. Cylinders must be hydrostatically tested every 5 years. (Testing must be documented.)

31.3.3. Operating Cylinders

a. Cylinders, cylinder valves, couplings, regulators, hoses, and other welding apparatus shall be kept free from oily or greasy substances.
    1. Oxygen cylinders or apparatus shall not be handled with oily hands or gloves.

   2. A jet of oxygen must never be permitted to strike an oily surface, greasy clothes, or enter a fuel oil or other storage tank.

b. When transporting cylinders by a crane or derrick, a cradle, boat, or suitable platform shall be used.
   1. Slings or electromagnets will not be used for this purpose.
   2. Valve-protection caps, where the cylinder is designed to accept a cap, shall always be in place when the cylinder is being transported.
c. Cylinders shall not be dropped or struck or be permitted to strike each other violently.
d. Valve-protection caps, designed to protect cylinder valves from damage, will not be used for lifting cylinders from one vertical position to another.
   1. Bars will not be used under valves or valve-protection caps to pry cylinders loose when frozen to the ground or otherwise fixed; the use of warm (not boiling) water is recommended.
e. Unless cylinders are secured on a special truck, regulators shall be removed and valve-protection caps, when provided, will be put in place before cylinders are moved.
f. Cylinders not having fixed hand wheels shall have keys, handles, or nonadjustable wrenches on valve stems while these cylinders are in service. In multiple-cylinder installations, only one key or handle is required for each manifold.
g. Cylinder valves shall be closed when work is finished prior to being moved.
h. Valves of empty cylinders shall be closed.
i. Cylinders shall be kept far enough away from the actual welding or cutting operation so that sparks, hot slag, or flame will not reach them, or fire-resistant shields shall be used.
j. Cylinders shall not be placed where they might become part of an electric circuit.
   1. Contacts with third rails, trolley wires, and similar items will be avoided.
   2. Cylinders will be kept away from radiators, piping systems, layout tables, and similar items, and shall not be used for grounding electric circuits such as for arc welding machines.
   3. Practices like tapping an electrode against a cylinder to strike an arc are prohibited.
k. The numbers and markings stamped into cylinders shall not be altered.
l. No person, other than the gas supplier, shall attempt to mix gases in a cylinder.
m. No one, except the owner of the cylinder or a person authorized by the owner, shall refill a cylinder.
n. No one shall tamper with safety devices in cylinders or valves.
o. Unless the cylinder is connected to a manifold, oxygen from a cylinder will not be used without first attaching an oxygen regulator to the cylinder valve. (Before connecting regulator to cylinder valve, the valve will be opened slightly for an instant and then closed.)

WARNING
Always stand to one side of the outlet when opening the cylinder valve.

p. A hammer or wrench will not be used to open cylinder valves. If valves cannot be opened by hand, the supplier will be notified.
q. Cylinder valves shall not be tampered with nor should any attempt be made to repair them.
   1. If trouble is experienced, the supplier should be promptly sent a report indicating the character of the trouble and the cylinder's serial number.
   2. The supplier's instructions as to its disposition shall be followed.
r. Complete removal of the stem from a diaphragm-type cylinder valve shall be avoided.
s. Cylinders will be placed with valve end up when in use, stored, and shipped, unless otherwise approved.

t. Before connecting a regulator to a cylinder valve, the valve will be opened slightly and closed immediately.
   1. The valve will be opened while standing to one side of the outlet, never in front of it.
   2. Never crack a fuel-gas cylinder valve near welding work, sparks, flame, or other possible sources of ignition.
u. Before a regulator is removed from a cylinder valve, the cylinder valve shall be closed and the gas released from the regulator.
v. Nothing shall be placed on top of an acetylene cylinder when in use that could damage the safety device or interfere with quick valve closure.
w. Cylinders with leaky valves or fittings that cannot be stopped by closing the valve shall be taken outdoors away from all sources of ignition and slowly emptied.
x. A warning shall be placed near cylinders having leaking fuse plugs or other leaking safety devices, stating not to approach them with any source of ignition. Such cylinders should be plainly tagged; the supplier should be promptly notified and his instructions followed as to their return.
y. Fuel-gas shall never be used from cylinders through torches or other devices equipped with shutoff valves without reducing the pressure thorough a suitable regulator attached to the cylinder valve or manifold.
z. The cylinder valve shall always be opened slowly.
aa. Acetylene cylinder valves shall not be opened more than one and one-half turns, and preferably no more than three-fourths of a turn.
bb. Where a special wrench is required, it shall be left in position on the valve stem while the cylinder is in use so that the fuel-gas flow can be quickly turned off in an emergency. For manifolded or coupled cylinders, such a wrench shall always be available for immediate use.
cc. Torches shall be inspected daily to ensure that valves, hose couplings, and tip connections are not leaking.
   1. Defective torches shall not be used and shall be taken out of service.
   2. Clogged torch tips shall be cleaned with suitable cleaning wires, drills, or other cleaning devices.
   3. Torches shall be lighted with friction lighters or other approved devices and not with matches or hot slag.
   4. Flames shall be lit promptly, according to the manufacturer's instructions.
dd. Fuel-gas and oxygen hoses shall not be interchangeable and shall be distinguished from each other by their color or by their surface characteristics. Hose couplings will require a rotary motion to be unlocked or pulled free.
ee. When parallel sections of an oxygen and fuel-gas hose are taped together, no more than 4 inches of each 12-inch section will be covered by tape.
ff. All hoses shall be inspected daily prior to use.
   1. Any hose subjected to flashback or showing evidence of severe wear or damage will be tested to twice its normal pressure, but in no case less than 300 pounds per square inch (psi).
   2. Defective hoses shall be removed from use.
   3. Appropriate fire extinguishers shall be immediately available in flame welding and cutting areas.

31.4. MATERIALS HANDLING

TABLE 31.1. MATERIALS HANDLING ROLES AND RESPONSIBILITIES	
Position or Department	**Responsibility**
S&H Director	a. Ensure the requirements of this standard practice remain current with applicable regulatory directives.
ES&H Manager, Site Safety Specialists and Representatives	a. Oversee site personnel to ensure the material handling procedures are followed. b. Assist with inspections as needed.
Supervisors	a. Ensure that elements of this policy are being followed by conducting inspections, reviews, spot-checks, and other follow-up actions. b. Ensure employees are aware of and properly trained on proper work practices, equipment and controls, when to move materials mechanically or manually, and any potential hazards associated with material handling. c. Conduct or arrange for inspections in their area of responsibility. d. Ensure that each employee under their supervision can properly identify and handle compressed gas cylinders. e. Initiate corrective action for deficient items noted during inspections.
Employees	a. Follow the requirements of this material handling procedure, as well as applicable regulatory directives.
SMTR	a. Ensure subcontractors are following elements of this policy by conducting inspections, reviews, spot-checks, and other follow-up actions. b. Initiate corrective action for deficient items noted during inspections.