FSGA/HAAF GARRISON
FT. STEWART, GA 31314

GARRISON SAFETY SOP – ANNEX X

WELDING, CUTTING, AND COMPRESSED GAS CYLINDERS

FSGA/HAAF Safety Program SOP
6 November 2024

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1. Purpose:

This Annex to the FSGA/HAAF Garrison Safety and Occupational Health (SOH) SOP serves to provide guidance to the safe execution of welding and cutting operations and in addition, provides instructions pertaining to the safe handling and storage of compressed gas cylinders.

2. Scope

This Annex to the Garrison SOH SOP applies to all military and civilian personnel assigned to the FSGA/HAAF Garrison. It is intended to provide additional information so all levels of leadership, SMs, and civilian workforce can properly implement the Garrison SOH Program.

3. References

29 CFR 1910 OSHA Standards for General Industry

29 CFR 1926, OSHA Standards for Construction Industry

AR 25-400-2, The Army Records Information Management System (ARIMS)

AR 385-10, The Army Safety Program

AR 700-68, Storage and Handling of Liquefied and Gaseous Compressed Gasses

DA Pam 25-403 – Guide to Recordkeeping in the Army

DA Pam 385-10, Army Safety Program

4. Records Management:

Records created throughout the processes prescribed by this Annex will be identified, maintained, and disposed of according to AR 25-400-2 (The Army Records Information Management System (ARIMS) and DA Pam 25-403 (Guide to Recordkeeping in the Army). The primary means of recordkeeping for the Garrison Safety Office (GSO) will be the Army Safety Management Information System (ASMIS) located at https://mishap.safety.army.mil . Record titles and descriptions are available on the ARIMS website https://www.arims.army.mil

5. Policy

- No cutting or burning will be performed within ten feet of paint booths or related equipment without prior written approval from DES Fire.
- Compressed gas cylinders will be inspected, handled, used, stored, and bled as prescribed in AR 700-68.
- Welders and their helpers will be equipped with and wear proper protective clothing & equipment (PPE).
- Except in established shops, welding machines will not be used until a Hot Work Permit, DA Form 5383-R has been obtained from DES Fire.
- When other employees are in the vicinity of an arc during welding operations, when practical, the operation will be screened so that they cannot see the arc or be injured from infrared and ultraviolet rays.
- Frames and exposed non-current carrying metal parts of engine driven electric welding units will be grounded.

- Only trained personnel will be allowed to operate welding machines. Apprentices will work under the direct supervision of a trained and qualified welder.
- Appropriate administrative actions will be initiated whenever prescribed protective devices are not used or PPE is not worn during hazardous exposures.
- Safety Data Sheets (SDS) will be available to all employees.

6. General Safety Precautions for Compressed Gases and Cylinders

- Reference to gases should be by the proper name of the gas rather than by “air” or “gas”.
- Compressed air will not be used to dust off clothing or other objects.
- Never permit oil or grease to come in contact with oxygen cylinders, valves, regulators, gauges, or fittings. Do not handle the cylinder or apparatus with oily hands, gloves, or clothing.
- Use of oxygen as a substitute for compressed air is prohibited. Under no circumstances will it be used for artificial ventilation.
- Do not attempt to mix gases in cylinders or use cylinders for purposes other than those intended.
- Transferring oxygen or acetylene from one cylinder to another is prohibited. Transferring carbon dioxide to fire extinguishers will be in accordance with TM 5-687. Transfer of other gases will be in accordance with AR 700-68.
- Cylinders will never be used for rollers, supports, or purposes other than gas containers.
- Cylinders will not be placed where they might form a part of an electrical circuit.
- Never put cylinders in tanks or unventilated rooms.
- Do not permit sparks, molten metal, electric currents, excessive heat from stoves, radiators, furnaces, or facility generating temperatures in excess of 125 degrees Fahrenheit, hot slag, direct flame, or electric arc to come in contact with the cylinder or its attachments.
- Place nothing on top of a cylinder which might damage the valve and regulator or interfere with quick closing of the valve.
- When cylinders are standing upright, whether in use, being transported, or in storage, they will be secured to prevent violent contact, accidental upsetting, or falling.
- A regulator, gauge, hose, or other appliance specified and used with a particular kind of gas will not be used in connection with any other gas.

- A regulator, gauge, or hose that is not manufactured or specified for any particular kind of gas may be used for more than one kind of gas, provided it is suitable for the purpose and is as thoroughly purged of gas or all dangerous substances before being used for another gas. Purging must be done by qualified personnel. Do not use unauthorized nonstandard connection fittings or other equipment.
- Numbers or marking stamped on a cylinder will not be altered or defaced.
- Do not attempt to repair or alter cylinders or valves. Operators will notify their supervisors when defects are discovered. Repairs will be made by the vendor. Repairs to attachments will be made by authorized repairmen who will use proper replacement parts.
- Never permit acetylene to escape into a room or enclosed space.
- Never allow acetylene cylinders to come in contact with electric welding apparatus or electrical circuits.
- Do not use acetylene through any device equipped with a cutoff valve unless the pressure has been reduced through a regulator.
- Under no circumstances will acetylene be generated, piped (except in approved cylinder manifolds) or utilized at a pressure exceeding 15 psi. The use of liquid acetylene is prohibited.

7. Handling Cylinders

- Cylinders will be handled carefully. Rough handling of cylinders (one cylinder striking another) may damage the cylinder, valve, or fuse plugs. This could cause a leak, which may result in an explosion.
- Because of their shape, smooth surface, and weight, cylinders are difficult to carry by hand. When cylinders must be moved without the aid of a cart or other mechanical means, use some type of carrying device. Cylinders may be rolled on bottom edge but never dragged.
- Do not lift cylinders with an electromagnet. Where cylinders must be handled by a crane or derrick, carry them in a cradle or similar device and take extreme care that they are not dropped. Do not use slings.
- Cylinders will never be lifted by grasping the valve or valve protection cap.
- When cylinders are not in use, valves will be closed tightly, and valve protection caps installed. Cylinders will not be moved, stored, or handled unless the valve protection caps are in place.
- Always consider cylinders as full and handle them with corresponding care.
- Protect cylinders from cuts or abrasions.

- When in doubt about proper handling of a compressed gas cylinder or its contents, consult your supervisor or the Garrison Safety Office (GSO).

8. Cylinder Storage

- Compressed gas cylinders that are a part of a welding unit will not be stored in welding bays or locations. Cylinders will be kept away from radiators, heaters, and other sources of heat.
- Cylinders will be stored in covered storage and will be protected from the direct rays of the sun.
- Flammable substances (gasoline, oil, volatile liquids), will not be stored in the same area as cylinders.
- Cylinders should not be stored near elevators, gangways, stairwells, or other places where they can be knocked down or damaged and must be secured to prevent tipping over.
- Empty and full cylinders will be stored separately, with empty cylinders being plainly marked (refer to 17-14) as empty to avoid confusion.
- Cylinders which have held the same contents will be grouped together.
- Cylinders should be stored in as small an area as practicable, with aisles between groups wide enough to minimize the spread of fire.
- Cylinders must be arranged to permit periodic inspection and to ensure they are used in the order they were received.
- Cylinders stored in the open will be handled as follows:
    - Protected from contact with the ground.
    - Protected against accumulation of ice and snow.
    - Used on-combustible or fire retardant materials for protection.
    - Leave an eight-inch air space between cover and cylinders.
    - Provide sufficient ventilation to carry off gas leakage.
- Outside storage areas will be at least 100 feet from operating buildings or open storage areas.
- Oxygen cylinders will be stored in areas separated from other gases and at least 40 feet from areas used for storage of flammable gases.
- Liquefied fuel gas and acetylene cylinders must always be stored with the valve end up.
- Leaking cylinders will be removed from the storage location. The responsible supervisor will be notified immediately.

- Only non-sparking tools will be used in a storage location.
- No smoking or other flame or spark producing device is allowed within 50 feet of a storage area. Storage areas will be conspicuously posted with "No Smoking" signs.

9. Safe Use of Cylinders

- Do not tamper with safety devices in valves on cylinders.
- If cylinders are used on cranes or roofs, they will be securely lashed to railings or other stable object.
- Use cylinders in an upright position, especially acetylene and liquefied gases.
- If an outlet valve becomes clogged with ice, it should be thawed with warm (not boiling) water. Apply water to the valve only. A flame should never be used.
- Do not use a cylinder without a pressure-reducing regulator attached to the cylinder valve.
- Make sure the threads on a regulator or union correspond to those on the cylinder valve outlet. Do not force connections that do not fit.
- Before making connections to a cylinder valve outlet, open the valve for an instant to clear the opening of particles of dust or dirt. Always point the valve and opening away from the body and not toward anyone else.
- When setting up cylinders for use, the acetylene valve outlet will be pointed away from the oxygen cylinders.
- Before opening the cylinder valve on fuel gas cylinders, ensure no open flame or other source of ignition is near.
- When opening cylinder valves, workers will stand to one side and away from the gauge faces.
- Open cylinder valves slowly by not more than one turn of the spindle at a time. A cylinder not provided with a hand wheel valve should be opened with a spindle key, special wrench, or other tool provided or approved by the gas supplier, and should be kept in operating position while gas is being released.

CAUTION: *CYLINDER VALVES SHOULD NEVER BE OPENED UNTIL THE REGULATOR IS DRAINED OF GAS AND THE PRESSURE ADJUSTING DEVICE ON THE HALF REGULATOR IS FULLY RELEASED.*

- Do not hammer or use an adjustable wrench on cylinder valves. This will damage the valve and cause leaks.
- If a cylinder valve cannot be operated by hand, the cylinder will be returned to Depot Property Division.
- Oxygen cylinder valves must be opened slowly so the needle or hand on cylinder gauge rises slowly. The valve will be fully opened to prevent leaks around valve

stems. When opening oxygen cylinders, stand to one side of the regulator valve to minimize the chance of injury due to valve blowout.

- During use, all cylinder valves will be opened fully. Acetylene will never be opened more than 1-1/2 turns. Usually, one-half turn or less is sufficient for welding purposes. The wrench will be left in place while the valve is open on acetylene cylinders without valve wheels.
- When a leak is suspected, test all connections by applying soapy water and watching for bubbles. Never test for leaks with open flames. If leaks are found, close valves immediately. After time has been allowed for the gas in the system to escape, proceed as follows:
    - If there is a leak around the valve stem, tighten the gland nut. If this does not stop the leak, remove cylinder from service, tag it to identify the trouble spot, and immediately notify the person designated to bleed cylinders.
    - If there is a leak between the cylinder and the regulator, tighten the union nut. If this does not stop the leak, take actions listed in paragraph 16-13 p(l) above.
    - If the leak is at a fuse plug or other safety device, take the cylinder out of use immediately and take the actions listed in paragraph 16-13 p(l) above.
    - If cylinders are leaking and the leak cannot be stopped by closing the valve, the cylinder will be taken outdoors, away from all sources of ignition, and slowly emptied.
- For welding or heating purposes, oxygen pressure will not be more than four times the acetylene pressure.
- Acetylene will not be used at a working pressure higher than 15 psi gauge pressure.
- Contents of cylinders will not be used below 5 pounds psi. The pressure on the acetylene cylinder will not be depleted to a point where constant working pressure cannot be obtained.
- When cutting or welding operation is finished or the cylinder is empty, the cylinder valve will be tightly closed.
- When cylinders have been emptied, they will be marked "EMPTY" with chalk. (Refer to 17-11)
- Valve protection caps will always be in place and hand tight except when cylinders are connected for use, or when cylinders are being processed for transfer to MO or Base Support.
- No one except the gas supplier will attempt to refill a cylinder or transfer contents from one cylinder to another.

10. Regulators

- Only regulators listed or approved by agencies such as Underwriters' Laboratories, Inc. or Factory Mutual will be used on compressed gas cylinders. Each regulator will be equipped with a high- and low-pressure gauge and will be used only with gases for which they are designed and intended.
- High pressure oxygen gauges will have safety vent covers to protect the operator from broken glass in case of an internal explosion.
- Oxygen gauges will be marked "OXYGEN - USE NO OIL."
- Regulators are delicate and should be handled carefully. They should not be dropped or pounded and should be repaired or tested only by skilled workers or returned to the manufacturer.
- If a regulator leaks or shows a continuous creep indicated on the low-pressure gauge by a steady buildup of pressure when the torch valves are closed, the cylinder valve should be closed and the regulator removed for repairs.
- If regulator pressure hands do not register properly, the regulators must be repaired.
- When regulators are connected but not in use, the pressure adjusting device should be released in accordance with paragraph 16-14f. below.
- Regulators should be cared for and stored in the same manner as any precision tool.

11. Installation of Regulators

Procedures for attaching regulator or reducing valve to a cylinder:

- To blow out dust or dirt, open the discharge valve slightly for an instant and then close it. On acetylene cylinders, ensure no open flame or other source of ignition is in the area.
- Connect the regulator to the outlet valve on the cylinder. Be sure regulator inlet threads match the cylinder valve outlet threads. Do not force connections which do not fit.
- Ensure connections between regulators, adapters, and cylinder valves are gas-tight. Do not connect an oxygen regulator to an acetylene cylinder and vice versa.
- Release the pressure-adjusting screw on the regulator to its limit by turning it counterclockwise until it is loose.
- Open the cylinder valve slightly. Let the hand on the high-pressure gauge move up slowly. Gradually open the cylinder valve to its full limit on oxygen cylinders. Make no more than 1-1/2 turns of the valve spindle on an acetylene cylinder.
- Attach oxygen hose to outlet of oxygen regulator and oxygen inlet valve on torch. Attach acetylene hose to outlet of acetylene regulator and acetylene inlet on torch.
- Test oxygen connections for leaks as follows:
    - Ensure torch oxygen valve is closed.
    - Turn oxygen regulator pressure adjusting screw clockwise to give about normal working pressure.

- Using soapy water (nonfat soap) or approved leak test solution, check connections for leaks.
- Check regulator for creeping indicated by an increase in the reading on the low pressure gauge. If the regulator creeps, have it repaired at once.

- Test acetylene connections for leaks. Ensure the torch acetylene valve is closed and proceed as indicated in paragraph f above, set the acetylene regulator pressure-adjusting screw to produce an approximate pressure of 10 psi.
- Adjust pressures of oxygen and acetylene as follows:
  - With all torch valves closed, slowly open oxygen cylinder valve.
  - Open torch oxygen valve, turn pressure adjusting screw on oxygen regulator to desired pressure.
  - Close torch oxygen valve.
  - Open acetylene cylinder valve 1-1/2 turns.
  - With torch acetylene valve closed, turn pressure adjusting screw on acetylene regulator to desired pressure.
- If torch is not to be used immediately, close cylinder valves, open torch valves to release pressure on regulator, close torch valves, and release pressure-adjusting screws on regulators.
- Purge each line individually. Open oxygen torch before closing the valve. Open acetylene torch valve and release acetylene to the atmosphere for a few seconds and close the valve.
- Open torch acetylene valve, light flame, and readjust regulator. Close torch acetylene valve. Acetylene pressure should first be adjusted with torch valve closed to prevent release of acetylene to air.
- Open torch valves and light torch according to instructions provided with equipment.

12. Care and Use of Torches

- Select proper welding head, mixer, tip, or cutting nozzle and screw it firmly into the torch.
- Do not use matches to light torches. Use a friction lighter or stationary pilot flame. When lighting, point the torch tip so no one will be burned when the gas ignites.
- When extinguishing the flame, first close the acetylene valve and then the oxygen valve.
- If a flashback should occur, shut off the oxygen valve, then the acetylene valve.
- Before changing torches, shut off the compressed gas at the pressure reducing regulator.
- To discontinue welding or cutting for less than 20 minutes, closing of torch valves only is permissible. For discontinuances of 20 minutes or more, during lunch periods, and overnight, proceed as follows:
  - Close the oxygen and acetylene cylinder valves.
  - Open the torch valves to relieve gas pressure from the hose and regulator.
  - Close the torch valves and release regulator pressure adjusting screws.

- Never put a torch down until the gases have been completely shut off. Do not allow torches or other equipment to come in contact with the sides of gas cylinders.
- Torches should be cared for and stored in the same manner as any precision tool.

13. Care and Use of Hoses

- Different colors of hose will be used - red for acetylene and green for oxygen and will not be interchanged.
- Do not attempt to shut off the gas, even temporarily, by crimping or kinking the hose.
- Whenever long lengths of hose must be used, suspend high enough overhead to permit unobstructed passage of persons and vehicles.
- If long lengths of hose are used, prevent from becoming kinked or tangled, from being run over by vehicles or otherwise damaged, or allowed to become a tripping hazard.
- All hoses should be inspected for leaks, worn places, and loose fittings at least weekly. To test for leaks, use soapy water on all connections and immerse hose in water under normal working pressure. Repair leaks at once.
- Hose will not be repaired with tape. Splices will be made with standard couplings only. Couplings for extra-long lengths of hose will not be made.
- A defective hose will not be used.
- Hoses will be stored in a cool location.
- Hoses will be protected from grease, oil, flying sparks, hot slag, or other hot objects. Do not coil under welding or cutting locations in a manner that permits hot sparks and slag to fall on it.
- A single hose having more than one gas passage will not be used.
- When parallel lengths of oxygen and acetylene hose are taped together to prevent tangling, no more than four of each 12 inches will be covered with tape.
- If a flashback occurs and burns the hose, the burned section of hose will be discarded.
- New hose will be blown out with oxygen at about 5 psi pressure to remove loose talc before being used.

14. Arc Welding and Cutting

Specific precautions for electric arc welding:

- In confined places, cover or arrange cables to prevent contact with falling sparks.
- Never change electrodes
  - With bare hands.
  - With wet gloves.
  - When standing on wet floors or grounded surfaces.
- Ensure portable or stationary frame welding units are properly grounded.

- If a work or electrode lead cable becomes worn (exposing bare conductors), immediately replace or cover the exposed portion with rubber, plastic, or friction tape equivalent to the cable covering.
- Keep welding cables dry and free of grease and oil. Where practicable, suspend cables overhead to permit the passage of vehicles and personnel. Keep cable orderly and out of the way.
- If the cables must be run some distance from the welding unit, suspend them on substantial overhead supports. Protect cables laying on the floor or ground so they will not interfere with safe passage or become damaged or entangled.
- Take special care to keep welding cables away from power supply cables or high tension wires.
- If the correct size electrode holder cannot be used, an extra holder will be provided to allow one to cool while the other is in use. Dipping hot electrode holders in water is prohibited.
- Do not permit bare metal parts of an electrode, electrode insulation, or any metal part of the electrode holder to touch bare skin or any wet covering on your body.
- Remove metal and carbon electrodes from holders when not in use to eliminate danger of electrical contact with persons or conducting objects.
- Electric welding should not be performed in wet conditions. When electric welding must be done under wet conditions, the operator will stand in a dry place.

Special precautions for gas-shielded arc welding:

- To supply gas to the welding torch, a regulator will be used to lower the pressure to 25 psi or less. A flow meter should control the volume of gas.
- If water is used to cool the torch and electric current cables, the water supply line will be equipped with a strainer to keep out impurities.

15. General Safety Precautions for Welding Operations

- Shirt sleeves will always be buttoned around wrists.
- Trousers will not have cuffs or be rolled up.
- Torn or ragged garments will not be worn.
- Arc flash protection goggles will be worn under arc-welding helmets.
- All outer clothing and shoes will be kept free of oil and grease.
- Protective aprons and sleeves or jackets are required when welding or cutting overhead.
- When working more than six feet above the floor or ground, use a platform with railings or safety belt and lifeline.
- Good housekeeping will be maintained in welding shops. Flammable liquids, packing materials, wiping cloths, cotton waste, scrap lumber, etc., are not permitted.
- Welding rods will be kept in their appropriate receptacle.

- Discard electrode or rod stubs in the proper waste container, not on the floor. Keep tools and other tripping hazards off the floor.
- When welding or cutting cylindrical objects, provisions will be made to prevent them from rolling or other objects from falling over onto them.
- Cutting or welding will not be performed directly on a concrete floor. Concrete may split and fly when sufficiently heated.
- Parts to be welded or cut will not be supported by compressed gas cylinders, whether full or empty, or on barrels or drums that have contained flammable liquids. Suitable benches or blocking will be provided.
- Wooden floors where sparks or hot metal may fall will be swept clean and covered with metal or other non-combustible material.
- Hot metal or slag will not be allowed to fall through cracks or other openings in the floor or into machine tool pits.
- Cracks or holes in walls, open doorways, and open or broken windows will be covered with sheet metal guards or fireproof curtains. Leave no openings between the metal guards or fireproof curtains and the floor.
- Welding or cutting will not be performed in areas where there are special hazards.
- Fire extinguishers will always be readily accessible at all welding operations.
- Flammable materials attached to or near equipment requiring welding, cutting, or brazing will be removed. If it is not practical to remove the part to be welded, or move the flammable materials to a safe location, an effective heat resisting material will be provided to shield the flammable material.
- Closed tanks, jacketed vessels, cored castings, or other hollow objects will not be heated or welded until all precautions have been taken to vent the confined air.
- Tanks, drums, and disassembled pipelines that have contained flammable liquids will be cleaned of all materials, ventilated, and purged of flammable gas or vapors before welding or cutting operations begin.
- Ensure spray booths or ducts are free of combustible materials before welding or cutting operations begin.
- During welding and cutting operations, certain poisonous gases, fumes, and dusts are involved. Weld only in well-ventilated areas or use proper respiratory protection.
- Where harmful concentrations of gases, fumes, and dust are generated by welding or cutting, local exhaust systems should be provided at the point of origin.
- When welding or cutting alloys containing, or metals coated with lead, brass, aluminum or zinc, a suitable respirator or effective exhaust ventilation (as determined by the Safety Office and Industrial Hygienist) will be used. Paint should be removed prior to welding or cutting unless otherwise cleared through the Safety Office and Industrial Hygienist.

- Where it is not practical for gases, fumes, and dust to be kept below the toxic limits by means of general ventilation or local exhaust systems, welders will be required to wear approved respiratory protective equipment.
- Wear respiratory protection and a safety harness with attached lifeline for work in confined spaces. The lifeline will be tended by a similarly equipped helper whose duty is to observe the welder and effect rescue in an emergency. A test for oxygen deficiency and combustible atmosphere will be made by approved personnel before entering confined area. All storage tanks and similar confined areas should be considered dangerous until proven otherwise.

Special precautions will be taken if welding or cutting in a confined space is stopped.

- Disconnect the power on arc welding or cutting units and remove the electrode from the holder.
- Turn off the torch valves on gas welding or cutting units.
- Shut off the gas supply at a point outside the confined area.
- Remove the torch and hose from the area. In certain situations, reevaluation of the atmosphere may be required prior to reentering the confined space to resume work.
- When using a gasoline powered welding generator inside a building or confined area, vent the engine exhaust to the outside.
- After welding or cutting is completed, mark hot metal or post a warning sign to keep other workers away from heated surfaces.
- When gas welding or oxygen cutting inside a booth provided for arc welding, place the cylinder outside the booth in an upright and secured position.

Appendix A – Abbreviations

AR	Army Regulation
ARIMS	Army Records Information Management System
ASMIS	Army Safety Management Information System
CFR	Code of Federal Regulations
COR	Contract Office Representative
DA Pam	Department of the Army Pamphlet
DoDI	Department of Defense Instruction
FSGA	Fort Stewart Garrison
GC	Garrison Commander
GSO	Garrison Safety Office
HAAF	Hunter Army Airfield
OHC	Occupational Health Clinic
OSHA	Occupational Safety and Health Administration
POC	Point of Contact

PPE	Personal Protective Equipment
SM	Service Member
SOH	Safety and Occupational Health
SOHMS	Safety and Occupational Health Management Systems
SOP	Standard Operating Procedure
USO	Unit Safety Officer

APPENDIX B – ANNUAL GSO REVIEWS

DATE	REVIEWED BY	CHANGES Y/N	SUMMARY OF CHANGES
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