

PURPOSE/APPLICATION

Portable arc welders are usually powered by diesel or gasoline engines. Properly installed and used the arc welder is very safe, but if used improperly the operator can be exposed to a number of hazards including toxic fumes, dusts, burns, fires, explosions, electric shock, radiation, noise, and heat stress.

PPE

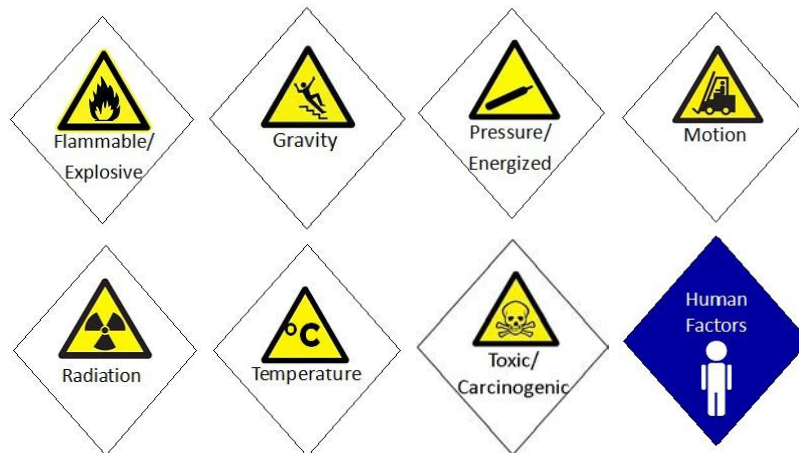
- Canadian Plains Energy Services (CPE) minimum requirements
- Welding Helmet
- Long sleeve shirt and pants
- Hearing Protection (as necessary)

TRAINING

- Welding Certifications

HAZARDS & CONCERNS

- Personal injury caused by temperature (flash burns/burns/heat/retinal burns/fume inhalation/electrocution/noise)
- Gravity (slip/fall)
- Motion (rotating equipment)
- Explosive atmosphere
- Traffic



PRECAUTIONS

- Prior to any welding, cutting or grinding operations, site Hazard Identification, Assessment and Control (HIAC) are completed to ensure that no workers are in the line of fire of any hot particulates or molten steel.
- Inspect work area prior to welding, ensure safe work environment.
- The use of welding screens and tents are to protect workers and prevent hot materials or UV from entering into a co-workers work space.
- No workers are allowed to work directly beneath a welding, cutting or grinding operation where there is a risk of sparks, debris or other falling hazards.

- If workers must work beneath a welding, cutting or grinding operation, a protective barrier must be installed to protect the worker(s) (e.g. covers, screens or guards).
- Inspect all equipment prior to use.
 - All welding, cutting and grinding operation equipment is erected, installed, assembled, started, operated, used, handled, stored, stopped, inspected, serviced, tested, cleaned, adjusted, carried, maintained, repaired, and dismantled in accordance with the manufacturer's specifications.
 - Do not change the polarity switch when your machine is under load. Arcing because of high current can burn the switch contact surface and can seriously burn you.
 - Make sure there is a power disconnect switch on the welding machine; this switch shuts down the machine immediately in an emergency.
 - Electrode holders should be stored where they cannot make contact with personnel, conductors, fuels or compressed gas tanks.
 - If you are not going to be welding for a few minutes, disconnect the power source and remove the electrodes.
 - Never strike an arc on a gas cylinder. Always keep electrodes and their holders and any other live parts away from gas cylinders.
 - Wet equipment should be dried off, but only after the power source has been disconnected.
 - Before using welding cables, check the insulation and lead cables for exposed conductors. Replace all welding leads spliced within ten feet of the holder. To reduce the chance of shock, check the electrode holders for loose or exposed connections.
 - Never coil or loop electrode cable around any part of your body.
 - Be sure the welding machine frame is properly grounded, and double-check the grounding connections.
 - Never use pipelines carrying gases or flammable liquids or conduits carrying electrical conductors as grounds.
 - Don't ground to a building structure that is a great distance from the weld.
 - Never weld on a load suspended from a crane or hoist if the wire rope or hoist chain can become a path for even part of the current flowing from the arc back to the welder; the current will heat the rope or chain and seriously weaken it without leaving visible damage. It may break under load years later, perhaps with fatal results.
 - If you must weld a suspended work piece run grounding cables from the work pieces on both sides of the weld to the same ground as the welder and use a nonconductive sling rated for the load.
 - Always operate in an open well-ventilated area or vent the engine exhaust directly outdoors.
 - Never fuel the engine while running or in the presence of an open flame.
 - Wipe up spilled fuel immediately and wait for fumes to disperse before starting the engine.
**Never remove the radiator pressure cap from liquid cooled engines while they are hot to prevent scalding yourself.*
 - Stop the engine before performing any maintenance or trouble shooting. The ignition system should be disabled to prevent accidental start of the engine.

- Keep all guards and shields in place.
- Keep hands, hair, and clothing away from moving parts.
- Be sure the welder is properly installed and grounded.
- Never weld without adequate ventilation.
- Take proper precautions to prevent fires.
- Protect your entire body with fire retardant clothing, shoes, and gloves.
- Wear eye protection at all times.
- Weld only in a fire safe area.
- Never do any welding, cutting, or hot work on used drums, barrels, tanks, or other containers.
- Mark metal "HOT" with a soapstone.
- Keep a well-stocked first aid kit handy.
- It is essential that the operator and helpers be properly clothed and protected because of the heat, ultra-violet rays, and sparks, produced by the arc welder (*See Figure 3*).

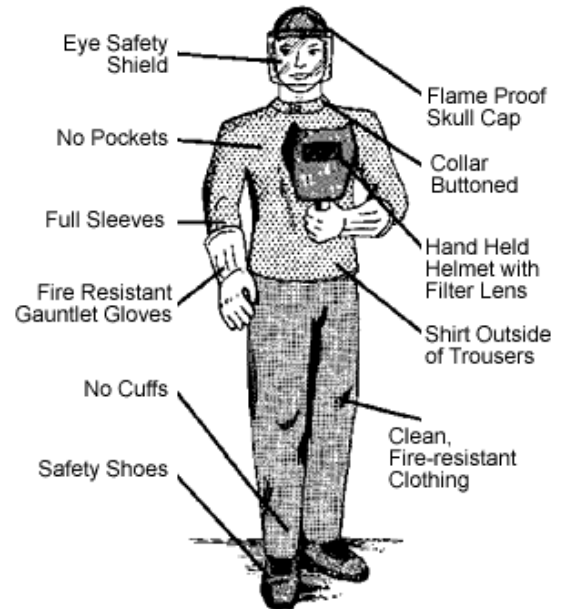


Figure 3. Select clothing to provide maximum protection from sparks and hot metals

- For body protection a pair of fire retardant long sleeved coveralls without cuffs is a good choice. Always avoid clothing with tears, snags, rips, or worn spots as these are easily ignited by sparks. The sleeves and collars should be kept buttoned.
- The hands should be protected with leather gauntlet gloves.
- A pair of high top leather shoes, preferably safety shoes, is good protection for the feet. If low shoes are worn the ankles should be protected by fire resistant leggings.
- Eyes should be protected by transparent goggles if the person wears prescription glasses or safety glasses if not. A welding helmet or hand shield with filter plate and cover plate is mandatory for eye protection from the harmful rays of the arc. The filter plate should be at least shade #10 for general welding up to 200 amps. Never use a helmet if the filter plate or cover lens is cracked or broken.
- A flame-proof skull cap to protect the hair and head as well as hearing protection in noisy situations is recommended.
- The employer will ensure that workers are trained in safe work procedures and are familiar with the processes.
- A person performing gas welding must test the regulator and its flexible connecting hose after its connected to a gas cylinder to ensure that there is no leak of the gas supply.

REFERENCES / ADDITIONAL INFORMATION

None

REGULATIONS

Alberta OHS Code - Part 10 Fire and Explosion Hazards

Welding – General 171.1

1. *An employer must, if reasonably practicable, comply with the requirements of CSA Standard W117.2-01, Safety in Welding, Cutting and Allied Processes.*
2. *An employer must ensure that welding or allied process equipment is erected, installed, assembled, started, operated, used, handled, stored, stopped, inspected, serviced, tested, cleaned, adjusted, carried, maintained, repaired and dismantled in accordance with the manufacturer's specifications.*
3. *An employer must ensure that, before a welding or allied process is commenced, the area surrounding the operation is inspected and*
 - a. *all combustible, flammable or explosive material, dust, gas or vapor is removed, or*
 - b. *alternate methods of rendering the area safe are implemented.*
4. *If a welding or allied process is performed above an area where a worker may be present, an employer must ensure that adequate means are taken to protect a worker below the operation from sparks, debris and other falling hazards.*
5. *An operator of an electric welding machine must not leave the machine unattended without removing the electrode.*
6. *An employer must ensure that appropriate welding and ground leads are used to fasten the electric supply cable securely.*

Alberta OHS Code - Part 18 – Personal Protective Equipment

Electric Arc Welding 231

A worker must not perform electric arc welding if it is reasonably possible for another worker to be exposed to radiation from the arc unless the other worker is wearing suitable eye protection or is protected by a screen.

Saskatchewan OHS Regulation

Fire extinguishers 361

1. *An employer, contractor or owner shall ensure that portable fire extinguishers are selected, located, inspected, maintained and tested so that the health and safety of workers at the place of employment is protected.*
2. *An employer, contractor or owner shall ensure that portable fire extinguishers are placed not more than nine meters away from:*
 - a. *each industrial open-flame portable heating device, tar pot or asphalt kettle that is in use; and*
 - b. *each welding or cutting operation that is in progress.*

Hot Work 370

5. *An employer or contractor shall not require or permit any welding or cutting of metal that has been cleaned with a flammable or combustible liquid until the metal has thoroughly dried.*

British Columbia OHS Regulation - Part 12 Tools, Machinery and Equipment

Welding, Cutting and Allied Processes 12.112

Standards

Welding, cutting and similar processes must be carried out according to the requirements of CSA Standard W117.2-94, Safety in Welding, Cutting, and Allied Processes.

12.114 Ventilation

Effective local exhaust ventilation must be used at any fixed work station to minimize worker exposure to harmful air contaminants produced by welding, burning or soldering.

12.115 Coatings on metals

A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.

Note: *If materials are to be welded and painted, coordination is necessary. See section 12.129(3) which restricts the application of coatings before welding operations.*

12.116 Flammable and explosive substances

1. *A container which may have held a combustible substance must be thoroughly cleaned before any welding or burning operation is carried out on the container.*
2. *Burning, welding or other hot work must not be done on any vessel, tank, pipe or structure, or in any place where the presence of a flammable or explosive substance is likely until*
 - a. *tests have been made by a qualified person to ensure the work may be safely performed, and*
 - b. *suitable safe work procedures have been adopted, including additional tests made at intervals that will ensure the continuing safety of the workers.*

12.118 Correct equipment

Welding equipment, including regulators, automatic reducing valves and hoses, must be used only for the gas for which it is designed.

12.119 Equipment inspection

Before using gas welding or burning equipment, the operator must ensure that the equipment is free from defects, leaks, oil and grease.

12.120 Flashback prevention

Suitable safety devices to prevent reverse gas flow and to arrest a flashback must be installed on each hose in an oxy-fuel system, between the torch and the regulator.

12.121 Receptacles for stubs

Receptacles for electrode stubs must be provided and used.

12.122 Radiation protection

1. Arc welding must not be carried out unless workers who may be exposed to radiation from the arc flash are protected by adequate screens, curtains or partitions or wear suitable eye protection.
2. A screen, curtain or partition near an arc welding operation must be made of or be treated with a flame - resistant material or coating, and must have a non-reflective surface finish.

Note: 12 m (40 ft) is the recommended minimum distance from which an electric welding arc should be seen by the unprotected eye.

12.123 Protective clothing and equipment

A worker involved in welding or burning operations must wear

- a. flame resistant work clothing,
- b. gauntlet gloves of leather or other suitable material and arm protection,
- c. an apron of leather or other suitable material for heavy work,
- d. eye and face protection against harmful radiation, particles of molten metal, and while chipping and grinding welds, and
- e. substantial safety footwear made of leather or other suitable material.

Note: Unless specifically manufactured as flame resistant, work clothing made of polyester, acetate, nylon, acrylic or polypropylene fibres, or mixtures of these with wool or cotton do not comply with paragraph (a). Such materials are not flame resistant and will melt while burning, causing deep and extensive burns to the skin. Work clothing made of laminated fabric containing polyurethane sponge should not be worn as it may readily ignite and burn.

Heavier wool or cotton fabrics are preferable to lighter fabrics because they are more difficult to ignite. The fabric should have a smooth tightly woven finish and be maintained in good condition. Follow the manufacturer's directions for all flame resistant protective apparel to ensure that the flame resistant properties are maintained.

f. Respiratory protection

Respiratory protective equipment must be provided and worn if an effective means of natural, mechanical or local exhaust ventilation is not practicable

- g. during short duration welding, burning or similar operations, and
- h. during emergency work.

12.125 Marking hot work

Recently welded or flame cut work must be marked "HOT" or effectively guarded to prevent contact by a worker, if a worker not directly involved in the hot work is likely to enter the work area.

12.126 Fire extinguishers

2. At least one fire extinguisher of a suitable type and capacity must be immediately available at a work location where welding or cutting is done.

Fire extinguisher locations must be marked and made known to workers.



SAFE WORK PRACTICE
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SWP-43
PORTABLE ARC WELDERS

Developed by:	1. Marty Fulkerth	2. _____	Date: Oct 27, 2009
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Last Revised by:	1. HSE Team	2. Cherie Haynes	Date: June 26, 2013
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