

Burns Industrial Equipment

Hot Work Safety Program

Last Revision: 10/10/2018

Approved By: TOM BETSCHART

PURPOSE:

The purpose of this policy is to establish cutting and welding safety procedures and to ensure that all cutting and welding operations are performed in the safest manner possible, and in compliance with applicable regulations.

POLICY:

All cutting and welding operations shall be performed in compliance with OSHA standards and all other applicable state, local and client regulations, policies, procedures and standard safe work practices. Welding is restricted to areas or situations where adequate fire prevention, welder protection and passerby protection can be assured.

PROCEDURES:

This safety standard is intended as a guide to safe practices in welding, burning, brazing and related operations. The precautions and protective measures outlined are recommended minimum requirements. Welders should exercise judgment in applying these precautionary measures in such matters as length of work periods, poor ventilation, unusual work locations, and specialized operations. Additional protective measures may be required in certain instances.

TRAINING:

- Fire Watch Training – At a minimum the fire watch will be trained to the following standards: A “Fire Watch” is a person specifically trained and assigned to warn others of hazards associated with flammable materials, and when capable to prevent incipient stage fires.
 - Ensure proper “Hot Work” permit is on site
 - Ensure permit is signed by all appropriate personnel
 - Ensure adequate means of access and egress are provided to the work site
 - Read and understand all permit provisions, and maintain the conditions of the permit at all times
 - Wear an identification vest (made of flame retardant material)
 - Maintain appropriate sewer drain coverage (if applicable)
 - Maintain a charged fire hose to the end nozzle, and/or a charged dry chemical fire extinguisher with current inspection tags
 - Maintain spark containment by using approved fire blankets
 - Prevent the taking of samples, venting, or opening of piping or equipment in the immediate area of the hot work
 - Must be able to communicate in English so that you can inform others in the event of emergency conditions
 - Determine the exact location of firefighting equipment in the immediate area
 - Ensure proper barricading and warning signs are used
 - Continuously monitor the work area during and for 30 minutes after hot work has finished to ensure no smoldering embers or slag exist

Burns Industrial Equipment

Hot Work Safety Program

Last Revision: 10/10/2018

Approved By: TOM BETSCHART

- During actual hot work, keep area wet when possible
- Continuously monitor the work area and surrounding area for any unsafe conditions, or potentially hazardous conditions
- In the event of a hazardous condition, emergency, or changing environment, the fire watch will stop all work until it is safe to resume
- Never leave the work site unless the work has stopped, or until you are relieved by another employee with equal or greater training and knowledge
- Ensure surrounding conditions are inspected and precautions are taken with consideration given to wind direction
- Ensure equipment such as welding machines, hoses, tools, etc., are located so as not to impede access or egress, or access to firefighting equipment
- In the event of a fire - Remain calm
- Only extinguish a fire when it is clearly within your abilities and the equipment available
- Know the location of the nearest alarm and how to activate the emergency system
- Know the evacuation routes and collection points
- If the fire cannot be extinguished, leave the area immediately and report to your evacuation area
- Await further instructions from the Incident Commander, or designated responsible personnel
- Only trained and qualified personnel may operate or maintain welding, cutting or brazing equipment Welders/Cutters will be trained per this policy and will possess the appropriate certifications for their work scope.
- Craft who perform any of the functions covered by this policy will be required to complete training including:
 - A test or other method to determine competency
 - All training records shall be documented and kept on file with Human Resources

General Rules

Initial Assessment – Fire is a primary focus and the assessment for fire protection guide should be used:

A dedicated fire watch is required for all hot work. If the object to be cut, burned or brazed cannot be moved and if all fire hazards cannot be removed, then guards shall be used to confine the heat sparks and slag and to protect the immovable fire hazards. If these steps cannot be taken to prevent fire, then the hot work will be stopped until a safer alternative is available to perform the work safely.

Supervisor/qualified personnel will inspect the area prior to work beginning, and authorize the work. The competent person will be trained to perform his/her job functions and to identify

Burns Industrial Equipment

Hot Work Safety Program

Last Revision: 10/10/2018

Approved By: TOM BETSCHART

substandard conditions/acts. The competent person shall ensure all oxygen-fuel gas supply equipment is suitable, safe to use, and in good working condition for the hot work.

Inspections and certification records will be kept for recordkeeping.

| If | And | Then |
|--|--|--|
| The object to be welded, cut or heated can be moved | A fire-resistant, safe workspace is available | Welding, cutting or heating shall be done in that space. |
| The object to be welded, cut or heated cannot be moved | All fire hazards can be moved to a safe distance | Welding, cutting or heating can be done once fire hazards are taken to a safe place. |
| The object to be welded, cut or heated cannot be moved | All the fire hazards cannot be removed | Guards shall be used to confine the heat, sparks, and slag, and to protect the immovable fire hazards. |

1. Before doing any welding or burning, outside of an area approved for routine hot work, be certain the necessary Hot Work Permit has been issued. All hot work will be approved by the client and the site supervisor. The crew responsible for the equipment will ensure all is suitable and in good working order. All equipment is inspected prior to beginning work and all crew members using the equipment will be familiar with "American Welding Society Standard A6-1-1966". Any equipment that is not ready for service or needs repair shall be red-tagged and repaired by qualified personnel.
2. Whenever it is necessary for hoses, lines or cords to cross walkways or work areas, they must be strung overhead or protected by planks laid on both sides of the hose. All hoses, cord and leads and other welding equipment must be maintained in a safe and serviceable condition, with no fraying or exposed copper permitted. They should be deployed in a manner that does not create tripping hazards.
3. Contain all sparks with fire blanketing.
4. Before each use, hose must be inspected for leaks, burns, worn places, loose connections, or other defects which may render the hose unfit for service. Hose burned by a flash back must be discarded.
5. Welding machine ground connections must be made on or as close as possible to the object being worked upon to assure a good ground and prevent damage to valves, pump bearings, etc.
6. Welding machine grounds shall not be made to handrails, stairs, or to projections from steel power or lighting towers, or on any active oil, gas, steam, air, or chemical line.
7. Temporary power lines to portable arc welding machines should be carried overhead whenever practical, or laid on the floor or ground suitably protected so that they cannot be damaged or interfere with safe passage.
8. Necessary precautions must be taken to protect against electrical shocks when working in wet or damp places.

Burns Industrial Equipment

Hot Work Safety Program

Last Revision: 10/10/2018

Approved By: TOM BETSCHART

9. In electric welding, all parts of the body should be covered to prevent skin burns from ultra-violet rays or molten metal. The feet and ankles are particularly vulnerable to burns, and care should be taken to see that they are properly protected.
10. Do not use ear cotton when welding. Sparks or slag may ignite the cotton.
11. Welding rod shall not be stored in its original container once the container has been opened. When an original container is opened, the rod shall be immediately transferred to either a rod oven or an approved container, such as the plastic "rod guard" container. The original container shall then be crushed and properly disposed of.
12. Full spark containment is required and any exposed equipment or small bore piping must be protected from damage. A trained fire watch must be present at all times hot work is in progress.
13. Two sets of Flash Back arrestors must be installed on oxyacetylene system; one set installed at regulators and one set at torch handle (unless torch is equipped with arrestors).
14. Welders must wear Z-87 Safety Glasses with side shields under their welder's hoods.
15. Grinders are required to have OSHA approved guards in place at all times. Exceptions must be approved by the Safety Department.
16. Only pipe stands that are designed to prevent pinch points at the center tube locking washer, and a stop at the base of the center tube to prevent crushing type injuries shall be used.
17. All welding rigs must be in safe operating condition and be properly identified.
18. Welding rigs must have emergency brake set and transmission in park or low gear when parked. If there is any slope the wheels must be chocked. When exiting a welding rig, welders must wear all required PPE.
19. The work area must be kept clean and materials including used weld rod removed when job is complete.
20. All welding rigs shall have a fire extinguisher.
21. Approved spark arrestors are required on all welding machines.
22. Always inspect grinders before each use. Grinders must have ground fault circuit interrupters (GFCI's)
23. Welding hoods must be equipped with the proper shaded lens for protection against radiant energy. (according to chart)
24. Make sure all sewers, drains, pits, pipe trenches, confined spaces; enclosed spaces have been tested for flammable vapors and/or hydrocarbons. Cover all openings per client policy.

Filter Lens Shade Numbers for Protection against Radiant Energy

| Shade Number | Welding Operation |
|--------------|--|
| 10 | Shielded metal arc welding 1/16, 3/32, 1/8, 5/32-in. diameter electrodes |

Burns Industrial Equipment

Hot Work Safety Program

Last Revision: 10/10/2018

Approved By: TOM BETSCHART

| | |
|----------|---|
| 11 | Gas-shielded arc welding (nonferrous) 1/16, 3/32, 1/8, 5/32-in. diameter electrodes |
| 12 | Gas-shielded arc welding (ferrous) 1/16, 3/32, 1/8, 5/32-in. diameter electrodes |
| 12 | Shielded metal-arc welding 3/16, 7/32, 1/4-in. diameter electrodes |
| 14 | Shielded metal-arc welding 5/16, 3/8-in. diameter electrodes. |
| 10 to 14 | Atomic hydrogen welding |
| 14 | Carbon arc Welding |
| 2 | Soldering |
| 3 or 4 | Torch Brazing |
| 3 or 4 | Light cutting, up to 1 in. |
| 4 or 5 | Medium cutting, 1 in. to 6 in. |
| 5 or 6 | Heavy cutting, over 6 in. |
| 4 or 5 | Gas welding (light), up to 1/8-in. |
| 5 or 6 | Gas welding (medium), 1/8-in. to 1/2-in. |
| 6 or 8 | Gas welding (heavy), over 1/2-in. |

Gas Cylinders

1. Compressed gas cylinders are to be shut-off at the bottle when not in use or unattended for short periods of time. At the end of the shift the bottles are to be shut off and gauges and hoses detached and properly stored and protective caps installed.
2. Compressed gas cylinders shall have gauges removed and be capped prior to transportation. Cylinders shall only be transported or stored in the up position.
3. Use approved storage racks or dollies to store compressed gas cylinders. Chain or #9 wire may also be used. Never use rope for this purpose.
4. On welding rigs compressed gas cylinders shall be securely stored in vertical racks.
5. Oxygen and acetylene cylinders must be stored at a distance of 20 feet apart or be separated by a fire wall that is 5 feet or higher and has a fire rating of 60 minutes or more. These cylinders must be kept at least 20 feet away from combustibles or separated by a fire wall.
6. Do not use a choker or chokers to haul cylinders.
7. Keep cylinders away from work so sparks, slag, or flame cannot reach them. If cylinders cannot be isolated, fire resistant shields must be provided for them.
8. Cylinders shall always have the gauges removed and cylinder caps installed prior to being moved.
9. Acetylene shall never be exposed to unalloyed copper except in a torch.
10. Compressed gas cylinders shall be equipped with connections that conform to ANSI B57.1-1965.
11. Cylinders shall be marked to identify contents.
12. No more than 15 psi of acetylene shall be used at any time.
13. Bottles shall be slightly opened then closed just prior to attachment of the regulator.
14. Torches shall be lighted by friction lighters, not matches or other hot work.
15. Welders must insure that lines have been adequately purged prior to working on them.

Burns Industrial Equipment

Hot Work Safety Program

Last Revision: 10/10/2018

Approved By: TOM BETSCHART

16. Equipment shall be inspected for leaks daily. Unserviceable/non-approved equipment may not be used.
17. All welders shall possess current certifications.
18. Hot work area shall be kept damp at all times.
19. Unattended/unused welding machines shall be turned off.
20. Fire Watches shall remain on site for 1/2 hour after job.
21. MOST IMPORTANTLY: NO HOT WORK PERMIT = NO WELDING.

Ventilation

The following are ventilation requirements for welding.

1. Ensure that adequate ventilation is provided for employees working with welding and cutting equipment. Confined space work will have a plan to address securing of cylinders, lifelines, and warning systems that will be utilized by the safety attendant (Fire Watch/Confined Space Attendant).
2. Ensure that contaminated air exhausted from a working space is discharged into the open air or otherwise clear of the source or intake air.
3. Do not use oxygen for ventilation, comfort cooling, blowing dust from clothing, or for cleaning a work area.
4. Ensure that all necessary precautions are taken to prevent the accumulation of gases when cutting torches are used.
5. Do not take compressed gas cylinders into confined areas.
6. Ventilation equipment consists of air siphons (air movers), and/or exhaust blower (copus air mover).
7. When using blowers or siphons to exhaust fumes, exhaust inlet must be kept as close as possible to the work. Air siphons use large amounts of compressed air. The following safety procedures shall be followed:
 - Keep connecting air hoses as short as possible.
 - Do not attempt to operate more than one siphon off a single air hose or outlet.
 - If used to exhaust a vessel, be sure to seal the bell of the inlet side around the manhole or vessel opening.
 - A daily inspection of the safety screens' condition should be accomplished on the blowers. Repair or replace if broken. The use of a blower hinge is also recommended.

Planning Hot Work Welding

In planning or carrying out hot work, certain factors should be considered besides the obviously important hot work permit, gas test and hazard analysis. Those factors include, but are not limited to:

Burns Industrial Equipment

Hot Work Safety Program

Last Revision: 10/10/2018

Approved By: TOM BETSCHART

1. The base metal and its health effects. The MSDS on the metal is available and will address this issue.
2. The welding or burning process to be used and its special health problems, if any.
3. The location of the work: Is the work to be done in the open or in a confined space?
4. Ventilation required: Is special ventilation equipment needed?
5. Position of the work: Is the work overhead or below? Can it be positioned to allow fumes to be carried away without entering the welder's breathing zone?
6. Presence of other employees near the job: Is eye protection needed against ultraviolet radiation? Are other workers in the path of the welding fumes?
7. Cleanliness of the metal surface: Are harmful or flammable materials present beneath patches or in seams?
8. Respiratory protection: Are fume respirators adequate, or are air-supplied respirators needed? Protection must be appropriate to the circumstances and must meet the minimum requirement of the permit, but also may be upgraded.
9. Ensure adequate first aid supplies are available before beginning work. All injuries will be reported immediately.

Welding and Burning Safe Practices

The following information is the recommended minimum precautionary measure to be followed in performing the types of hot work listed in Table 13-1. If, in the opinion of the supervisor, additional protection is required for a particular welding or burning job, such added protective measures should be used.

Open Area includes most outside work, the mechanical shop (except vessels or partitioned areas inside the building) and well-ventilated large rooms, buildings or tanks. Confined Spaces include work areas such as inside small tanks, drums, towers, or other vessels, whether indoors or out, as well as small rooms, deep excavations, and manholes.

Table 13-1 - Welding and Burning Stick Electrode Welding

| Electrode | Basic Elements | Byproducts | Precautions |
|------------------------|------------------------|-----------------------|-------------|
| AWS E-6010 | Iron | | A |
| AWS E-6011 | Iron | | A |
| AWS E-6012 | Iron | | A |
| AWS E-6013 | Iron | | A |
| AWS E-6020 | Iron | | A |
| E-316 Stainless 18-12 | Chromium, Nickel, Iron | Chromium, Nickel | B |
| E-310 Stainless 25-20 | Chromium, Nickel, Iron | Chromium, Nickel | B |
| e-308 Stainless 18-8 | Chromium, Nickel, Iron | Chromium, Nickel | B |
| E-610 12% Cr | Chromium, Iron | Chromium | B |
| E-502 5% Cr | Chromium, Iron | | A |
| E-605 9% Cr | Chromium, Iron | | B |
| E-7018 Low Hydrogen | Iron | Chromium Fluorides | C |
| E-8018 B-2 (1-1/4% Cr) | Chromium, Iron | | A |
| E-9018 B-3 (2-1/4% Cr) | Chromium, Iron | | A |
| E-8108 C-2 (3-1/2% Ni) | Nickel, Iron | | |

Burns Industrial Equipment

Hot Work Safety Program

Last Revision: 10/10/2018

Approved By: TOM BETSCHART

| | | | |
|--------------|---|------------------|---|
| Stoody 6 | 65% Cobalt, 45% Tungsten, 28% Chromium Cobalt | Chromium | B |
| Eutectic 680 | High Chromium, Nickel | Chromium, Nickel | B |
| Inco-A | 68% Nickel | Nickel | B |
| Inconel 182 | 65% Nickel | Nickel | B |
| Monel 190 | 60% Nickel, 23% Copper | Nickel, Copper | B |
| Ni-Rod 55 | 60% Nickel | Nickel | B |
| Carpenter 20 | 36% Nickel, 20% Chromium | | B |

Precautions:

A. No special precautions are needed in open or well-ventilated areas. Work in poorly ventilated areas will require respiratory protection. Work in confined spaces may require fume filter-type respirators or supplied air. Adhere to or upgrade permit requirements. Consult the Welding Supervisor.

B. Moderate amounts of fumes generated:

1. Use exhaust blowers or air siphons to remove fumes from breathing zone in open areas.
2. Work in confined spaces will require high efficiency particulate respirators.

C. Fumes and gases generated:

1. Use exhaust blowers or air siphons to remove gases and fumes from breathing zone in open areas.
2. Work in confined spaces will require air-supplied respirator.

D. Intense arc. Large amounts of metal fumes and gases generated:

1. Provide adequate ventilation of work. Use fume exhausters to remove fumes and gases from breathing zone in open areas. Do not direct exhaust air toward other employees. Use fume filter-type respirators in open areas.
2. In confined areas, adequate ventilation must be provided and air-supplied respirator must be worn.

E. Use only in metalizing hood. If necessary to metalize in other locations, use air-supplied respirator and protect other workers in the vicinity. Do not use any lead alloys in open shop area.

**Table 13-1
Tungsten Arc Welding, Gas Shielded (Heliarc)* (TIG)**

| Rod | Basic Elements | Harmful Byproducts | Precautions |
|-------------------|-------------------------------|------------------------|-------------|
| Evedur 1010 | 05.6% Copper Silicon | Copper, Ozone | C |
| Oxweld 372 Copper | 98% Copper | Copper, Ozone | C |
| AWS ER 4043 | Aluminum, Silicon | Ozone | C |
| AWS ER 5356 | Magnesium, Aluminum | Ozone | C |
| Oxweld 28 | 18% Chromium, 8% Nickel, Iron | Chromium, Nickel Ozone | C |
| Steel | Steel | Ozone | C |
| 1-1/4% Chromium | Chromium, Iron | Ozone | C |
| 2-1/4% Chromium | Chromium, Iron | Ozone | C |

*High levels of ultraviolet light produced. Avoid eye flash with side shield goggles. Avoid skin burns with proper clothing.

C. Fumes and gases generated:

1. Use exhaust blowers or air siphons to remove gases and fumes from breathing zone in open areas.
2. Work in poorly ventilated areas will require respiratory protection.
3. Work in confined spaces will require air-supplied respirator.

Short Arc Consumable Electrode Gas Shield* (MIG)

Burns Industrial Equipment

Hot Work Safety Program

Last Revision: 10/10/2018

Approved By: TOM BETSCHART

| Wire | Basic Elements | Harmful Byproducts | Precautions* |
|--------------------|---------------------------------|-----------------------|--------------|
| 18-8 Stainless | 18% Chromium, 8 % Nickel, Steel | Chromium,Nickel,Ozone | B |
| 25-20 Stainless | 25% Chromium, 20% Nickel, Steel | Chromium,Nickel,Ozone | B |
| Oxweld 63 | 98% Copper | Copper, Ozone | B |
| Airco 110 | 98% Copper | Copper, Ozone | B |
| Oxweld 62 | 91.5% Copper, Aluminum | Copper, Ozone | B |
| Type 316 Stainless | 18% Chromium, 13% Nickel, Steel | Copper, Nickel, Ozone | B |
| Aluminum | Aluminum | Ozone | B |
| Hastelloy B | Nickel, Molybdenum | Nickel, Ozone | B |
| Inconel 62 | Chromium, Nickel | Nickel, Ozone | B |
| Oxweld 65 | Iron | | B |

*High levels of ultraviolet light produced. Avoid eye flash with side shield goggles. Avoid skin burns with proper clothing.

B. Moderate amounts of fumes generated:

1. Use exhaust blowers or air siphons to remove fumes from breathing zone in open areas.
2. Work in confined spaces or poorly ventilated areas will require high efficiency particulate respirators.

Acetylene Welding and Brazing

| Wire | Basic Elements | Harmful Byproducts | Precautions |
|----------------|---|-------------------------|-------------|
| Hastelloy D | Silicon, 90% Nickel | Nickel | A |
| Oxweld 5M | Copper, Zinc, Tin | Copper, Zinc | B |
| 1 Oxweld | Steel | | A |
| Aluminum | Aluminum | | A |
| Everdur 1010 | Copper, Silicon | Copper | A |
| Arcosil J | 56% Silver, 22% Copper 17% zinc, 5% Tin | Copper, Zinc | B |
| Oxweld 28 | 18% Chromium, 8% Nickel, Steel | Chromium, Nickel | B |
| 18-8 Stainless | 18% Chromium, 8% Nickel, Steel | Chromium, Nickel | B |
| Easy-Flo | 45% Silver, 15% Copper 25% Cadmium, 16% Zinc | Copper, Cadmium Zinc | B |
| Sil-Fos | 15% silver, 80% Copper 5% Phosphorus | Copper | B |
| Oxweld 372 | 98% Copper | Copper | B |
| Colmonoy 6 | 65% Cobalt, 28% Chromium | Cobalt, Chromium | B |
| Chromium | Tungsten | | |
| Stoodite | Iron, 30% Chromium | Chromium | B |
| Borod | Tungsten Carbide, Iron | | |

A. No special precautions are needed in open or well-ventilated areas. Work in confined spaces or poorly ventilated areas may require fume filter-type respirators. Consult the mechanical welding and metals supervisor.

B. Moderate amounts of fumes generated:

1. Use exhaust blowers or air siphons to remove fumes from breathing zone in open areas.
2. Work in confined spaces will require high efficiency particulate respirators.

Silver Soldering and Soldering

| Rod, Wire | Basic Elements | Harmful Byproducts | Precautions* |
|-----------|----------------|--------------------|--------------|
|-----------|----------------|--------------------|--------------|

Burns Industrial Equipment

Hot Work Safety Program

Last Revision: 10/10/2018

Approved By: TOM BETSCHART

| | | | |
|-------------|-------------------------------|-----------------------|---|
| 1801 Super | Silver, Copper, Cadmium, Zinc | Copper, Cadmium, Zinc | B |
| 1602 | Silver, Copper, Tin | Copper | B |
| 18 FC | Copper, Tin Zinc | Copper, Zinc | B |
| 16 FC | Silver Copper, Nickel | Copper, Nickel | B |
| 15 Phoson | Silver Copper Phosphorous | Copper | B |
| 11 Allstate | Copper, Zinc, Nickel | Copper, Zinc, Nickel | B |

B. Moderate amounts of fumes generated:

1. Use exhaust blowers or air siphons to remove fumes from breathing zone in open areas.
2. Work in confined spaces will require high efficiency particulate respirators.

Air Arc Cutting and Gouging (Carbon Rod)*

| Material Worker | Basic Elements | Harmful Byproducts | Precautions* |
|------------------|-----------------------|--------------------|--------------|
| Steel | Iron | Iron Oxides | D |
| Cast Iron | Iron | Iron Oxides | D |
| Monel | Copper, Nickel | Copper, Nickel | D |
| Stainless Steels | Chromium Nickel, Iron | Chromium, Nickel | D |
| Chrome Steels | Chromium, Iron | Chromium | D |
| Brass | Copper, Zinc | Copper, Zinc | D |
| Copper | Copper | Copper | D |
| Aluminum | Aluminum | Nickel Oxides | D |
| High Nickel | Nickel | Nickel Oxides | D |

*Air gouging produces much higher metal fume levels than ordinary cutting or welding. Hearing protection needed for high noise levels.

D. Intense arc. Large amounts of metal fumes and gases generated:

1. Provide adequate ventilation of work. Use **fume** exhausters to remove fumes and gases from breathing zone in open areas. Do not direct exhaust air toward other employees. Use fume filter-type respirators in open areas.
2. In confined areas, adequate ventilation must be provided.
3. Use IH monitoring or representative sampling results to determine level of respiratory protection. If no monitoring or sampling results are available, supplied air must be used until analytical information is available to safely downgrade the level of protection.

Plasma Arc Cutting

| Metals Cut | Basic Elements | Harmful Byproducts | Precautions* |
|-----------------|------------------------|--------------------|--------------|
| Steel | Iron | Iron Oxides | D |
| Cast Iron | Iron | Iron Oxides | D |
| Monel | Copper, Nickel | Copper Nickel | D |
| Stainless Steel | Chromium, Nickel Steel | Chromium, Nickel | D |
| Chrome Steel | Copper, Steel | Chromium | D |
| Brass | Copper, Zinc | Copper, Zinc | D |
| Aluminum | Aluminum | Aluminum Oxides | D |
| Everdur | Silicon, Copper | Copper | D |
| Copper | Copper | Copper | D |

*High levels of ultraviolet light produced. Avoid eye flash with proper eye protection. Avoid skin burns with proper clothing. High noise levels produced. Hearing protection required.

D. Intense arc. Large amounts of metal fumes and gases generated:

1. Provide adequate ventilation of work. Use fume exhausters to remove fumes and gases from breathing zone in open areas. Do not direct exhaust air toward other employees. Use fume filter-type respirators in open areas.

Burns Industrial Equipment

Hot Work Safety Program

Last Revision: 10/10/2018

Approved By: TOM BETSCHART

2 Adequate ventilation must be provided in confined areas.

3. Use IH monitoring or representative sampling results to determine level of respiratory protection. If no monitoring or sampling results are available, supplied air must be used until analytical information is available to safely downgrade the level of protection.

