Environmental Health and Safety

Welding, Burning and Cutting Program

Pursuant to 29 CFR § 1910 Subpart Q and 29 CFR § 1926 Subpart J

Revised June 2020
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Welding, Burning and Cutting program

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Purpose and application
To provide written procedures to prevent the outbreak of fire, fire alarm activations, and smoke and odor migration in buildings resulting from permanent or temporary operation involving the use of open flames or which produces heat or sparks.

Scope
This procedure applies to work performed by any Arizona State University employee, student and contractor performing work in existing buildings, new construction in existing buildings or new construction attached to existing buildings.

This procedure shall apply to, but is not limited to, the following hot work processes:

- Grinding.
- Heat treating.
- Hot riveting.
- Powder-driven fasteners.
- Similar applications producing a spark, flame, or heat.
- Sweating pipe.
- Torch-applied roofing in conjunction with the requirements of NFPA 241, standard for safeguarding construction, alteration, and demolition operations.
- Welding and allied processes.

Training requirements
All employees intending to perform hot work activities must attend the following training:

- Complete annual ASU Fire Safety training.
- Online Hot Work Safety Awareness training.

Employees are also required to attend training when a new process or equipment has been obtained, when an unsafe act has been observed, or when the supervisor feels that retraining is necessary.

Confined space training is required when the work necessitates confined space entry. Documentation of all training is required. Welding Safety (Hot Work) training sessions are available through the EHS training website on the need, individual department training sessions may also be conducted by contacting EHS.

Responsibilities
Environmental health and safety, or EHS
- Audit compliance with this program as needed and notifying affected management of
any findings or opportunities for improvement.

- Provide hot work training.
- Provide policies, programs, and guidelines designed to ensure that safe work practices are developed, employed, and revised as necessary.
- Stopping hot work activities that do not have a proper permit issued.

**Fire marshal office, or FMO**

- Contacting lead person or supervisor to obtain more specific information about hot work activities, or visiting the work site, as deemed necessary.
- Perform review of all hot work permits for hot work activities for all new construction and renovation activities occurring on any ASU property or facility.
- Serve as a technical resource for fire prevention issues.
- Stopping hot work activities that do not have a proper permit issued.

**Capital programs management group (CPMG) and facilities management (FM)**

- Complete required hot work permit request form when necessary.
- Ensure that all contractors (both general and sub) post permits for the duration of the hot work.
- Ensure that the contractor is performing the required minimum fire watch.
- For new construction activities and renovation projects, assists EHS with the intent of this program.
- Maintain documentation of current and cancelled permits.
- Manage all designated hot work areas in accordance with this procedure.
- Suitably protect building occupants against hazards generated by the work.

**ASU employees, student clubs, and contractors**

- Follow the guidelines and provisions outlined in this program.

**Authorization**

Before cutting or welding is permitted, the FMO shall inspect the designed hot work area. The FMO shall designate precautions to be followed in granting authorization to proceed preferably in the form of a written permit.

Where combustible materials such as paper clippings, wood shavings, or textile fibers are on the floor, the floor shall be swept clean for a radius of 35 feet (10.7 m). Combustible floors shall be kept wet, covered with damp sand, or protected by fire-resistant shields. Where floors have been wet down, personnel operating arc welding or cutting equipment shall be protected from possible shock.

In the presence of explosive atmospheres, which may include mixtures of flammable gases, vapors, liquids or dusts with air, or explosive atmospheres that may develop inside
uncleaned or improperly prepared tanks or equipment which have previously contained such materials, or that may develop in areas with an accumulation of combustible dusts.

In areas near the storage of large quantities of exposed, readily ignitable materials such as bulk sulfur, baled paper, or cotton.

Relocation of combustibles. Where practicable, all combustibles shall be relocated at least 35 feet (10.7 m) from the work site. Where relocation is impracticable, combustibles shall be protected with flame proofed covers or otherwise shielded with metal or asbestos guards or curtains.

Based on fire potentials of plant facilities, establish areas for cutting and welding, and establish procedures for cutting and welding, in other areas.

Insist that cutters or welders and their supervisors are suitably trained in the safe operation of their equipment and the safe use of the process.

Advise all contractors about flammable materials or hazardous conditions of which they may not be aware.

**Prohibited areas**

Cutting or welding shall not be permitted in the following situations:

- Based on fire potentials of plant facilities, establish areas for cutting and welding, and establish procedures for cutting and welding, in other areas.
- Cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs shall not be undertaken if the work is close enough to cause ignition by conduction.
- Designate an individual responsible for authorizing cutting and welding operations in areas not specifically designed for such processes.
- Ducts and conveyor systems that might carry sparks to distant combustibles shall be suitably protected or shut down.
- If welding is to be done on a metal wall, partition, ceiling or roof, precautions shall be taken to prevent ignition of combustibles on the other side, due to conduction or radiation, preferably by relocating combustibles. Where combustibles are not relocated, a fire watch on the opposite side from the work shall be provided.
- In areas not authorized by management.
- In sprinkled buildings while such protection is impaired.
- Management. Management shall recognize its responsibility for the safe usage of cutting and welding equipment on its property and:
• Welding shall not be attempted on a metal partition, wall, ceiling or roof having a combustible covering nor on walls or partitions of combustible sandwich-type panel construction.

• Where cutting or welding is done near walls, partitions, ceiling or roof of combustible construction, fire-resistant shields or guards shall be provided to prevent ignition.

Permit holder

Permit holder shall:

• Be responsible for the safe handling of the cutting or welding equipment and the safe use of the cutting or welding process.

• Complete required hot work permit request form when necessary

• Conduct fire watch when required.

• Determine that fire protection and extinguishing equipment are properly located at the site.

• Determine that the cutter or welder secures his approval that conditions are safe before going ahead.

• Determine the combustible materials and hazardous areas present or likely to be present in the work location.

• Determine the combustible materials and hazardous areas present or likely to be present in the work location and advise all contractors about flammable materials or hazardous conditions of which they may not be aware.

• Ensure that workers performing hot work are trained and know the procedures that apply to the specific work or task being performed

• Post permits for the duration of the hot work

• Secure authorization for the cutting or welding operations from EHS or FMO.

• See that cutting and welding are so scheduled that plant operations that might expose combustibles to ignition are not started during cutting or welding.

Permits

A Hot Work Permit application submitted with welder’s certification and photo identification is required when performing hot work involving welding, cutting, use of an open torch, brazing or other similar operations on campus. All hot work permits must be retained in department records for a minimum of one year.
CPMG

• All hot work permits must be retained in department records for a minimum of one year.
• All project managers and project coordinators supervising contractors intending to perform hot work activities must also complete a hot work permit and submit for review and approval.
• Post the signed and approved hot work permit in the vicinity of where the hot work will be performed and for the duration of the hot work activity. Permits must be posted at the job site in an accessible and conspicuous location.
• Provide a 2nd spotter and fire extinguisher on site.
• Verify a fire watch for at least thirty (30) minutes after hot work activity has been completed.

Art studios theater shops and machine shops

• All hot work permits must be retained in department records for a minimum of one year.
• Hot work activities that are conducted in designated shop areas require an annual inspection and permit.
• Hot work done outside of the shop and in or near any facility must go through the FMO permit process.

A hot work permit will **not** be issued if the following conditions exist:

• All wall and floor openings are open and not covered.
• An explosive atmosphere exists. Use air-monitoring equipment to determine safe levels of combustible gases and vapors.
• Appropriate fire extinguisher is not immediately available for use.
• Combustible or flammable materials are within thirty-five (35) feet and cannot be moved or protected from ignition sparks.
• Cutting or welding on pipes or other metals conducts enough heat to ignite combustible materials located nearby.
• Fire protection system is not in service.
• Fire Watch personnel performing other duties.
• Work is not covered underneath by a fire-resistive tarpaulin or similar material.

**Designated hot work areas**

A designated hot work area may be established where hot work activities are occurring frequently and conditions are maintained in compliance with this program.

**Permanent hot work designation locations**
Departments that perform hot work on a routine basis in a permanent hot work location will be exempt from the permit requirements only if the area is inspected, approved and issued an annual registration and inspected annually by EHS. The registration must be renewed on a yearly basis or when changes in the shop warrant a repeat inspection. When approved by the EHS inspector, a sign will be posted at the work site that reads "Hot Work".

Each hot work area must register with EHS and must complete the Safety Hot Work Checklist identified in Appendix C quarterly and maintain copies for at least one year for review by EHS during planned and unannounced inspections.

FDM, contractors, and academic departments that perform hot work on a routine basis in a permanent shop.

- Any deficiencies to the designated hot work area or shop must be corrected to continue the designation of "Hot Work Approved Area.
- New permit is required if changes are made to the shop.
- Registration and inspection of permanent hot work locations shall occur annually.
- Registrations shall be kept by the department for one year.
- Signage will be posted at the work site that reads "Hot Work Approved Area".

Temporary hot work designation locations

FDM, contractors, and academic departments that perform hot work as a one time or non-regular routine basis.

- Hot work permit shall be posted at the work site.
- Permits are only good for duration specified on permit.
- The area shall be inspected, approved and issued a permit by the FMO.

Hot work equipment

Hot work equipment includes but not limited to, oxygen/fuel gas welding and cutting, ARC welding and cutting, and metal cutting equipment.

1. Equipment must be inspected by the operator prior to use.

2. Stored portable oxygen/fuel gas welding and cutting equipment located inside of a building must be in a well-ventilated dry location at least 20 feet from combustible materials and away from elevators, stairs, or means of egress.

3. Make sure the system is equipped with a flashback arrestor.

4. Operate the equipment according to manufactures specifications.
5. Emergency disconnects must be provided, e.g., a switch or circuit breaker must be provided to ARC welding equipment (the electrical disconnect shall be labeled "Emergency Disconnect" and must be visible).

**Fire protection and prevention**

It is the responsibility of each supervisor to ensure that all employees involved in all hot work activities adhere to all fire protection and prevention procedures.

Per Standard for Fire Prevention in Use of Cutting and Welding Processes, NFPA Standard 51B, the basic precautions for fire prevention in welding or cutting work are:

**Fire hazards** - If the object to be welded or cut cannot readily be moved, all movable fire hazards in the vicinity shall be taken to a safe place.

**Guards** - If the object to be welded or cut cannot be moved and if all the fire hazards cannot be removed, then guards shall be used to confine the heat, sparks, and slag, and to protect the immovable fire hazards.

**Restrictions** - If the requirements stated in this procedure cannot be followed then welding and cutting shall not be performed.

**Special precautions** - When the nature of the work to be performed falls within the scope of paragraph 1910.252 (a)(2), certain additional precautions may be necessary:

**Combustible and flammable materials** - Remove all combustible and flammable materials 35 feet from the work area/hazard zone. Wherever there are floor openings or cracks in the flooring that cannot be closed, precautions shall be taken so that no readily combustible materials on the floor below will be exposed to sparks which might drop through the floor. The same precautions shall be observed with regard to cracks or holes in walls, open doorways and open or broken windows.

**Fire extinguishers** - Suitable fire extinguishing equipment shall be maintained in a state of readiness for instant use. Such equipment may consist of pails of water, buckets of sand, hose or portable extinguishers depending upon the nature and quantity of the combustible material exposed. A minimum of 2-A, 20BC fire extinguisher must be readily available (contractors must provide their own fire extinguishers which must be compliant with NFPA standard).

Proper safety precautions/measures are taken to prevent fire danger. Inspection must confirm the hot work area is free of debris and that flammable liquids or vapors, lint, dust, or combustible materials/storage are not at risk of ignition from sparks or hot metal.
A fire watch shall be provided during hot work activities and shall continue for a minimum of 30 minutes after the conclusion of the operation. Individuals designated for the fire watch shall have fire-extinguishing equipment readily available and must be trained in use and capabilities of such equipment.

Be aware of the location of their nearest exits and fire alarm pull stations (if provided) and have a fully charged fire extinguisher ready.

All contractors involved in hot work must complete a Service Provider Acknowledgement Agreement and comply with its requirements. All contractors must obtain a Hot Work Permit from Capital Program Management Group (CPMG).

Isolation of fire detection systems

Fire detection equipment must be protected from false activation and damage. If hot work impacts the fire detection system, the FM Fire Systems Technicians must be notified for proper instructions to deactivate, disable, or take off line any devices in the impacted area. Work must not proceed until the FM Fire Systems Technician confirms the deactivation of the impacted fire alarm devices. Minimal impairment of the fire detection systems must be maintained at all times. Project Manager (PM), tradesmen, and contractors must ensure fire detection systems are isolated where hot work is being performed, as appropriate.

Fire watch for welding activities

The Fire Watch may only be performed by an individual who is not performing any other duties that would take attention away from the area where the hot work is performed.

- A minimum of 2-A, 20BC fire extinguisher must be readily available.
- Be aware of the inherent hazards involved in hot work.
- Be aware of the location of their nearest exits and fire alarm pull stations (if provided) and have a fully charged fire extinguisher ready.
- Be familiar with the surrounding facilities to sound an alarm in the event of a fire
- Be trained in campus fire safety procedures and the use of fire extinguishing equipment.
- Complete annual ASU Fire Safety training.
- Complete Welding Safety training.
- Contractors must provide their own fire extinguishers which must be compliant with NFPA standard.
- Ensure that any covers from sprinkler heads are immediately removed upon completion of the hot work. Sprinkler heads cannot be covered after work hours and must be removed.
- Ensure that appropriate fire extinguishers are readily available at the job site.
• Ensure that no condition arises, or action is taken, that will lead to a hazardous situation in the hot work area.
• Ensure that safe conditions are maintained during the hot work.
• Have means of emergency communication to ASU Police Department.
• Know how to report a fire or other emergency situation.
• Must remain in a location that allows immediate communication with the individual(s) performing hot work.
• Must remain in the work area after work is completed to ensure the risk of fire from hot work has passed (minimum of thirty (30) minutes).

• Using appropriate Personal Protective Equipment.
• Watch for fires in all exposed areas for a minimum of thirty (30) minutes (including lunch and break times), sound the alarm if necessary, and try to extinguish fires only when obviously within the capability of the equipment available;

Health/safety protection and ventilation
Engineering controls for prevention of contamination and exposure control must be established for each work area as follows:

• Atmospheric testing and monitoring for combustible gases and vapors must always be conducted inside a confined space before work commences and at regular and predetermined intervals thereafter. Contact EHS for additional assistance.

• Forced air ventilation is required indoor or confined spaces where mechanical ventilation is not in place.

• Hot work activity in enclosed areas not designed for human occupancy must be conducted in accordance with the ASU Confined Space Entry Policy (EHS102). Hot work conducted in confined spaces must follow the ventilation requirements in 29 CFR 1910. 254 (c)(4).

• Hot work should not be conducted in the presence of explosive mixtures of flammable gases, vapors, liquids, or dusts or where explosive mixtures could develop inside improperly prepared tanks or equipment.

• The dimension of the space vertically or horizontally may confine movement of operation or restrict egress. All personnel involved in hot work must identify emergency egress procedures.

• The materials used to perform hot work have the potential of producing airborne contaminants that may potentially expose those involved with or near the hot work. Safety Data Sheets on all products used for operation should be reviewed by all
affected personnel and must be immediately available and provided to any employee requesting them.

- Ventilation should be adequate, depending on volume and configuration of space, number and type of operations that are generating contaminants, natural air flow rate where operations are taking place, location of the welding breathing zone, and whether ventilation can be obtained mechanically or naturally. Minimum ventilation for welding requires: (1) a minimum of 2000 cubic feet per minute per welder as general ventilation, or (2) local exhaust ventilation (at the point of contaminant generation) of 100 linear feet per minute (29 CFR § 1910.252).
- Ventilation techniques for welding operations vary depending on size and type. For basic operations, fans will provide enough ventilation. However, ventilation should never be relied on as the only method of protecting employees when it is suspected that air contaminants are present. Where ventilation is poor, respirator use should be evaluated before hot work activities commence. Ventilation of the space where hot work is going to occur should be evaluated based on the guidelines provided below:
- While working in poorly ventilated spaces, exposure to air contaminants generated by welding or cutting must be controlled by ventilation, respiratory protection, or by a combination of the two.

**Compressed gas cylinders, or CGC**

When performing hot work in confined spaces, employees must comply with ASU’s Compressed Gas Safety Plan.

**Handling**

- CGC should be inspected before using to check for leaking, corrosion, cracking, burn marks, contaminated valves, worn hoses and faulty connectors, or broken gauges. If any defective condition is discovered, the CGC should not be used.
- Cylinders should be secured in the upright position to prevent tipping.
- Regulators must be compatible with the cylinder and its content. Many regulators are similar in design and construction, so it is necessary to check the regulator's model number and compare it with the cylinder's requirements to ensure compatibility.
- Cylinder carts equipped with cylinder restraints such as a chain or strap should be used for transporting and while using CGC. Never drop cylinders or let items fall on them.
- Do not accept delivery of acetylene CGC that arrive in the horizontal position. Transporting cylinders in this manner makes them much more susceptible to explosion.
• CGC should be inspected before using to check for leaking, corrosion, cracking, burn marks, contaminated valves, worn hoses and faulty connectors, or broken gauges. If any defective condition is discovered, the CGC should not be used.
• Never open valves until regulators are drained of gas and pressure adjusting devices are released. When opening CGC, point outlets away from people and sources of ignition and open valves slowly. On valves without handle wheels, use only supplier recommended wrenches. On valves with handle wheels, never use wrenches. Never use a hammer to turn a handle wheel open or closed.
• When cylinders are empty, close and return them. Empty CGC must be marked "MT" or "Empty."

Storage
• Check the manufacturer's model number and compare it with the gas supplier's requirements and with the gas cylinder.
• Cylinder carts must be used to transport cylinders from location to location
• Cylinders must be secured from tipping and secured in an upright position while in use. The cylinder must be braced from tipping over by placing a strap or chain around the top third of the cylinder.
• Empty or unused gas cylinders must be promptly returned to the supplier
• Gas cylinders and welding equipment must be left outside the work space where the work was performed. Examples of such locations include boilers, tanks, or pressure vessels.
• Heavy portable equipment mounted on wheels must be securely blocked to prevent movement.
• Oxygen and acetylene must be stored at least twenty (20) feet apart and separated by a non-combustible wall at least five (5) feet in height
• Oxygen and fuel gas cylinders must be stored separately with protective valves in place.
• Protective valve caps should be in place on the CGC when it is placed into storage. This will reduce the likelihood that a blow to the valve will result in leakage.
• Regulators must be compatible with the CGC and designed for the appropriate cylinder.
• When stored, CGC should be arranged in such a way that old stock will be used before new stock.

Confined spaces
• De-energize electrode holders by disconnecting the power supply when arc welding is to be halted or welder needs to leave the job.
• Ensure that available ventilation in the confined space meets the ventilation requirements.
• Keep all gas cylinders and welding machines outside of confined spaces
- Positively isolate the gas supply outside the confined space when torches are not in use for a substantial period of time (such as during lunch). When practical, employees should remove torches and hoses from confined spaces.
- When hot work activities are conducted in a confined space, the space will be a permit required confined space.
- When performing hot work in confined spaces, employees must comply with ASU’s confined space entry program.

**Warning signs, barricades and barriers**
In order to control traffic, barriers and proper signs must be posted to ensure traffic is prevented from exposure to hot work areas. Shields must be used to prevent exposure to sparks and flashes. A clear path to an exit of at least forty-four (44) inches must be maintained at all times. Whenever possible, vehicular traffic should be kept out of hot work areas while work is in progress.

**Personal protective equipment**
The following PPE must be used to protect the employee from physical hazards while performing hot work:
- Flame-resistant gloves must be worn to protect the hands during hot work activities
- Goggles and/or safety glasses must be worn to protect the eyes.
- Protective clothing must be worn to cover all body parts and to protect against ultraviolet and infrared flash burns.
- Welding helmets must be worn to protect the face and to protect users from arc rays, welding sparks, and splatters.

**Information and external references**
- American National Standard Institute (ANSI) ANSI Z49.1: Safety in Welding, Cutting and Allied Process
- Arizona Administrative Code R4-36-201 et seq.
- ASU Compressed Gas Safety Plan.
- ASU Confined Space Entry Program.
- ASU Facilities Building Permit and Inspection Requirements.
- ASU Hot Work Operations/Cutting and Welding Compliance Guidelines.
- International Building Code (IBC)
- International Fire Code (IFC)
- National Fire Protection Association (NFPA) Standard
- Occupational Health and Safety Administration (OSHA) 29 CFR § 1910 Subpart Q
- Occupational Health and Safety Administration (OSHA) 29 CFR § 1926 Subpart J
Brazing and Soldering – Soldering and brazing uses molten metal to join two pieces of metal. The metal added during both processes has a melting point lower than that of the work piece, so only the added metal is melted, not the work piece. Brazing produces a stronger joint than does soldering, and often is used to join metals other than steel, such as brass. Brazing can also be used to apply coatings to parts to reduce wear and protect against corrosion.

Combustible Materials – Solid materials that are capable of burning and igniting.

Confined Space – A space that has all of the following characteristics:
1. It is large enough and so configured that a person can bodily enter; and
2. It has limited or restricted means for entry or exit; and
3. It is not designed for continuous occupancy.

Confined spaces can be classified into two categories:
- High-hazard permit-required confined space.
- Low-hazard non-permit required confined space.

Low-hazard confined spaces are those confined spaces that do not contain or have the potential to contain any atmospheric or other hazards capable of causing death or serious physical harm. A low-hazard confined space may become a high-hazard confined space if there are hazardous materials brought into the space or if hazardous activities (such as welding, brazing, or cutting) are conducted in the space.

Permit-required confined spaces are those spaces that contain high hazards and are based on their inherent hazard potential. For a high-hazard permit-required confined space, an entry permit is used to ensure proper hazard evaluation, safe entry, safe work and safe exit. See Section 5.4 for additional information on confined spaces.

Cutting – Any process, including grinding, which produces sparks capable of igniting combustible or flammable materials and transmits heat to the work material from a hot gas.

Fire marshal office (FMO) – At ASU campuses, the State Fire Marshal's office has delegated the designated ASUFMO as the Authority Having Jurisdiction for plan review and construction inspections. The ASUFMO also has the responsibility and authority to enforce State Fire Marshal regulations and requirements on campus.

Designated hot work area – A room or other enclosed location designated for the purpose of hot work and registered with EHS as a laboratory or for storage of hazardous materials.

Fire watch for welding activities – At least one individual dedicated solely to the look out and control of stray fires.
**Flammable compressed gas** - Flammable compressed gases have dangers besides high pressure. These gases can easily catch fire and burn rapidly. These include acetylene, hydrogen, natural gas and propane.

**Flammable materials** – Solid or liquid materials that are capable of igniting at a low temperature and continuing to burn.

**Grinding** – See the definition for Cutting.

**Hot work** – Operations such as welding, cutting, burning, heating, grinding, or similar spark, slag, or intense heat producing activities that are capable of igniting combustible materials or flammable atmospheres or providing a source of ignition for a fire. Also defined as cutting and welding operations for construction/demolition activities that involve the use of portable gas or arc welding equipment, open flame or spark-producing apparatus.

**Hot work permit** – A hot work permit is the means by which Capital Programs Management Group (CPMG) and EHS can stay aware and keep track of construction and all other activities that involve hot work. EHS also provides a step-by-step checklist for hot work fire safety and serves as a reminder to contractors of their fire prevention responsibilities before, during, and after any hot work is conducted. The permit system is intended to educate the parties involved in construction of these hazards to implement control measures to help mitigate them.

**Management** - For the purpose of hot work, all persons, including owners, contractors, educators, who are responsible for hot work operations.

**New construction** – New work that is comprised of structural and mechanical work creating new buildings. The following are the types of hot work anticipated for new construction:
- General activities hot work: All other cutting/welding for equipment/building component installations (handrails, guardrails, specialties, and ornamental metal) and HVAC equipment installations.
- Mechanical work: Tunnel services connections, building system installations, HVAC equipment installations.
- Structural hot work: Cutting/welding reinforcing steel and structural steel for all of the project's structural work (tunnels construction, building super-structure, and site work).

**Nonflammable compressed gas** - These types of gases do not catch fire easily or burn quickly, but will eventually burn and possess other dangers. The cylinder label and Material Safety Data Sheet (MSDS) will describe the toxic properties and physical
hazards posed by specific nonflammable compressed gases. These include: ammonia, argon, carbon dioxide, nitrogen, oxygen, chlorine, and nitrous oxide. Symptoms of exposure include dizziness, unconsciousness, or suffocation under certain circumstances. They can also be harmful if inhaled, and can cause irritation to the eyes, nose, throat, and lungs.

**Permit** - A document issued by the authority having jurisdiction for the purpose of authorizing performance of a specified activity.

**Permit holder** - The individual responsible for activities conducted in the hot work area and is issued the hot work permit.

**Renovations and remodels** - New work that takes place in an existing building. The following are the types of hot work anticipated for renovations/remodels:
- Demolition hot work: Dismantling built-in equipment, removal of discontinued/abandoned services, new services tie-ins, building system installations/modifications.
- General hot work activities: All other cutting/welding for equipment/building component installations (handrails, guardrails, specialties, and ornamental metal).
- Mechanical hot work: Removal of discontinued/abandoned services, new services tie-ins, building system installation/modifications.

**Shielding** – Non-combustible welding drapes, used in hot work areas. Visible signs should be displayed on shielding while hot work is being performed.

**Shop** - Any area designed as a shop or work area for any type of “hot work” that is not related to construction or renovation projects (i.e., welding shops, areas and equipment utilizing grinding tools, torches, etc…that may cause sparks, fire or hazardous vapors or fumes).

**Smoldering** – A slow combustion of material without visible light and generally evidenced by smoke and an increase in temperature.

**Soldering** - Soldering uses metals with a melting point below 800 degrees Fahrenheit. Soldering is commonly used to join electrical, electronic, and other small metal parts.

**Thawing pipe** – Devices for thawing the frozen fluid in pipes or pipes having the means for preventing the fluid from freezing or the pipe from bursting when the fluid freezes.

**Torch operations** – A plasma torch is used as an advanced tool for welding and cutting operations. Intense ultraviolet radiation, high noise levels, and gases are generated during this process.
**Welding** – Welding is the most common way of permanently joining metal parts. In this process, heat is applied to metal pieces, melting and fusing them to form a permanent bond. The following lists the most commonly practiced forms of welding:

- **Arc Welding** – The act of joining or cutting metals by generating heat from an electric arc that extends between the welding electrode and the electrode placed on the equipment being welded.


- **Resistance Welding** – The act of joining or cutting metals by generating heat through resistance created by the flow of an electric current.
Appendix B

CPMG Building Permit Application
BUILDING PERMIT APPLICATION

ARIZONA STATE UNIVERSITY
FACILITIES DEVELOPMENT AND MANAGEMENT
CPMG - CONSTRUCTION SUPPORT SERVICES

Permit Type: ☐ Demolition(DP) ☐ Electrical(EP) ☐ Emergency Repair(ER) ☐ Hot Work(hot work) ☐ Insurance Claim(IC)

*Polytechnic Building Demos require URED Approval

☐ New Construction/Remodel(BP) ☐ Recordkeeping Review(RK) ☐ Temp Power(TP) ☐ Other(OP) ______

Target Date to Complete Code Review:

Permit #:

Addendum #:

Attach 2 copies of plans & deliver to CPMG, MC 5512 or scan and email to DL.WG.CPMG.BCSS. ASU’s Permit & Inspection Requirements are available at: http://cfo.asu.edu/fdm-bldg-permit-requirements.

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<td>If remodeled area is a lab, provide lab details.</td>
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<tr>
<td>Bldg Name/Area:</td>
<td>Bldg #:</td>
</tr>
<tr>
<td>Work Order#:</td>
<td>Room(s):</td>
</tr>
<tr>
<td>ASU Project#:</td>
<td>Project Start Date:</td>
</tr>
<tr>
<td>Current Use of Area:</td>
<td>Completion Date:</td>
</tr>
<tr>
<td>Use of Remodeled Area:</td>
<td>If remodeled area is a lab, provide lab details.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Scope:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition: If project is a demolition, will demo consist of wrecking any load-supporting structural member? Yes ☐ ☐ Deliver NESHAP Notification to CSS.</td>
<td></td>
</tr>
<tr>
<td>Dust Control: Is construction activity a dust generating activity that disturbs surface area of 1/10 acre or more? Yes ☐ ☐ Deliver Dust Control Plan and Permit to CSS.</td>
<td></td>
</tr>
<tr>
<td>Stormwater: Will construction activities (clearing, grading, excavating, stockpiling) result in land disturbance equal to or greater than one or more acres of land or will construction activities disturb less than one acre of land that is part of a larger common plan of development that will ultimately disturb one or more acres? Yes ☐ ☐ Deliver Stormwater documents to CSS.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applicant Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager:</td>
<td>Phone:</td>
</tr>
<tr>
<td>Requesting Dept Contact:</td>
<td>Phone:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contractor Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name:</td>
<td>ROC#:</td>
</tr>
<tr>
<td>Superintendent Name:</td>
<td>Email:</td>
</tr>
<tr>
<td></td>
<td>Phone:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CSS Use Only</th>
<th>Signature</th>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADA Code Review</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asbestos Services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Code Review</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EHS – Fire Safety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EHS – Lab Safety/Biosafety</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Health Services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approved by CSS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plan Review Notification</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ASU Police</td>
<td>Parking &amp; Transit</td>
</tr>
<tr>
<td>Blue Stake/Drainage</td>
<td>Office of the University Architect</td>
</tr>
<tr>
<td>Facman</td>
<td>University Business Services</td>
</tr>
</tbody>
</table>
Appendix C

Hot Work Safety Check List
Hot Work Area Safety Inspection Checklist

Please complete this checklist within one (1) week of receipt and return to EHS at EHS@asu.edu or MS6412. Contact EHS at 480-965-1823 to discuss any no response that cannot be addressed prior to scheduled hot work. You will receive this form quarterly. Failure to complete and return checklists may result in your area no longer being a designated hot work area.

Designated Hot Work Area Location: Building: ______________ Room No. ______________

<table>
<thead>
<tr>
<th>Item to be verified as in place or ongoing for each designated hot work area.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designated Room/s or shops have a current EHS Safety Registration signage posted.</td>
<td></td>
</tr>
<tr>
<td>Hot work equipment to be used shall be in satisfactory operating condition and in good repair.</td>
<td></td>
</tr>
<tr>
<td>Hoses in good repair and compatible with gases used.</td>
<td></td>
</tr>
<tr>
<td>Flash arrestor(s) are in place on oxygen and fuel gas lines or contained within torch.</td>
<td></td>
</tr>
<tr>
<td>Check valves installed on both torch inlets and operating properly. Check valves can stop the reverse flow of gases, but will not prevent flashbacks.</td>
<td></td>
</tr>
<tr>
<td>Hot work site is clear of combustibles or combustibles are protected. Shall be 35ft. or a barrier between the welding operation and combustible materials.</td>
<td></td>
</tr>
<tr>
<td>Exposed surfaces are of noncombustible materials or, if combustible, then protected by fire blanket or other non-combustible surface.</td>
<td></td>
</tr>
<tr>
<td>Floors and immediate are kept clean.</td>
<td></td>
</tr>
<tr>
<td>No exposed combustible materials are located on the opposite side of any partitions, walls, ceilings or floors potentially impacted by the hot work.</td>
<td></td>
</tr>
<tr>
<td>Fire watch is assigned and understands duties/responsibilities. Mandatory observation time (minimum 30 minutes) is identified and understood.</td>
<td></td>
</tr>
<tr>
<td>A fully operational (2A:20BC minimum) rated fire extinguisher is available within 30 feet of the designated hot work area.</td>
<td></td>
</tr>
<tr>
<td>Hot work permit application has been submitted for hot work conducted by ASU FACMAN or contractors.</td>
<td></td>
</tr>
<tr>
<td>Hot work permit application has been submitted for hot work conducted by ASU faculty/staff/students who conduct hot work activities outside the assign shop area.</td>
<td></td>
</tr>
<tr>
<td>Welder’s curtain, screen or other approved barrier in place.</td>
<td></td>
</tr>
<tr>
<td>Compressed gas cylinders are secured at two-thirds of the cylinder height.</td>
<td></td>
</tr>
<tr>
<td>Protective caps are in place when gas cylinders are not in use and oxygen cylinder is separated from fuel gas cylinder by at least 20 feet or a one (1) hour rated fire wall.</td>
<td></td>
</tr>
</tbody>
</table>

Note: “Protected” means a fire retardant treated material or other non-combustible, fire retardant treated barrier separates the hot work from any exposures to combustible material.

Any questions contact the ASU Fire Marshal at asufire@asu.edu or call at 480.965.1823.

References:
  - 2003 International Fire Code: Section 2604.3.1
  - ASU EHS: Hot Work Operations/Cutting & Welding Compliance Guidelines
    [https://cfo.asu.edu/ehs-hot-work-welding](https://cfo.asu.edu/ehs-hot-work-welding)
  - ASU Building Permit & Inspection Requirements
    [https://cfo.asu.edu/fdm-bldg-permit-requirements#typesBuildingPermit](https://cfo.asu.edu/fdm-bldg-permit-requirements#typesBuildingPermit)

Inspection Completed by: ___________________________ Date: __________________

Supervisor Signature: ___________________________ Date: _______________ Time: _______________
Hot Work Permit

Issued by: ___________________________ print, and sign.

Permit duration: ___Project ___Day ___Week ___Month

Issued to: ___________________________ Date: ___________________________ Time: AM/PM

Campus: T W P DPC

Building /room: ___________________________ / ___________________________

☐ ☐ Cutting or welding permitted in an area that has been made fire safe.

☐ ☐ All movable fire hazards in the vicinity have been taken to a safe place.

☐ ☐ Guards used to contain the heat, sparks and slag if fire hazards cannot be removed.

☐ ☐ Floor or wall openings or cracks, open doorways and windows protected or closed.

☐ ☐ Fire extinguisher available for instant use.

☐ ☐ Fire watch in areas where other than a minor fire might develop such as around combustible material.

☐ ☐ Floors swept clean of combustible material for a radius of 35'.

☐ ☐ Areas adjacent to walls being worked on are checked for combustibles and any combustibles are either removed or protected.

☐ ☐ Combustible floors have been kept wet, covered with damp sand or protected by fire resistant shields.
☐ ☐ Welding/cutting done only in areas authorized by management. No welding/cutting in sprinkled building when sprinkler system is impaired or in presence of explosive atmosphere, or in area of storage of readily ignitable material.

☐ ☐ Dusts and conveyor systems that might carry sparks to distant combustibles protected or shutdown.

☐ ☐ Cutter/welder is trained in safe operation of equipment and the safe use of the process.

☐ ☐ Any on-site contractors advised about flammable material or hazardous conditions of which they may not be aware.

**Welding or cutting containers:**

☐ ☐ Container thoroughly cleaned and ventilated.

☐ ☐ Any pipe lines or connections to containers disconnected or blanked.

☐ ☐ Warning sign posted to warn other workers of hot metal.

☐ ☐ Appropriate ventilation provided.

☐ ☐ When working in confined spaces a permit has been issued as per 1910.146.

**When work is completed**

☐ ☐ Work area has been inspected for any fire sources, fire damage, or potential for fire.

☐ ☐ Reactivated smoke / fire detectors that were disabled because of the hot work.
I verify that the above location has been examined and the necessary precautions have been taken to prevent the outbreak of fire due to Hot Work.

Employee Signature, issued: ________________________________
Date: ________________
Time: ________________

Employee Signature, closed: ________________________________
Date: ________________
Time: ________________

Supervisor Signature: ________________________________
Date: ________________
Time: ________________

Questions? Contact ASU Environmental Health and Safety at 480-965-1823 or email SafetyPartners@asu.edu.

Revision date 06/8/2020