



## Hot Work Program

### Purpose & Scope

This program outlines procedures for Fayetteville State University employees who perform operations (e.g. grinding, welding, cutting, burning, & heating) capable of producing a source of ignition. The material for this program is located in the OSHA Standard for Welding, Cutting, & Brazing Standard, 29 CFR 1910, Subpart Q and NFPA 51B, Fire Prevention During Welding, Cutting, and Other Hot Work.

### Program Statement

It is the responsibility of FSU to protect employees and other individuals from hazards associated with hot work operations and to comply with all regulatory requirements for the safe operation of such equipment. This program establishes guidelines to guard against fires from heat-producing operations performed by using portable equipment away from the shop area. Employees must be aware of procedures to follow when welding, grinding, cutting, or conducting other hot work operations.

### Definitions

**Affected Employee** – an employee whose job requires them to work in an area in which hot work is being performed.

**Authorized Employee** – a trained employee who is authorized to perform hot work.

**Brazing and Soldering** – soldering and brazing use molten metal to join two pieces of metal. The metal added during both processes has a melting point lower than that of the workpiece, so only the added metal is melted, not the workpiece. 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.

**Cutting/Grinding** – Any process which produces sparks capable of igniting combustible or flammable materials and transmits heat to the work materials from a hot gas.

**Designated Area** – A permanent location designed for or approved for hot work operations to be performed regularly.

**Fire Watch** – Trained personnel who are in attendance during the entire hot work operation and are immediately available to extinguish a fire or take other effective action if needed.

**Hot Work** – Any process that can be a source of ignition when flammable material is present or can be a fire hazard regardless of the presence of flammable material in the workplace. Common hot work processes are welding, soldering, cutting, and brazing.

**Hot Work Permit** – A document issued for the purpose of authorizing a specified activity.

**Welding** – Joining together (metal pieces or parts) by heating the surface to the point of melting using a blowtorch, electric arc, or other means, and uniting them by pressing, hammering, etc.

## **Roles & Responsibilities**

**EHS Officer / Professional** is responsible for the following:

- Ensures that a written program is in place
- Inspects and monitors work areas to ensure compliance with this program
- Coordinates training for applicable employees on hot work safety and permitting
- Accepts completed Hot Work Permits from FSU authorized employees and contractors performing hot work activities in occupied FSU buildings
- Aids FSU authorized employees and contractors upon request

**Manager/Supervisor** is responsible for the following:

- Ensures that only authorized and trained employees perform hot work
- Ensures that authorized employees complete required training prior to performing hot work and completes and submits hot work permit to the EHS Officer / Professional for approval
- Ensures employees conducting hot work are provided appropriate equipment and personal protective equipment to complete job safely
- Be capable of identifying hazards when hot work is anticipated
- Ensures hired contractors have their own Hot Work Program or follow the guidance in this program and provide the EHS Officer / Professional with completed permits

**Authorized & Affected Employees** are responsible for the following:

- Complying with this program
- Performs hot work if trained (authorized employees) to do so and with a completed permit
- Performs fire watch if trained (affected employees) to do so
- Ensures the safe handling of cutting or welding equipment and safe use during the process
- Identifies combustible materials and hazardous areas present or likely to be present in the work area
- Protect combustible materials from ignition by moving the hot work to a location free from dangerous combustibles or, if not feasible, moving combustibles to a safe location or provide shielding to prevent ignition
- Ensures appropriate fire protection and extinguishing equipment are properly located at the site
- Ensures a fire watch is present
- Ensures smoke/fire detection devices have been adequately addressed
- Ensures HVAC precautions have been adequately addressed
- Ensures hot work operations do not interfere with other operations in the area

**Contractors** are responsible for the following:

- All contractors hired to conduct hot work at FSU shall have their own written hot work program that fulfills all regulatory requirements or follow the guidance in this program

- Contractors working in occupied FSU buildings shall notify the EHS Officer / Professional that hot work is being conducted and provide copies of all hot work permits prior to commencing work
- Contractors working on new construction or renovating unoccupied university facilities shall follow their own hot work policies and procedures, which shall fulfill all regulatory requirements

## **Pre-Hot Work Activities**

All hot work activities are required to have a Hot Work Permit, unless the welding, cutting, or brazing operations are being conducted in an area/shop designed to facilitate safe hot work operations. If possible, move hot work activities to a safe area free from all combustible materials and fire hazards. If hot work activities cannot be relocated to a safe area, the following precautions must be taken, in addition to acquiring a Hot Work Permit, to ensure fire and other hazards, are addressed prior to hot work commencing:

### **Hot Work Permit**

A Hot Work Permit must be completed prior to the commencement of any hot work. On completion, the EHS Officer / Professional will review the permit, inspect the work area, and confirm the aforementioned precautions have been taken to prevent fire in accordance with NFPA 51B. It is the responsibility of the authorized employee conducting the hot work, or their supervisor, to notify the EHS Officer / Professional of the scheduled work in a timely manner to ensure they have sufficient time to respond to the request.

- The authorized employee completely fills out the Hot Work Permit (See Attachment 1) and submits it to the EHS Officer / Professional for review.
- On completion, the authorized employee or designated rep. must return the hot work permit to the EHS Officer / Professional for recordkeeping.
- Permits are not required when welding in a designated hot work area or when working outside of the facility.
- FSU must ensure that all contractors are aware of this permit system.

### **Inspection**

- Hot work permits are posted at the entrance to the work site to inform personnel of the hot work operations taking place.
- Smoke detectors and sprinkler systems have been addressed by facilities maintenance staff.
- Heating, ventilation, and air conditioning (HVAC) have been addressed by facilities maintenance staff.
- Ducts that might carry sparks to a distant combustible material must be suitably protected or disengaged.
- Welding and cutting equipment are in proper working order
- Precautions have been taken to protect the area within 35 feet of the hot work area:
  - Floors are swept clean of dust and combustibles
  - Combustible floors are wetted or covered with damp sand, metal, or other suitable shields
  - No combustible materials or flammable liquids are present
  - Combustible surfaces are protected with covers, guards, or metal shields
  - Combustible materials in adjacent rooms are moved away from walls
  - All wall and floor openings are covered, blocked, or shielded
  - Grated floors are protected to ensure collection of sparks during work
- Precautions within 50 feet of the hot work area:
  - Relocate or protect explosive material, compressed gas cylinders, or stored fuel
- A fire watch is established and assigned to a properly trained individual

## **Guards**

If the object to be welded or cut cannot be moved and if all the fire hazards cannot be removed, then guards must be used to protect the immovable fire hazards.

## **Safety Screen**

If there is welding where ultraviolet light radiation could harm the eyes of anyone passing by, the authorized employee will be required to install an approved noncombustible or flameproof screen or shield to protect by-standards.

## **Combustible Materials**

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 that might drop through the floor. The same precautions shall be observed regarding 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. Selection of equipment depends upon the nature and quantity of the combustible material exposed. Such equipment may consist of:

- Portable fire extinguisher(s)
- Pail of water
- Bucket of sand
- Water hose

## **Compressed Gas Cylinders**

- Cylinders must be secured to prevent tipping; valves are closed with protection caps in place.
- Oxygen and fuel cylinders are separated and away from combustible fuel, flammable fuels, and heat sources.

## **Fire Watch**

During and after hot work activities, the work area must be monitored to ensure hot work does not result in a fire.

- Personnel assigned to fire watch responsibilities must be trained in the contents of the Hot Work Program and fire extinguisher use and limitations.
- Fire watch must be conducted during and at least 30 minutes following the hot work activity.
- Appropriate fire extinguishing equipment must be readily available during fire watch.
- Fire watch personnel must have the ability to sound the fire alarm and alert the responding Fire Department in the event of a fire.

## **Prohibited Areas**

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

- In unauthorized areas, such as occupied office space.
- In sprinklered buildings, while such protection is impaired.
- In the presence of explosive atmospheres or potential for explosive atmospheres.
- In areas near the storage of large quantities of exposed readily ignitable materials.
- In areas not approved by the EHS Officer / Professional through the hot work permitting process.

## **Specialized Hot Work Precaution**

### **Pipes:**

- Prior to cutting or welding on pipes, the authorized employee must ensure the pipes are purged and empty.
- 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.

### **Containers:**

- No welding, cutting, or other hot work shall be performed on used drums, barrels, tanks, or other containers until they have been cleaned to ensure no flammable materials or vapors are present.
- Pipes connected to containers must be disconnected prior to hot work.
- All hollow spaces, cavities, or containers must be vented during the hot work to permit the escape of air and gases. Purging with inert gas is recommended.

### **Confined Space:**

If hot work activities are to take place in a confined space, the authorized employee must be trained under and follow all components for the Confined Space Entry Program.

Prior to hot work in a confined space the following precautions must be addressed:

- Ensure a confined space entry permit is completed.
- Ensure all openings/covers are open and secured from closing.
- Test atmosphere within the confined space for oxygen, explosive, and toxins.
- Isolate lines and maintain vents open and valves leak-free.
- Lockout/Tagout all systems not required during hot work.
- Provide a means for readily turning off power, gas, and other supplies from outside the confined space.
- Protect or remove any hazardous materials which may become hazardous when exposed to hot work.
- Ventilation within the confined space must be supplied to ensure fumes and gases do not exceed exposure limits and oxygen limits remain within an acceptable range.
  - If ventilation is not possible, the authorized employee must be provided airline respirators or a self-contained breathing apparatus to ensure safe respirable air at all times. Respiratory protection users must have medical clearance and be include in the University Respiratory Protection Program.
- Gas cylinders and welding machines must be left outside the confined space and secured to prevent movement during hot work operations.
- Where an authorized employee must enter a confined space through a manhole or other small opening, means must be provided to quickly remove (rescue) the authorized employee in an emergency (i.e. lifeline).

- When breaks in hot work occur (lunch or overnight) all valves must be turned off and hoses and connection must be disconnected at the power source.

### Personal Protective Equipment

Authorized employees performing hot work, and any personnel assigned to the hot work project as assistants must be provided appropriate personal protective equipment (PPE).

Eye Protection: Suitable eye protection must be provided and worn by authorized employees and assistants during all hot work operations.

- PPE used for eye protection such as goggles, helmets, and hand shields must meet minimum ANSI standards.
- Table 1 provides recommendations for selection of the proper shade numbers for eye protection based on the type of hot work being done.

Protective clothing: Heat resistant clothing must be provided and worn by authorized employees during hot work operations.

- Other PPE including head, hand, and foot protection shall be provided based on the hazard evaluation of the work area and work to be completed.

**Table 1**

Welding Operation	Shade Number
Shielded metal-arc welding (5/16, 3/8-inch electrodes) <b>or</b> Carbon arc welding	14
Atomic hydrogen welding	10-14
Gas-shielded arc welding (ferrous) (1/16, 3/32, 1/8, 5/32-inch electrodes) <b>or</b> Shielded metal-arc welding (3/16, 7/32, 1/4-inch electrodes)	12
Gas-shielded arc welding (nonferrous) (1/16, 3/32, 1/8, 5/32-inch electrodes)	11
Shielded metal-arc welding (1/16, 3/32, 1/8, 5/32-inch electrodes)	10
Heavy gas welding (1/2-inch and over)	6-8
Medium gas welding (1/8 to 1/2-inch)	5-6
Medium cutting (1-6-inches) <b>or</b> Light gas welding (up to 1/8-inch)	4-5
Torch brazing <b>or</b> Light cutting (up to 1-inch)	3-4
Soldering	2

### Ventilation

Ventilation must be adequate during general welding and cutting hot work operations. Mechanical ventilation must be provided when welding or cutting operations take place:

- In a space less than 10,000 cubic feet per welder
- In a room having a ceiling height of less than 16 feet
- In a confined space

- In a space containing partitions, balconies, or other structural barriers, which may significantly obstruct ventilation.

Ventilation should be provided at a rate of 2,000 cubic feet per minute (CFM) per welder unless local exhaust hoods, booths, or supplied breathing air is provided in the work area. Natural ventilation will be considered sufficient where the restrictions in mechanical ventilation of this plan are not present.

Cutting or welding operations involving hazardous materials must be pre-approved and reviewed by the EHS Officer / Professional prior to work.

### **Post-Hot Work Activities**

Upon completion of hot work operations, the fire watch personnel must remain on site for at least 30 minutes to ensure fire hazards are mitigated, sign the hot work permit indicating the work is complete, and return it to the EHS Officer / Professional. As a precautionary measure, it is recommended the hot work area be inspected again at the end of the shift to ensure fire hazards or potential fires are properly handled.

### **Information & Training**

Authorized and affected employees will be trained to perform hot work activities as outlined in this plan and according to requirements contained in 29 CFR 1910 Sec Q 251-255. Training shall cover all aspects of the hot work program including:

- a) Pre-hot work operations
- b) Completion of hot work permits
- c) Personal protective equipment
- d) Ventilation
- e) Post-hot work operations

### **Recordkeeping**

The **EHS Officer / Professional** will:

- Provide Hot Work training and be responsible for maintaining training records. Records will include names of the individuals trained, type of training, date of training, and name of the trainer.
- Maintain original hot work permits up to a year.

### **Annual Review**

The Hot Work Program will be reviewed by the **EHS Officer / Professional**. The annual review will include current training and any documents associated with this program. When new tasks, procedures, and/or positions are added or modified/revised which affect Hot Work, the Hot Work Program will be updated immediately to reflect these changes.



### HOT WORK PERMIT

Date \_\_\_\_\_

Time \_\_\_\_\_

Name of person(s) performing work \_\_\_\_\_

Location of Work \_\_\_\_\_

YES	NO	Hot Work Checklist
		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 area where other than a minor fire might develop.
		Floors swept clean of combustible material for a radius of 35 feet.
		Combustible floors are 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 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.
		Welding or cutting containers: Container thoroughly cleaned and ventilated
		Any pipelines or connections to containers disconnected or blanked.
		PPE used as needed (e.g., eye protection, helmet, protective clothing, respirator, gloves).
		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.

	PRINT NAME	SIGNATURE
<b>Manager / Supervisor:</b>		
<b>EHS Officer / Professional:</b>		

**Completed by the Fire Watch Attendant once hot work is complete:**

*This is to confirm that I have personally made a fire inspection of the above mentioned area where I have been supervising hot work and as of \_\_\_\_\_ (insert date and time), there was no fire in the area and, in my opinion, there was not residue that could cause a fire to develop.*

<b>Print Name:</b>	<b>Signature:</b>
--------------------	-------------------