



Occupational Health and Safety

HOT WORK SAFETY PLAN

[INSERT DEPARTMENT NAME HERE]



HOT WORK SAFETY PLAN

Plan last updated: **December 2018**

Scope: This Hot Work Safety Plan (known as the "Plan") addresses welding, cutting, brazing, and related hot work operations capable of initiating fires or explosions, creating toxic fumes, or generating heat or molten flying objects that could injure workers. Examples of hot work processes covered under this Plan include:

- Welding (arc, oxygen-fuel gas, and resistance)
- Cutting (arc, oxygen, and torch)
- Open-flame soldering
- Brazing
- Grinding
- Heat treatment
- Hot riveting
- Other applications that may generate a spark, flame, or heat

This Plan does not cover additional requirements for hot work operations in confined spaces or lockout/tagout procedures during hot work. See the University's **Confined Space Entry Plan** and **Lockout/Tagout Plan** for more information about such operations.

Policy: The University of Kentucky recognizes a potential for fire from hot work operations. For that reason the Hot Work Safety Plan is required to be implemented in all departments at the University to protect employees and property from fire resulting from hot work operations. Each department shall review, adopt, and implement the plan and complete all necessary portions requiring assignment of responsibilities. Departments and contactors may submit to Occupational Health and Safety (OHS) alternative plans that meet the same requirements. Alternative plans must be reviewed and approved by OHS prior to adoption and implementation.

This plan applies to hot work activities in each department that meet the criteria set forth by the written plan. The plan will also apply to outside contractors that provide a service to the University by performing hot work operations. Employees and contractors should follow the applicable *Hot Work Permitting* flow charts attached to this document to determine the necessary steps that should be taken to conduct hot work associated with the University of Kentucky.

PLAN ADMINISTRATION

The *Program Contact Information* table provides the roles and contact information for the administration of this Plan.

Program Contact Information

Task	Contact Person	Contact Information
Plan Administrator		Work:
Supervisor		Work:
Supervisor		Work:

Plan Administrator. The Plan Administrator or designee is responsible for the safe operation of welding and related hot work activities, and developing and maintaining this written Plan. The Administrator or designee will:

- Conduct hazard assessments for all work areas where hot work is performed and welding, cutting, and brazing equipment is used and stored, and ensure that hazard assessments conducted by contractors or consultants submit them to the Administrator or designee.
- Establish areas for cutting and welding, and establish procedures for cutting and welding in other areas on the basis of fire potential of the facilities.
- Designate an individual responsible for authorizing cutting and welding operations in areas not specifically designed for such processes.
- Ensure that cutters, 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.

Supervisor. The Supervisor will:

- Be responsible for the safe handling of the cutting or welding equipment and the safe use of the cutting or welding process.
- Determine whether combustible materials are present or likely to be present in the work location.
- Protect combustibles from ignition according to safe practices described in this Plan.
- Secure authorization for the cutting or welding operations from the Administrator or designated representative.
- Ensure that the cutter, welder, or hot work operator secures the approval of the Supervisor that conditions are safe before going ahead.
- Determine that fire protection and extinguishing equipment are properly located at the site.
- Ensure fire watch personnel are available at the site when required.

Operators of welding, cutting, or other hot work equipment. The cutter, welder, or hot work operator will:

- Conduct hot work only after specific written approval from the Administrator or designee.
- Handle all hot work and related equipment safely and perform work so as not to endanger lives and property.
- Cease hot work operations if unsafe conditions develop.
- Notify the Administrator or designee for reassessment of the situation in the event of suspected unsafe conditions or concerns expressed by affected persons.

Plan Review and Update

This Plan will be reviewed and updated:

- Annually
- Whenever there is a change in federal or state rules related to welding, cutting, brazing, or other hot work operations
- Whenever there is a change in facility operations related to the use, handling, or storage of welding equipment and supplies

- Whenever equipment operators demonstrate a lack of understanding or skill to perform welding or other hot work operations safely

DEFINITIONS

Fire watch means an individual or individuals whose primary responsibility is the surveillance of all exposed areas to ensure that safe conditions are maintained during hot work.

Hot work means any work involving burning, welding, cutting, brazing, or similar operations capable of initiating fires, explosions, noxious fumes, or molten flying objects.

Hot work permit means written authorization to perform hot work operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

HAZARD ASSESSMENT

The Administrator or designee will ensure that a hazard assessment is conducted in each work area where welding or other hot work operations are or may be performed. The assessment will identify sources of hazards that could expose employees to high heat, light (optical) radiation, fumes, molten flying objects, and combustion from sparks.

Each hazard assessment will identify hazards, recommend controls, and provide guidance on appropriate personal protective equipment (PPE) selections when a hazard control is not feasible or satisfactory.

The Administrator or designee may use the attached [Job Hazard Analysis Worksheet](#) and [PPE Hazard Assessment Form](#) for guidance when conducting the assessment(s).

Hazard Assessment Procedure

Following is the process for evaluating the operations and tasks that present potential hazards to employees conducting or working near welding or other hot work operations:

1. Conduct a survey of each work area to assess if hazards are present, or are likely to be present, for which hazard controls or PPE is needed. The Administrator will also provide worksite evaluations of any operation at the request of a supervisor or employee.
2. Review injury and illness records, the layout of the work areas, and the placement of workers in the work areas.
3. Collect and organize the data if available for each work area, and estimate the potential for injuries according to the basic hazard categories and potential sources of injury and illness.
4. Determine the type, level of risk, and seriousness of potential injury from each of the hazards found in the work areas, and evaluate the possibility of exposure to several hazards.
5. Categorize and record the hazards.

6. Determine what type of engineering or administrative control and/or PPE will protect against the hazards.
7. Incorporate the results of the assessment and recommendations for protection into this Plan and supplementary documents.

GENERAL REQUIREMENTS FOR HOT WORK PERSONNEL

Hot Work Operator

The hot work operator will:

- Be trained in the safe operation of his or her equipment and the safe use of the process.
- Have an awareness of the inherent risks involved and understand the emergency procedures in the event of a fire.
- Handle the equipment safely and use it as described in this Plan and according to manufacturer's instructions so as not to endanger life or property.
- Get Administrator or designee approval before starting hot work operations and comply with the requirements of this Plan or hot work permit.
- Cease hot work operations if unsafe conditions develop and notify the supervisor or the Administrator for reassessment of the situation.

Fire Watch Personnel

Fire watch personnel will:

- Be present during hot work operations and remain for a minimum of 30 minutes after completion of hot work in order to detect and extinguish smoldering fires.
- Be aware of the inherent hazards of the worksite and of the hot work.
- Ensure that safe conditions are maintained during hot work operations.
- Have the authority to stop the hot work operations if unsafe conditions develop.
- Have purpose-designated fire-extinguishing equipment readily available and be trained in its use.
- Be familiar with the facilities and procedures for sounding an alarm in the event of a fire.
- Watch for fires in all exposed areas surrounding the hot work operation and try to extinguish them only when the fires are obviously within the capacity of the equipment and fire-fighting skills available.
- Immediately contact the Supervisor and/or the Administrator if he or she determines that the fire may grow beyond control.

HOT WORK AREAS

Designated Area

A designated area will be a specific area approved for welding or other hot work, such as a maintenance shop or a detached outside location that is of noncombustible or fire-resistive construction, essentially free of combustible and flammable contents, and suitably segregated from adjacent areas. These designations are generally long-term for facilities in which specific hot work operations are repeatedly performed. A fire watch is not normally required in a Designated Area.

Hot Work Permit-Required Area

A permit-required area will be a non-designated area that is made fire-safe by removing or protecting combustibles from ignition sources and where protective

controls and ventilation are adequate to control worker exposure to heat, intense light, fumes, and flying objects.

A hot work permit is not needed in a designated area if it meets the following requirements:

- Ensure that combustible materials such as paper clippings, wood shavings or textile fibers are swept clean for a radius of 35 feet in the welding shop. 29 CFR 1910.252(a)(2)(v)
- Provide welding screens/curtains and place around the area where hot work operations will be performed. The screen/curtain shall completely enclose the area.
- Develop a checklist, similar to the hot work permit checklist, and have employees complete before hot work operations begin. The checklist should at least include the date/time of the hot work operations.

HOT WORK PERMIT

Authorization. Only designees authorized by the Administrator may issue hot work permits.

Before hot work operations begin in a non-designated area, a completed hot work permit is required. Based on local conditions, the Administrator or designee must determine the length of the period for which the hot work permit is valid.

Posting. A signed and dated copy of the hot work permit must be posted at the entrance to the area where hot work operations are conducted under the permit.

A copy of the standard *Hot Work Permit* form is attached to this Plan. A copy of the form may be modified to include additional controls for special or site-specific activities not normally covered under the standard hot work permit.

General Hot Work Permit Requirements

The following standard safe work practices and site conditions must be confirmed by the Administrator or designee before permitting hot work to begin:

- All hot work and related equipment (e.g., welding equipment, shields, PPE, fire extinguishers) must be in satisfactory operating condition and in good repair.
- The floor must be swept clean for a radius of 35 feet (ft) if combustible materials such as paper or wood shavings are on the floor.
- Combustible floors except wood on concrete must be kept wet or be covered with damp sand. Where floors have been wet down, personnel operating arc welding or cutting equipment must be protected from possible shock or be protected by noncombustible or fire-retardant shields.
- All combustible materials must be moved at least 35 ft away from the hot work operation. If relocation is impractical, combustibles must be protected with fire-retardant covers, shields, or curtains. Edges of covers at the floor must be tight to prevent sparks from going under them, including where several covers overlap when protecting a large pile.
- Openings or cracks in walls, floors, or ducts within 35 ft of the site must be tightly covered with fire-retardant or noncombustible material to prevent the passage of sparks to adjacent areas.
- If hot work is done near walls, partitions, ceilings, or roofs of combustible construction, fire-retardant shields or guards must be provided to prevent ignition.
- If hot work is to be done on a wall, partition, ceiling, or roof, precautions must be taken to prevent ignition of combustibles on the other side by relocating combustibles. If it is impractical to relocate combustibles, a fire watch on the opposite side from the work must be posted.
- Hot work must not be attempted on a partition, wall, ceiling, or roof that has a combustible covering or insulation, or on walls or partitions of combustible sandwich-type panel construction.

- Hot work that is performed on pipes or other metal that is in contact with combustible walls, partitions, ceilings, roofs, or other combustibles must not be undertaken if the work is close enough to cause ignition by conduction.
- Fully charged and operable fire extinguishers that are appropriate for the type of possible fire must be available immediately at the work area. These extinguishers should be supplied by the group performing the hot work. The fire extinguishers normally located in a building are not considered to fulfill this requirement.
- Special precautions must be taken to avoid accidental operation of automatic fire detection or suppression systems (for example, special extinguishing systems or sprinklers).
- Nearby personnel must be suitably protected against heat, sparks, and slag.

FIRE PREVENTION AND PROTECTION

All welding and other hot work operations will be conducted in compliance with the National Fire Protection Association (NFPA) Standard 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*.

General Procedures

The following procedures must be completed before welding or other hot work operations begin:

- All movable fire hazards within 35 ft of a welding or other hot work operation must be moved to a safe place if the object to be welded or cut cannot readily be moved.
- 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 confine the heat, sparks, and slag, and to protect the immovable fire hazards.
- Combustible material must be protected from exposure to sparks wherever there are floor openings or cracks in the flooring, cracks or holes in walls, open doorways, and open or broken windows that cannot be closed.
- Fire extinguishers or extinguishing equipment must be ready and available for instant use; such equipment may consist of pails of water, buckets of sand, or

hose or portable extinguishers, depending on the nature and quantity of the combustible material exposed.

Prohibited Conditions for Hot Work

Hot work must not be permitted in the following areas until the conditions prohibiting hot work have been modified:

- In the presence of explosive atmospheres, or in situations where explosive atmospheres may develop inside contaminated or improperly prepared tanks or equipment which previously contained flammable liquids
- In areas with an accumulation of combustible debris, dust, lint, and oily deposits
- In areas near the storage of exposed, readily ignitable materials such as combustibles
- On a container such as a barrel, drum, or tank that contained materials that will emit toxic fumes when heated
- In a confined space, until the space has been inspected and determined to be safe

Administrative Precautions

Plant operations that might expose combustibles to ignition must not be scheduled to start during welding and other hot work operations.

Conditions for Fire Watch

Fire watchers are required whenever welding or cutting is performed in locations where other than a minor fire might develop, or any of the following conditions exist:

- Appreciable combustible material is closer than 35 feet (ft) (10.7 meters (m)) to the point of operation.
- Appreciable combustibles are more than 35 ft (10.7 m) away but can be easily ignited by sparks.
- Wall or floor openings within a 35-foot (10.7 m) radius expose combustible material in adjacent areas including concealed spaces in walls or floors.

- Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.

Housekeeping

Welders must place welding cable and other equipment so that it is clear of passageways, ladders, and stairways.

INSPECTIONS

Before welding or other hot work operations are permitted, the work area must be inspected by the Administrator or designee responsible for authorizing such operations. The inspector must indicate in writing (e.g., checklist or hot work permit) that:

- Hot work equipment is in good condition.
- Compressed gas cylinders are stored and handled according to safety procedures outlined in this Plan or supplemental documents.
- Electrical systems associated with hot work operations are in good condition and operated according to safety procedures outlined in this Plan or supplemental documents.
- Flammable and combustible materials such as trash, rags, and open containers of solvents have been removed from the area.
- Flammable, combustible, or toxic residues have been removed or are adequately covered.
- All movable fire hazards in the vicinity have been removed from the hot work area.
- Ventilation is adequate to maintain a safe atmosphere during hot work.
- Adjacent spaces have been inspected and meet requirements for hot work.
- Operators and other affected workers are wearing required PPE

- Fire watch personnel are on duty when required
- Flammable, combustible, or toxic coatings (preservative coatings or insulation) have been removed from hot work surfaces.
- Toxic preservatives on surfaces where hot work is performed are stripped back at least 4 inches (in.); otherwise airline respirators must be used.

Recordkeeping. Inspection records must be maintained according to the Recordkeeping requirements of this Plan.

PPE

PPE is required for all workers who use hot work equipment and/or perform hot work operations.

All employees and contractors operating welding equipment must wear eye protection.

Eye and face protection devices must meet the specifications of the American National Standards Institute (ANSI) Z87.1, *Occupational and Educational Eye and Face Protection Devices*, for all filter lenses and plates.

General PPE Requirements

The degree of PPE will vary with size, nature, and location of work to be performed.

Hot work permit areas. The operator of any hot work equipment and work areas covered under a hot work permit must be equipped with protective devices and/or PPE as indicated in the permit before any work begins.

Designated areas (hot work permit not required). The operator of any hot work equipment in work areas designated for hot work must be equipped with protective devices and/or apparel as indicated below:

- Portable and/or mechanical ventilation capable of keeping the levels of fumes, dust, and gases below the thresholds established in regulations for permissible exposure limits (PELs) for hazardous and toxic substances. If local exhaust or general ventilation is not available and fume, dust, and gas generation is high, respirators must be used.
- Respiratory protection where required. NOTE: No employee will be issued or required to use a respirator until that employee has satisfied the criteria for medical evaluation, donning, doffing, and fit testing in the **Respiratory Protection Plan**.
- Gloves, apron, and/or jacket that are made of a material that is an insulator from heat and electricity.
- Welder's helmets equipped with proper filter plate and cover lenses. See the **Filter Lens Shade Number Table** for more information.
- Screens to protect persons not properly protected from the visual effects of viewing arc welding or cutting and during gas or oxygen cutting or welding.
- Lifelines and harnesses for work in confined spaces as prescribed in the **Confined Space Entry Plan**.

Arc Welding or Cutting PPE

Helmets or hand shields must be used during all arc welding or arc cutting operations except submerged arc welding. Helpers or attendants must be provided with proper eye protection.

Gas Welding or Oxygen Cutting PPE

Goggles or other suitable eye protection must be used during all gas welding or oxygen cutting operations. Spectacles with side shields and suitable filter lenses are permitted for use during gas welding operations on light work, for torch brazing, or for inspection.

Resistance Welding PPE

Operators and attendants of resistance welding or resistance brazing equipment must use transparent face shields or goggles to protect their faces or eyes.

Filter Lens Shade Number Table

Welding operation	Shade No.
Shielded metal-arc welding— 1/16-, 3/32-, 1/8-, 5/32-in. electrodes	10
Gas-shielded arc welding (nonferrous)— 1/16-, 3/32-, 1/8-, 5/32-in. electrodes	11
Gas-shielded arc welding (ferrous)— 1/16-, 3/32-, 1/8-, 5/32-in. electrodes	12
Shielded metal-arc welding: 3/16-, 7/32-, 1/4-in. electrodes	12
Shielded metal-arc welding: 5/16-, 3/8-in. electrodes	14
Atomic hydrogen welding	10–14
Carbon arc welding	14
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1 in.	3 or 4
Medium cutting, 1 in. to 6 in.	4 or 5
Heavy cutting, 6 in. and over	5 or 6
Gas welding (light) up to 1/8 in.	4 or 5
Gas welding (medium) 1/8 in. to 1/2 in.	5 or 6
Gas welding (heavy) 1/2 in. and over	6 or 8

HAZARD NOTIFICATION

Employers must include the following information on health hazard notices:

- All filler metals and fusible granular materials must carry the following notice, as a minimum, on tags, boxes, or other containers:

“CAUTION—Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate ventilation. See ANSI Z49.”

- Filler metals containing cadmium in significant amounts must carry the following notice on tags, boxes, or other containers:

“WARNING—CONTAINS CADMIUM—POISONOUS FUMES MAY BE FORMED ON HEATING—Do not breathe fumes. Use only with adequate ventilation such as fume collectors, exhaust ventilators, or air-supplied respirators. See ANSI Z49.1. If chest pain, cough, or fever develops after use call physician immediately.”

VENTILATION

Natural Ventilation

Natural ventilation may be used for welding or cutting operations where the space restrictions for mechanical ventilation are not present.

Mechanical Ventilation General Requirements

Mechanical ventilation will be provided when welding or cutting is done on metals and other compounds other than those specified in this section (e.g., fluorine, lead, zinc) and when the following conditions apply:

- A space of less than 10,000 cubic (cu) ft (284 cu meters (m)) per welder
- A room having a ceiling height of less than 16 ft (5 m)
- In confined spaces or where the welding space contains partitions, balconies, or other structural barriers to the extent that they significantly obstruct cross ventilation

Mechanical Ventilation Specifications

Ventilation will be provided to hot work areas at the minimum rate of 2,000 cubic ft (57 cubic m) per minute per welder.

Fluorine Compounds

Local exhaust ventilation or airline respirators are required for fixed-location production welding and for all production welding on stainless steels where air samples taken at the welding location indicate that the fluorides liberated are above the maximum allowable concentration.

Hazard Notification

Brazing and gas welding fluxes containing fluorine compounds must have a cautionary wording to indicate that they contain fluorine compounds, such as the following:

“CAUTION—CONTAINS FLUORIDES—This flux, when heated, gives off fumes that may irritate eyes, nose, and throat.

1. Avoid fumes and use only in well-ventilated spaces.
2. Avoid contact of flux with eyes or skin.
3. Do not take internally.”

Fluorine Compounds in Confined Spaces

In confined spaces, welding or cutting involving fluxes, coverings, or other materials which contain fluorine compounds must be done in compliance with the ventilation requirements of the **Confined Space Entry Plan**.

Zinc

Indoors, welding or cutting involving zinc-bearing base or filler metals coated with zinc-bearing materials must be done in compliance with the **Mechanical Ventilation Specifications** section of this Plan.

Zinc in Confined Spaces

In confined spaces welding or cutting involving zinc-bearing base or filler metals or metals coated with zinc-bearing materials must be done in compliance with the ventilation requirements of the **Confined Space Entry Plan**.

Lead

Indoors, welding involving lead-base metals must be done in compliance with the **Mechanical Ventilation Specifications** section of this Plan.

Indoor Operations

Indoors, welding or cutting operations involving metals containing lead other than as an impurity or metals coated with lead-bearing materials, including paint, must be done using local exhaust ventilation or airline respirators.

Outdoor Operations

Outdoor operations require the use of approved respirators in accordance with the **Respiratory Protection Plan**. In all cases, workers in the immediate vicinity of the cutting operation must be protected by local exhaust ventilation or airline respirators.

Lead in Confined Spaces

In confined spaces, welding involving lead-base metals must be done using local exhaust ventilation or airline respirators and in compliance with the confined space requirements of the **Confined Space Entry Plan**.

Beryllium

Welding or cutting at any location involving beryllium-containing base or filler metals must be done using local exhaust ventilation and airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposure is within the PEL for beryllium. In all cases, workers in the

immediate vicinity of the welding or cutting operations must be protected as necessary by local exhaust ventilation or airline respirators.

Cadmium

Indoor Operations

Indoors, welding or cutting operations involving cadmium-bearing or cadmium-coated base metals must be done using local exhaust ventilation or airline respirators unless atmospheric tests under the most adverse conditions show that employee exposure is within the PEL for cadmium.

Outdoor Operations

Outdoor operations require approved respirators such as fume respirators and in accordance with the **Respiratory Protection Plan**.

Cadmium in Confined Spaces

Welding or brazing work in confined spaces involving cadmium-bearing filler metals must be done using ventilation as prescribed by the **Mechanical Ventilation Specifications** section of this Plan and the ventilation requirements of the **Confined Space Entry Plan**.

Mercury

Indoor and Confined Space Operations

In confined spaces or indoors, welding or cutting operations involving metals coated with mercury-bearing materials, including paint, must be done using local exhaust ventilation or airline respirators unless atmospheric tests under the most adverse conditions show that employee exposure is within the PEL for mercury.

Outdoor Operations

When done outdoors, welding or cutting operations involving metals coated with mercury-bearing materials, including paint, must be done using approved respirators in accordance with the **Respiratory Protection Plan**.

Cleaning Compounds

Manufacturer's instructions and other precautions must be followed when cleaning materials are used. Degreasing and other cleaning operations involving chlorinated hydrocarbons must be located so that no vapors from these operations will reach or be drawn into the atmosphere surrounding any welding operation. In addition, trichloroethylene and perchloroethylene will be kept out of atmospheres penetrated by the ultraviolet radiation of gas-shielded welding operations.

Cutting of Stainless Steel

Oxygen cutting with either a chemical flux or iron powder or gas-shielded arc cutting of stainless steel must be done using mechanical ventilation adequate to remove the fumes generated.

FALL PROTECTION

Operators of hot work equipment or helpers working on platforms, scaffolds, or runways must be protected against falling from heights above 4 ft in accordance with the facility's **Fall Protection Program**. Such protection may include guardrails, safety harnesses, or other equally effective safeguards.

SPECIAL OPERATIONS

Confined Spaces

For the purposes of identifying a confined space in welding, cutting, and brazing operations, a confined space is a relatively small or restricted space such as a tank,

boiler, pressure vessel, or compartment. See the **Confined Space Entry Plan** for detailed information about work in a confined space.

Fire prevention in confined spaces

When arc welding is to be suspended for any substantial period, such as during lunch or overnight, all electrodes must be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine be disconnected from the power source.

Whenever the torch is not to be used for a substantial period such as during lunch hour or overnight, the torch valves must be closed and the fuel-gas and oxygen supply to the torch positively shut off at some point outside the confined area. Where practicable, the torch and hose must also be removed from the confined space.

Work in confined spaces

Ventilation is a prerequisite to work in confined spaces. For ventilation requirements see the General Provisions subsection in this analysis.

Gas cylinders and welding machines must be left outside the confined space when welding or cutting is performed.

Before operations are started, heavy portable equipment mounted on wheels must be securely blocked to prevent accidental movement.

Where a welder must enter a confined space through a manhole or other small opening, means must be provided for quickly removing him in case of emergency. When safety belts and lifelines are used for this purpose, they must be attached to the welder's body so that his body cannot be jammed in a small exit opening. An attendant with a preplanned rescue procedure must be stationed outside to observe the welder at all times and be capable of putting rescue operations into effect. However, a tapping procedure on the walls of tanks as a means of

communication in lieu of direct observation of the welder by the attendant is an acceptable way to communicate.

After welding operations are completed, the welder must mark the hot metal or provide some other means of warning other workers about the hot metal.

Ventilation in confined spaces

All welding and cutting operations carried on in confined spaces must be adequately ventilated to prevent the accumulation of toxic materials or possible oxygen deficiency. This applies not only to the welder but also to helpers and other personnel in the immediate vicinity. Air replacement must be clean and safe to breathe.

Oxygen must never be used for ventilation.

Respirators in confined spaces

In circumstances for which it is impossible to provide such ventilation, airline respirators or hose masks approved for this purpose by NIOSH must be used. In areas immediately hazardous to life, a full-facepiece, pressure-demand, self-contained breathing apparatus or a combination full-face piece, pressure-demand supplied-air respirator with an auxiliary, self-contained air supply approved by NIOSH must be used.

Where welding operations are carried on in confined spaces and where welders and helpers are provided with hose masks, hose masks with blowers, or self-contained breathing equipment, a worker must be stationed on the outside of such confined spaces to insure the safety of those working within.

Fuel-Gas Welding

Employers must adopt procedures to prevent mixtures of fuel gases and air or oxygen that may explode. Mixtures of air or oxygen with flammable gases prior to consumption except at the burner or in a standard torch, are not allowed unless approved for the purpose.

Portable cylinders. All portable cylinders used for the storage and shipment of compressed gases must be constructed and maintained in accordance with the regulations of the U.S. Department of Transportation, 49 CFR parts 171–179. Compressed gas cylinders must be legibly marked with either the chemical or the trade name of the gas. Markings must be a stencil, stamp, or label, and must not be readily removable. Whenever practical, the marking must be located on the shoulder of the cylinder.

Oxy-acetylene Welding

Oxy-acetylene welders must:

- Check to make sure the safety fuse plug or disk is functioning.
- Never use oxygen or fuel gas directly from the cylinder. There has to be a regulator attached to the valve.
- Stand to one side of the regulator (in case it malfunctions), open the cylinder valve slowly, and do no more than 1½ turns.
- Use 3 - 7 psi for oxygen and 1 - 12 psi for acetylene, but never over 15 psi.
- Purge oxygen and acetylene lines and light the acetylene using a striker, not a lighter.
- Store oxygen and acetylene separately, secured in an upright position, with valves closed, and at least 20 ft or more from combustibles.

Arc Welding

Operators and supervisors of arc welding equipment and operations must strictly follow the printed rules and instructions covering operation of equipment supplied by the manufacturers.

Supervisors must ensure that operators follow the procedures for fire prevention and protection, protection of personnel, and health protection and ventilation.

Arc welders must:

- Ensure welding machines are grounded.
- Avoid wet or damp areas to prevent electric shock.

- Check that connections are tight.
- Ensure cables are maintained and conductors are well insulated.
- Ensure cable splices are not within 10 ft of a holder.
- Use flash screens to protect others in the area from the flash.

Resistance Welding

Periodic inspection must be made by qualified maintenance personnel, and a certification record maintained. The certification record must include the date of inspection, the signature of the person who performed the inspection and the serial number, or other identifier, for the equipment inspected. The operator must be instructed to report any equipment defects to his supervisor and the use of the equipment must be discontinued until safety repairs have been completed.

Workers designated to operate resistance-welding equipment must have been properly instructed and judged competent to operate such equipment.

EMERGENCY RESPONSE

Injured Person

In case of an accident that results in a serious injury (i.e., requires medical attention):

1. Attend the injured person(s), give standard first aid, make the situation safe, and comfort the injured.
2. Call 911 from a cell phone, phone in crane cab, or other nearest location.
3. Notify the office or designated personnel by phone or radio.
4. Send a person, if available, to the office to coordinate help.
5. Set up rescue rigging if the situation requires (trained staff only).
6. Wait for the emergency medical service to arrive.

REPORTING ACCIDENTS AND INJURIES

Any person who observes or causes an injury to a worker or damage to property or equipment must immediately report the incident to a supervisor and UK OHS at 859-257-3862.

Accident Investigation

If an employee sustains a work-related injury, the employee or a co-worker will immediately notify the Supervisor of the work-related injury or illness, and the supervisor will ensure the injured or ill employee receives prompt medical treatment.

UK employees must call Workers' Care at 1-800-440-6285 in the event of a workplace-related injury. UK OHS receives notification of injuries reported to this number and may perform incident investigations.

TRAINING

Fire Watchers

Fire watchers must have fire extinguishing equipment readily available and be trained in its use. They must be familiar with the equipment and procedures for sounding an alarm in the event of a fire. They must watch for fires in all exposed areas, try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound the alarm. A fire watch must be maintained for at least a half hour after completion of welding or cutting operations to detect and extinguish possible smoldering fires.

Oxygen-Fuel Gas Welders and Cutters

Workers in charge of the oxygen or fuel-gas supply equipment, including generators, and oxygen or fuel-gas distribution piping systems must be instructed and judged competent by their employers for this important work before being left in charge. Skilled mechanics must be properly instructed to repair regulators or parts of regulators, including gages.

Arc Welders and Cutters

Workers who operate arc-welding equipment must be instructed and qualified to operate and maintain such equipment.

Resistance Welders

Workers designated to operate resistance-welding equipment must be properly instructed and judged competent to operate such equipment.

RECORDKEEPING

The Administrator or designee will maintain all records related to this Plan. Unless otherwise noted, the records will be kept **[location]**. All records will be available for regulatory agency review on request.

The Administrator or designee will maintain the following written records:

- Job hazard assessments
- An updated list of designated locations allowed to perform welding or other hot work operations without requiring a permit
- Hot work permits
- Inspection reports and checklists
- Accident or incident reports and investigations
- Training records

Record retention time. All records, including employee training records (e.g., curricula, written or electronic materials, sign-in sheets, individual employee records) will be retained for 36 months.

ATTACHMENTS

Hot Work Permitting – Employees

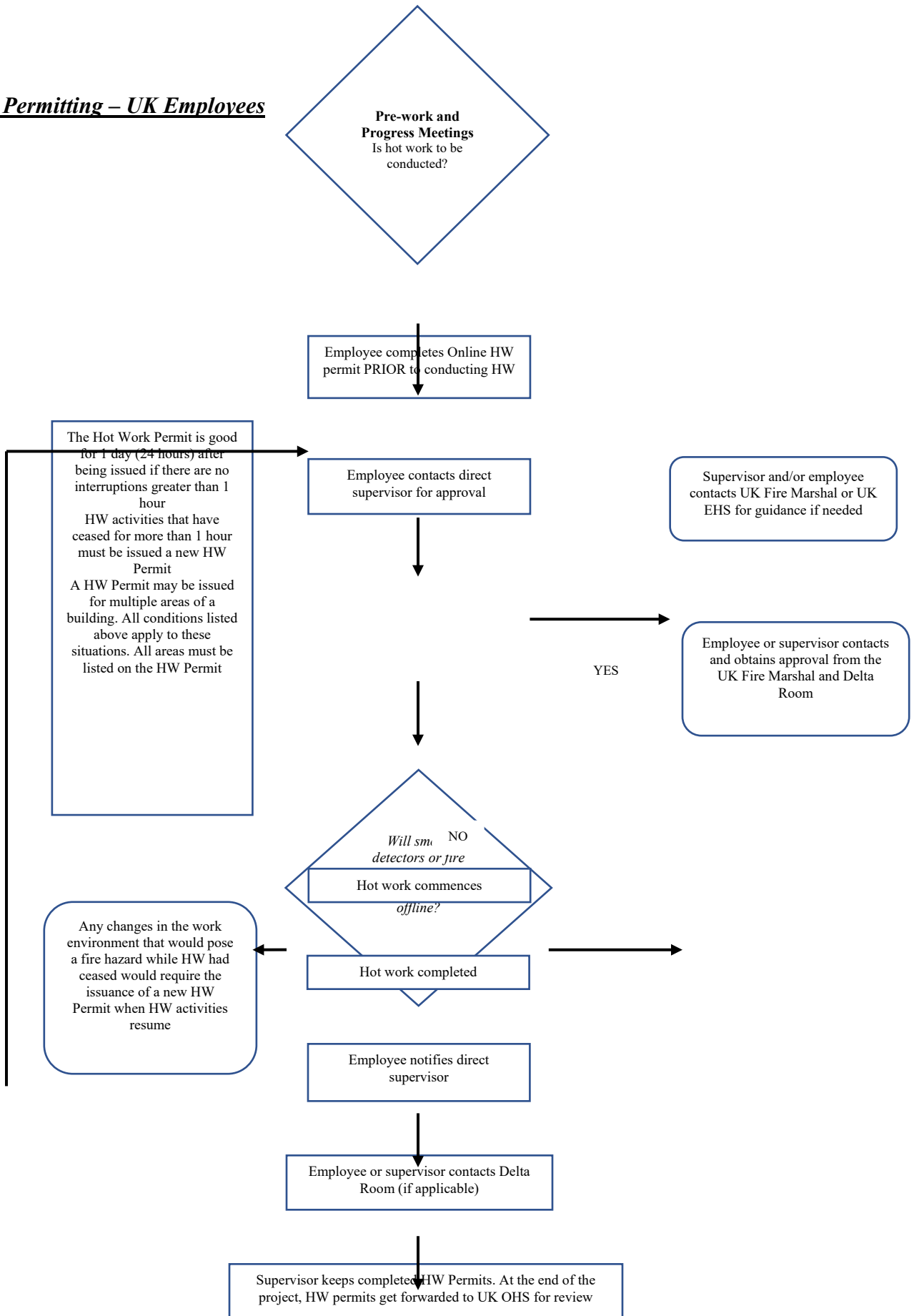
Hot Work Permitting – Contractors

Job Hazard Analysis Worksheet

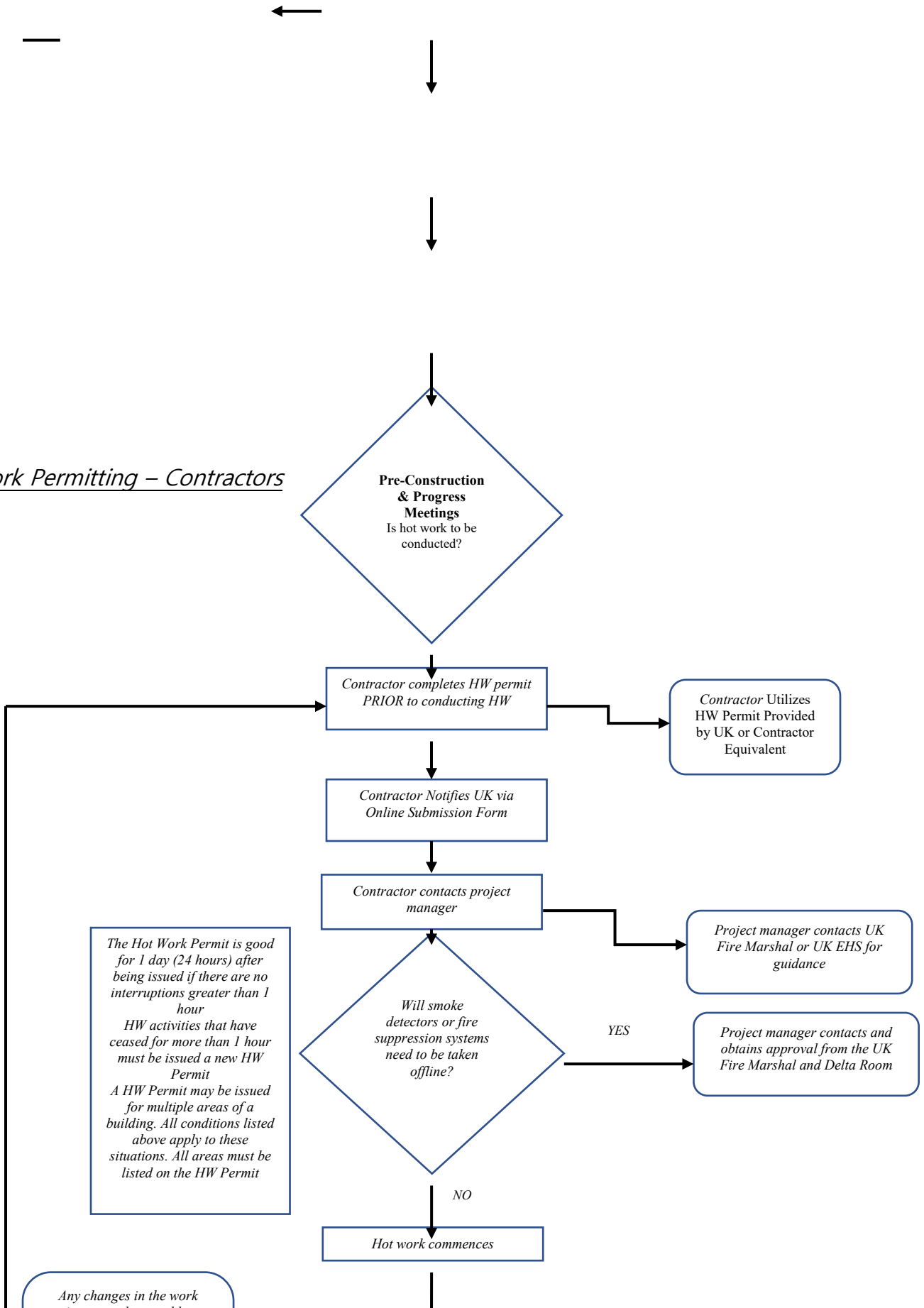
PPE Hazard Assessment Certificate

Hot Work Permit

Hot Work Permitting – UK Employees



Hot Work Permitting – Contractors





Personal Protective Equipment (PPE) Hazard Assessment Instructions & Form

Based on the hierarchy of controls, PPE is a last resort. Personal protective equipment alone should **not** be relied upon to provide protection against hazards but should be used in conjunction with engineering controls, administrative controls, and procedural controls.

This document addresses eye, face, head, hand, foot, torso, respiratory, noise, and fall protection. It will serve as the Personal Protective Equipment (PPE) Certification document required to satisfy the federal requirements of the Occupational Safety and Health Administration (OSHA) Standard, 29 CFR 1910.132 Subpart I- Personal Protective Equipment.

General Guidelines

The PPE Hazard Assessment can be conducted for an area, a job category or for an individual by selecting and filling in the appropriate box. The assigned evaluator shall include their name, department/division being assessed, and the date. Completed assessments must be accessible to employees and inspectors and updated when needed.

PPE HAZARD ASSESSMENT INSTRUCTIONS

Step 1: Inform Affected Employees of the Process

Affected employees from each work area that is being assessed should be involved in the process. Discuss the reasons for the survey and the procedures being used for the assessment. Review the job procedures, potential hazards and the PPE currently in use.

Step 2: Review data:

Reports of work-related injuries or illnesses, near-miss events and reported safety concerns are sources of data that can provide helpful information for assessing hazards.

Step 3: Conduct a walk-through survey:

The purpose of the survey is to identify sources of hazards to employees. Observe the following: layout of the workplace, location of the employees, work operations, hazards and places where PPE is currently used including the device and reason for use. Using the

form, check the type of hazard(s) present within each section (organized by body part). Further descriptions can be provided in the adjacent box. Consideration should be given to the following basic hazard categories:

1. Impact (falling/flying objects)
2. Penetration (sharp objects piercing foot/hand)
3. Compression (roll-over or pinching objects)
4. Chemical exposure (inhalation, ingestion, skin contact, eye contact or injection)
5. Temperature extremes (heat/cold)
6. Dust/flying debris (grinding, chipping, sanding, etc.)
7. Fall (slip/trip, scaffolds, elevated work)
8. Radiation (non-ionizing: UV/IR/light, welding, brazing, cutting, furnaces, etc.)
9. Noise (mechanical rooms, machines, cage washing, jackhammers, etc.)
10. Electrical (shock, short circuit, arcing, static)

Step 4: Select PPE:

After considering and/or planning for other controls, select the PPE which provides at least the minimum level of protection required to protect employees from the hazards. Using the form, note the appropriate PPE in the required PPE box. For help with proper PPE selection, contact UK Occupational Health and Safety.

Step 5: Make Document Accessible:

Once completed, signed and dated, store the form either electronically or as a hard copy in a location easily accessible to employees and inspectors.

Step 6: Revise Protocol:

Update departmental protocols with the new or modified PPE requirements if applicable




Step 7: Reassess the workplace as necessary by identifying and evaluating:






1. New equipment and processes
2. Injury/Illness records or accident reports
3. Suitability of previously selected PPE

See the attached completed example of the PPE Hazard Assessment Certificate.

UK Occupational Health and Safety can be reached at (859) 257-3862 if you have any questions regarding the PPE Hazard Assessment Form.

PPE HAZARD ASSESSMENT FORM

I am reviewing (check the appropriate box):	<input type="checkbox"/> A worksite	Specify location:		
	<input type="checkbox"/> A single employee's job description	Name of employee:		
	<input type="checkbox"/> A job description for a class of employees	Position Title:		
		Location:		
Your Name:		Department/Division:		
Date:				
	EYE HAZARDS: Tasks that can cause eye injury include: working with chemicals or acids; UV lights; chipping, sanding, or grinding; welding; furnace operations; and metal and wood working.			
	<i>Check the appropriate box for each hazard:</i>			
			<i>Description of hazard(s):</i>	<i>Required PPE</i>
	Chemical Exposure	<input type="checkbox"/>		
	High Heat/Cold	<input type="checkbox"/>		
	Dust/Flying Debris	<input type="checkbox"/>		
	Impact	<input type="checkbox"/>		
	UV/IR Radiation	<input type="checkbox"/>		
Other:	<input type="checkbox"/>			
HEAD/NECK/FACE HAZARDS: Tasks that can cause head/neck/face injury include: working below other workers who are using tools or materials that could fall, working on energized electrical equipment or utilities, and working in trenches or confined spaces.				
	HEAD/NECK/FACE HAZARDS: Tasks that can cause head/neck/face injury include: working below other workers who are using tools or materials that could fall, working on energized electrical equipment or utilities, and working in trenches or confined spaces.			
	<i>Check the appropriate box for each hazard:</i>			
			<i>Description of hazard(s):</i>	<i>Required PPE</i>
	Chemical Exposure	<input type="checkbox"/>		
	Dust/Flying Debris	<input type="checkbox"/>		
	Impact	<input type="checkbox"/>		
	UV/IR Radiation	<input type="checkbox"/>		
	Electrical Shock	<input type="checkbox"/>		
Other:	<input type="checkbox"/>			
FOOT HAZARDS: Tasks that can cause foot injury include: exposure to chemicals or acids, welding or cutting, materials handling, renovation or construction, and electrical work.				
	FOOT HAZARDS: Tasks that can cause foot injury include: exposure to chemicals or acids, welding or cutting, materials handling, renovation or construction, and electrical work.			
	<i>Check the appropriate box for each hazard:</i>			
			<i>Description of hazard(s):</i>	<i>Required PPE</i>
	Chemical Exposure	<input type="checkbox"/>		
	High Heat/Cold	<input type="checkbox"/>		
	Impact/Compression	<input type="checkbox"/>		
	Electrical	<input type="checkbox"/>		
	Puncture	<input type="checkbox"/>		
Slippery/Wet Surfaces	<input type="checkbox"/>			
Other:	<input type="checkbox"/>			

	HAND HAZARDS: Hand injury can be caused by: work with chemicals or acids, exposure to cut or abrasion hazards (for example, during demolition, renovation, woodworking, or food service preparation), work with very hot or cold objects or materials, and exposure to sharps.		
	<i>Check the appropriate box for each hazard:</i>	<i>Description of hazard(s):</i>	<i>Required PPE</i>
	Chemical Exposure <input type="checkbox"/>		
	High Heat/Cold <input type="checkbox"/>		
	UV/IR Radiation <input type="checkbox"/>		
	Electrical Shock <input type="checkbox"/>		
	Puncture <input type="checkbox"/>		
	Cuts/Abrasion <input type="checkbox"/>		
Other: <input type="checkbox"/>			
	BODY HAZARDS: Injury of the body (torso, arms, or legs) can occur during: exposure to chemicals, acids, or other hazardous materials; abrasive blasting; welding, cutting, or brazing; chipping, sanding, or grinding; use of chainsaws or similar equipment; and work around electrical arcs.		
	<i>Check the appropriate box for each hazard:</i>	<i>Description of hazard(s):</i>	<i>Required PPE</i>
	Chemical Exposure <input type="checkbox"/>		
	High Heat/Cold <input type="checkbox"/>		
	Impact/Compression <input type="checkbox"/>		
	Electrical Arc <input type="checkbox"/>		
	Cuts/Abrasion <input type="checkbox"/>		
	Other: <input type="checkbox"/>		
	FALL HAZARDS: Personnel may be exposed to fall hazards when performing work on a surface with an unprotected side or edge that is 4 feet or more above a lower level, or 10 feet or more on scaffolds. Fall protection may also be required when using vehicle man lifts, elevated platforms, tree trimming, performing work on poles, roofs, or fixed ladders.		
	<i>Check the appropriate box for each hazard:</i>	<i>Description of hazard(s):</i>	<i>Required PPE</i>
	Fall hazard <input type="checkbox"/>		
	NOISE HAZARDS: Personnel may be exposed to noise hazards when working in mechanical rooms; machining; grinding; sanding; cage washing; dish washing; working around pneumatic equipment, grounds equipment, generators, chillers, motors, saws, jackhammers, or similar equipment.		
	<i>Check the appropriate box for each hazard:</i>	<i>Description of hazard(s):</i>	<i>Required PPE</i>
	Noise hazard <input type="checkbox"/>		
	RESPIRATORY HAZARDS: Personnel may be exposed to respiratory hazards that require the use of respirators: during emergency response, when using certain chemicals outside of a chemical fume hood; when working with hazardous powders; when entering fume hood plenums, when working with animals; when applying paints or chemicals in confined spaces; when welding, cutting, or brazing on certain metals; and when disturbing asbestos, lead, silica, or other particulate hazards.		
	<i>Check the appropriate box for each hazard:</i>	<i>Description of hazard(s):</i>	<i>Required PPE</i>
	Chemical exposure <input type="checkbox"/>		
	Particulate exposure <input type="checkbox"/>		
Other: <input type="checkbox"/>			
I certify that the above hazard assessment was performed to the best of my knowledge and ability, based on the hazards present on this date.			
_____ (signature)			

University of Kentucky Job Hazard Analysis

Employee Information

<u>Employee Name:</u>	<u>Employee UK ID:</u>	<u>Employee Job Title:</u>
<u>Department Name:</u>	<u>Department #:</u>	<u>Date of Evaluation:</u>

Supervisor Information

<u>Supervisor Name:</u>	<u>Supervisor UK ID:</u>	<u>Supervisor Job Title:</u>
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Task Information

<u>Task Title:</u>		
<u>Routine or non-routine task:</u>	<input type="checkbox"/> Routine (More than 4 times a year)	<input type="checkbox"/> Non - Routine (Less than 4 times a year)

Signatures

<u>Employee Signature:</u>	<u>Date:</u>	<u>Supervisor Signature:</u>	<u>Date:</u>
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Risk Assessment Reference Sheet

Risk Assessment Matrix					
		² Severity of Injury or Illness			
		Negligible = 1	Marginal = 2	Critical = 3	Catastrophic = 4
¹ Likelihood of Occurrence	Frequent = 5	5	10	15	20
	Probable = 4	4	8	12	16
	Occasional = 3	3	6	9	12
	Remote = 2	2	4	6	8
	Improbable = 1	1	2	3	4

Risk Assessment Results Key		
Risk Score From Matrix	Risk Rating	Deadline for Department to Implement Risk Controls
1 to 3	Low	Not Required
4 to 6	Medium	1 Year
8 to 10	Serious	6 Months
12 to 20	High	3 Months

¹ Likelihood of Occurrence or Exposure to Hazard		
¹ Likelihood Rank	¹ Description for Likelihood Rating	
5	Frequent	Likely to occur repeatedly
4	Probable	Likely to occur several times
3	Occasional	Likely to occur sometime
2	Remote	Not likely to occur
1	Improbable	Very unlikely - may assume exposure will not happen

² Severity of Potential Injury From Hazard		
² Severity Rank	Description for Severity Rating	
4	Catastrophic	Death or permanent total disability
3	Critical	Disability exceeding 3 months
2	Marginal	Minor injury, lost work day accident
1	Negligible	First aid or minor medical treatment

Step 1 (Description)	Potential Hazards	Current Safety Procedures	Likelihood to Occur (Use Ratings from Risk Matrix)
Step 1 Image:			

Step 2 (Description)	Potential Hazards	Current Safety Procedures	Likelihood to Occur (Use Ratings from Risk Matrix)
Step 2 Image:			

