

DUQUESNE UNIVERSITY

HOT WORK PROGRAM

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Prepared by: Environmental Health and Safety Department

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Purpose

This program is to provide a safe environment in University buildings and on University premises where temporary hot work may be performed. Potential health, safety and property hazards can result from the fumes, gases, sparks, hot metal and radiant energy produced during hot work. These, and other hazards, can be reduced through the implementation of effective controls as outlined in this Program.

The Occupational Safety and Health Administration (OSHA) and the National Fire Protection Association (NFPA) prohibits hot work operations unless appropriate steps are taken to minimize fire hazards, such as removal or guarding of combustible materials and, when possible, restricting hot work to specially designated areas.

Scope

This program applies to all employees and contracted/sub-contracted personnel who perform or are authorized to perform any "Hot Work" at the University. All projects involving hot work in other than permitted areas must be required to have an approved Hot Work Permit on site signed by the Department or Project Supervisor responsible for the project. Departments where hot work is performed are responsible for ensuring that adequate controls and procedures are in place before work begins.

All "Hot Work" projects covered by this Program include, but not limited to, any temporary operation involving the following:

- A. Burning
- B. Welding
- C. Brazing
- D. Torch Cutting
- E. Soldering
- F. Heat Transfer
- G. Grinding
- H. Open Flames
- I. All Heat Producing Tasks
- J. All Spark Producing Tasks

Responsibilities:

Administration - Duquesne University has the overall responsibility for providing a place of employment free of recognized hazards and unsafe conditions, as well as complying with federal, state, and local standards and regulations.

The Deans, Directors or Department Heads - Have the overall responsibility of ensuring that all pertinent personnel are provided with the required equipment and resources to conduct safe hot work operations. They must also ensure that proper safety equipment and training are made available to each worker involved in hot work operations.

Environmental, Health and Safety - Has the responsibility of ensuring local, state, federal and insurance company compliance with the Hot Work Program and the responsibility for guidance and technical expertise needed to oversee the program. Responsibilities also include providing training for affected personnel.

Department Supervisor (whose employee(s) engage in hot work) - To ensure that all aspects of this Program are implemented and hazards are controlled so not to present a hazardous exposure to University employees, students and visitors. It is also the responsibility of Department Supervisors to insure the employee(s) designated to perform hot work utilizes the necessary procedures and equipment to minimize that employee's own exposure to the hazards generated. Responsibility also includes ensuring that all equipment is maintained in a safe operational manner. They have the responsibility to issue Hot Work Permits and ensure the Permits are completed prior to start of work.

University Employee(s) (engaged in hot work) - Are responsible for following this Program and implementing controls that will eliminate or greatly reduce the hazards generated by their work for the protection of themselves, University employees, students and visitors. Personnel using tools or equipment for hot work are also responsible for ensuring that equipment is in proper working order, the work site is made fire safe prior to start of work, and the area is made fire safe prior to leaving the work area.

Fire Watch - Is responsible for ensuring that safe conditions are maintained during hot work operations and for reporting all fires that have developed regardless if it was extinguished or not. The fire watch has the authority to stop the hot work operation if an unsafe condition develops.

Project Supervisor(s) for Outside Contractor(s) - Are responsible for ensuring outside contractors and sub-contractors involved in hot work have and follow a Hot Work Program or comply with the provisions of this Program. Advise all outside contractors about flammable materials or hazardous conditions that they may not be aware of.

General Requirements

Fire Prevention and Protection

The basic precautions for fire prevention during hot work operations are:

- A. Fire Hazards - If the object to be worked on cannot readily be moved, all movable fire hazards in the vicinity must be taken to a safe place.
- B. Guards - If the object to be worked on 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.
- C. Restrictions - If the basic requirements for fire prevention, as stated above cannot be followed then hot work will not be performed.

Special Precautions

If the object to be worked on cannot be moved and all fire hazards cannot be removed and guards are required, the special precautions listed below must be followed:

- A. Combustible Materials - Wherever there are floor openings or cracks in the flooring that cannot be closed, precautions must be taken so that no readily combustible materials on the floor below will be exposed to sparks that may drop through the floor. The same precautions must be observed with regard to cracks or holes in walls, open doorways and open or broken windows.
- B. Fire Extinguishers - Suitable fire extinguishing equipment will 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.
- C. Fire Watch - A Fire watch will be required whenever hot work is performed in all areas where any of the following conditions exist:
 - 1.) Combustible material, in building construction or contents, closer than 35 feet to the point of operation.
 - 2.) Combustibles are more than 35 feet away but are easily ignited by sparks.
 - 3.) Wall or floor openings within a 35-foot radius expose combustible material in adjacent areas including concealed spaces in walls or floors.
 - 4.) 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.

Fire watchers must have fire extinguishing equipment readily available and be trained in its use. They must be familiar with the procedure 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 continuous fire watch must be maintained for at least 1-hour after the completion of hot work operations to detect and extinguish possible smoldering fires. After the continuous 1-hour fire watch, Department and Project Supervisors must monitor the hot work area for an additional 3 hours (see Hot Work Permits section).

- D. Authorization - Before hot work is permitted, the Department Supervisor responsible for authorizing hot work operations must inspect the area and complete a Hot Work Permit. He/she will designate precautions to be followed in granting authorization to proceed in the Hot Work Permit.
- E. Floors - Where combustible materials such as paper clippings, wood shavings, or textile fibers are on the floor, the floor must be swept clean for a radius of 35 feet. Combustible floors will 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 must be protected from possible shock.
- F. Prohibited areas - Hot work will not be permitted in the following situations:
- 1.) In areas not authorized by management.
 - 2.) In sprinklered buildings while such protection is impaired (contact EH&S for approval).
 - 3.) In the presence of explosive atmospheres (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.
 - 4.) In areas near the storage of large quantities of exposed, readily ignitable materials.
- G. Permitted Areas - Areas where a Hot Work Permit is not required as long as all precautionary measures, as listed in this Program, are adhered to:
- 1.) Weld Shop, Fisher Hall
 - 2.) Mechanic's Shop, Grounds Garage
 - 3.) Academic laboratories (research and classes)
- H. Relocation of Combustibles - Where practicable, all combustibles will be relocated at least 35 feet from the work site. Where relocation is impracticable, combustibles must be protected with flame-resistant covers or otherwise shielded with metal or flame-resistant guards or curtains.
- I. Ducts - Ducts and other systems that may carry sparks to distant combustibles must be suitably protected or shut down.
- J. Combustible Walls - Where hot work is conducted near a wall, partition, ceiling or roof of combustible construction, fire-resistant shields or guards must be provided to prevent ignition.
- K. Noncombustible Walls - If hot work is to be done on a metal wall, partition, ceiling or roof, precautions must 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 must be provided.
- L. Combustible Cover - hot work will not be attempted on a metal partition, wall, ceiling or roof having a combustible covering or on walls or partitions of combustible sandwich-type panel construction.
- M. Pipes - Hot work on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs will not be undertaken if the work is close enough to cause ignition by conduction.

- N. Fire prevention precautions - Hot work will be permitted only in areas that are or have been made fire safe. When work cannot be moved, the area must be made safe by removing combustibles or protecting combustibles from ignition sources.
- O. If hot work is to be done in close proximity to a sprinkler head, a wet rag must be gently wrapped around the head and then removed at the conclusion of the hot work operation. During the hot work operation, special precautions must be taken to avoid the accidental activation of fire detection and suppression systems.

Welding or Cutting Containers

- A. Used Containers - No hot work will be performed on used drums, barrels, tanks or other containers until they have been cleaned so thoroughly as to make absolutely certain that there are no flammable materials present or any substances such as greases, tars, acids, or other materials which when subjected to heat, might produce flammable or toxic vapors. Any pipelines or connections to the drum or vessel must be disconnected or blanked.
- B. Venting and Purging - All hollow spaces, cavities or containers must be vented to permit the escape of air or gases before conducting hot work.

Confined Spaces

When hot work is to be done in confined spaces, appropriate entry procedures must be followed (see Duquesne University's Confined Space Entry Program). The Confined Space Entry Program is available through the EH&S Department.

- A. Accidental Contact - When arc welding is to be suspended for any substantial period of time, 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.
- B. Torch valve - In order to eliminate the possibility of gas escaping through leaks or improperly closed valves, when gas welding or cutting, the torch valves must be closed. The gas supply to the torch must be shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. Where practicable, the torch and hose will also be removed from the confined space.
- C. Securing Cylinders and Machinery - When hot work is being performed in any confined spaces, the gas cylinders and welding machines will be left on the outside. Before operations are started, heavy portable equipment mounted on wheels must be securely blocked to prevent accidental movement.
- D. Ventilation - All hot work operations within confined spaces will be adequately ventilated to prevent the accumulation of toxic materials or possible oxygen deficiency. All air, replacing that withdrawn, must be clean and respirable.
- E. Warning Sign - After welding operations are completed, the welder must mark the hot metal or provide some other means of warning other workers.

Protection of Personnel - General

- A. Railing - A welder or helper working on platforms, scaffolds, or runways must be protected against falling. This may be accomplished by the use of railings, safety harnesses, lifelines, or some other equally effective safeguards.
- B. Welding cable - Welders must place welding cable and other equipment so that it is clear of passageways, ladders, and stairways.

Personal Protective Equipment

- A. Personal Protective Equipment (PPE) must be worn during hot work operations. The type of work to be performed and the hazards present during the work will dictate the required PPE. A hazard assessment or the work will indicate the potential hazards and the necessary PPE.
- B. Departmental Supervisors and the EH&S Department can assist with these hazard assessments.

Compressed Gas Cylinder Storage and Handling

Storage and handling of compressed gas cylinders are important parts of many cutting and welding operations. The following must be observed:

- A. Oxygen and fuel gas cylinders should be stored separately with the protective valve caps in place. Except when in use, oxygen and fuel gas cylinders should be stored at least 20 feet apart or separated by a noncombustible wall at least 5 feet high.
- B. Cylinder carts equipped with a cylinder restraint, such as a chain or strap, must be used when transporting compressed gas cylinders.
- C. All cylinders must be secured, when stored or in use, in an upright position. Securing devices in storage should prevent tip-over. When in use, cylinders should remain on a welding cart and be secured to that cart.
- D. All cylinders not in use must have their protective valve cap in place.
- E. Regulators must be compatible with the cylinder and its contents. Many regulators are similar in design and construction. Check the regulator's model number and compare that with the cylinder's requirements.

Hot Work Permits

Hot Work Permits (Appendix A, B, and C) can help minimize the risk of fire during hot work activities by serving as a checklist for supervisors, operators and those performing fire watch duties. Department and Project Supervisors are responsible for issuing permits and will be trained and qualified to examine the work site and ensure that appropriate protective steps, such as those listed in this Program, have been taken. A Hot Work Permit must be issued and completed prior to each hot work operation.

- A. Department Supervisors will issue Hot Work Permits to their University employees. University Project Supervisors will issue Hot Work Permits to outside contractors and sub-contractors.

- B. Hot work operations are only permitted in designated areas and those areas determined to be safe after a Hot Work Permit has been completed. All sections of the Hot Work Permit must be completed. If a section does not apply, a NA (not applicable) must be designated; do not leave a section or question blank.
- C. The Hot Work Permit will be issued in two parts:
 - 1. Part 1 in its entirety (including WARNING on back) will be completed by the Department Supervisor/Project Supervisor and retained for his/her files. Permits are only valid for a normal, 8-hour shift and will expire at the end of the shift. If this time frame does not allow for the hot work to be completed, a new Hot Work Permit must be issued. If hot work is to be finished by another party other than those starting the Permit, the initial permit must be closed out and a new Permit must be issued.
 - 2. Part 2 will be issued to the person performing the work. The person performing the work will complete the TIME STARTED & TIME FINISHED sections of Part 2 and display the Permit at the hot work location at all times.
- D. A fire watch must occur during the entire time the hot work operation is proceeding. Once hot work operations have finished, a fire watch must continue for at least 1-hour. This is continuous and includes fire watching through any break and lunchtime. After the 1-hour fire watch, the fire watcher must sign-off the permit and return it to the Department Supervisor/Project Supervisor that issued the permit.
- E. If an initial fire watch is required, the Department/Project Supervisor responsible for the Hot Work Permit must monitor the work area for fire for 3 more hours after the fire watch. The frequency of monitoring will depend on the likelihood of a fire starting but at the least, once per hour. Most losses due to fire occur between 1 and 4 hours AFTER the hot work is completed. This fire watch is not to be conducted at the end of the shift/day when no one is left in the area to keep track of the conditions following the hot work.
- F. After the Department Supervisor/Project Supervisor responsible for the hot work permit has finished the 3-hour fire monitoring, he/she must sign-off the permit and return the completed permit to the EH&S Department for recordkeeping.

Outside Contractor(s) & Sub-Contractors

Project Supervisor(s) are responsible for ensuring outside contractors and sub-contractors involved in hot work operations on University premises have and follow a Hot Work Program or comply with the provisions of this Program.

- A. Outside contractors and sub-contractors are responsible for ensuring their employees are adequately trained in all aspects of conducting hot work safely.
- B. Outside contractors and sub-contractors are required to provide the appropriate length of fire watch for all hot work operations.
- C. After completing the hot work operation and the appropriate fire watch, the outside contractor and sub-contractors are responsible for ensuring that building alarms and fire detection and extinguishing systems are operational before leaving the site.

Off-Hours, 2nd Shift and Night-Turn

If the immediate supervisor responsible for the hot work project is available during off-hours, 2nd shift and/or night-turn, he/she must issue the Hot Work Permit prior to hot work being initiated. If the immediate supervisor is not available, it is the responsibility of the person performing the hot work to complete the Hot Work Permit in its entirety and conduct a fire watch according to this Program. Once the hot work and the fire watch have been completed, the person conducting the hot work must return the completed Hot Work Permit to their immediate supervisor. It is the immediate supervisor's responsibility to return the completed Hot Work Permit to the EH&S Department.

Training

It is expected that any University employee engaged in hot work has received training and developed the skills necessary to conduct hot work in a safe and professional manner. The EH&S Department will train and consult with any employee, at the request of their supervisor, on the topic of personal and fire safety as it relates to hot work.

All supervisors and employees engaged in hot work operations and Hot Work Permitting will be trained on the provisions and guidelines of this Program and in the completion of the Hot Work Permit.


This Program will be reviewed at least annually and updated when deemed necessary.

APPENDIX A

HOT WORK PERMIT

**BEFORE INITIATING HOT WORK, CAN THIS JOB BE AVOIDED?
IS THERE A SAFER WAY?**

This Hot Work Permit is required for any temporary operation involving open flames or producing heat and/or sparks. This includes, but is not limited to: Brazing, Cutting, Grinding, Soldering, Torch Applied Roofing and Welding.

INSTRUCTIONS	PART 1	REQUIRED PRECAUTIONS CHECKLIST
<p>1. Firesafety supervisor:</p> <p>A. Verify precautions listed at right (or do not proceed with the work).</p> <p>B. Complete and retain Part 1.</p> <p>C. Issue Part 2 to person doing job.</p> <p>HOT WORK BEING DONE BY</p> <p><input type="checkbox"/> EMPLOYEE</p> <p><input type="checkbox"/> CONTRACTOR</p> <p>DATE _____ JOB NUMBER _____</p> <p>LOCATION/BUILDING AND FLOOR _____</p> <p>NATURE OF JOB _____</p> <p>NAME OF PERSON DOING HOT WORK _____</p> <p>I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.</p> <p>SIGNED (Firesafety Supervisor/Operations Supervisor) _____</p>	<p>0828865</p>	<p><input type="checkbox"/> Available sprinklers, hose streams and extinguishers are in service/operable.</p> <p><input type="checkbox"/> Hot Work equipment in good repair.</p> <p>Requirements within 35 ft (11 m) of work</p> <p><input type="checkbox"/> Flammable liquids, dust, lint and oily deposits removed.</p> <p><input type="checkbox"/> Explosive atmosphere in area eliminated.</p> <p><input type="checkbox"/> Floors swept clean.</p> <p><input type="checkbox"/> Combustible floors wet down, covered with damp sand or fire-resistive sheets.</p> <p><input type="checkbox"/> Remove other combustibles where possible. Otherwise protect with fire-resistive tarpaulins or metal shields.</p> <p><input type="checkbox"/> All wall and floor openings covered.</p> <p><input type="checkbox"/> Fire-resistive tarpaulins suspended beneath work.</p> <p><input type="checkbox"/> Protect or shut down ducts and conveyors that might carry sparks to distant combustibles.</p> <p>Work on walls, ceilings or roofs</p> <p><input type="checkbox"/> Construction is noncombustible and without combustible covering or insulation.</p> <p><input type="checkbox"/> Combustibles on other side of walls, ceilings or roofs are moved away.</p> <p>Work on enclosed equipment</p> <p><input type="checkbox"/> Enclosed equipment cleaned of all combustibles.</p> <p><input type="checkbox"/> Containers purged of flammable liquids/vapors.</p> <p><input type="checkbox"/> Pressurized vessels, piping and equipment removed from service, isolated and vented.</p> <p>Fire watch/Hot Work area monitoring</p> <p><input type="checkbox"/> Fire watch will be provided during and for 60 minutes after work, including any coffee or lunch breaks.</p> <p><input type="checkbox"/> Fire watch is supplied with suitable extinguishers, and where practical, a charged small hose.</p> <p><input type="checkbox"/> Fire watch is trained in use of equipment and in sounding alarm.</p> <p><input type="checkbox"/> Fire watch may be required in adjoining areas, above and below.</p> <p><input type="checkbox"/> Monitor Hot Work area for 4 hours after job is completed.</p> <p>Other Precautions Taken:</p> <p><input type="checkbox"/> _____</p>
<p>PERMIT EXPIRES</p>	<p>DATE</p>	<p>TIME</p>
<p>AM</p>		
<p>PM</p>		
<p>NOTE: EMERGENCY NOTIFICATION ON BACK OF FORM. USE AS APPROPRIATE FOR YOUR FACILITY.</p>		
		
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APPENDIX B

WARNING!

HOT WORK IN PROGRESS WATCH FOR FIRE!

INSTRUCTIONS

PART 2

1. Person doing Hot Work: Indicate time started and post permit at Hot Work location. After Hot Work, indicate time completed and leave permit posted for Fire Watch.
2. Fire Watch: Prior to leaving area, do final inspection, sign, leave permit posted and notify Firesafety Supervisor.
3. Monitor: After 4 hours, do final inspection, sign and return to Firesafety Supervisor.

HOT WORK BEING DONE BY

- EMPLOYEE
 CONTRACTOR

DATE _____ JOB NUMBER _____

LOCATION/BUILDING AND FLOOR _____

NATURE OF JOB _____

NAME OF PERSON DOING HOT WORK _____

I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.

SIGNED (Firesafety Supervisor/Operations Supervisor) _____

TIME STARTED		TIME FINISHED	
<input type="checkbox"/> AM	<input type="checkbox"/> PM	<input type="checkbox"/> AM	<input type="checkbox"/> PM
PERMIT EXPIRES		DATE	TIME
			AM PM

FIRE WATCH SIGNOFF:

Work area and all adjacent areas to which sparks and heat might have spread were inspected during the watch period and were found fire safe.

Signed: _____

FINAL CHECKUP:

Work area was monitored for 4 hours following Hot Work and found fire safe.

Signed: _____

REQUIRED PRECAUTIONS CHECKLIST

- Available sprinklers, hose streams and extinguishers are in service/operable.
- Hot Work equipment in good repair.

Requirements within 35 ft (11 m) of work

- Flammable liquids, dust, lint and oily deposits removed.
- Explosive atmosphere in area eliminated.
- Floors swept clean.
- Combustible floors wet down, covered with damp sand or fire-resistant sheets.
- Remove other combustibles where possible. Otherwise protect with fire-resistant tarpaulins or metal shields.
- All wall and floor openings covered.
- Fire-resistant tarpaulins suspended beneath work.
- Protect or shut down ducts and conveyors that might carry sparks to distant combustibles.

Work on walls, ceilings or roofs

- Construction is noncombustible and without combustible covering or insulation.
- Combustibles on other side of walls, ceilings or roofs are moved away.

Work on enclosed equipment

- Enclosed equipment cleaned of all combustibles.
- Containers purged of flammable liquids/vapors.
- Pressurized vessels, piping and equipment removed from service, isolated and vented.

Fire watch/Hot Work area monitoring

- Fire watch will be provided during and for 60 minutes after work, including any coffee or lunch breaks.
- Fire watch is supplied with suitable extinguishers, and where practical, a charged small hose.
- Fire watch is trained in use of equipment and in sounding alarm.
- Fire watch may be required in adjoining areas, above and below.
- Monitor Hot Work area for 4 hours after job is completed.

Other Precautions Taken:

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APPENDIX C

WARNING!

HOT WORK IN PROGRESS WATCH FOR FIRE!

IN CASE OF EMERGENCY:
CALL: _____
AT: _____

WARNING!

