 <p>Carnegie Mellon University Environmental Health & Safety FIRE LAB WORK</p>	<p>Environmental Health and Safety Hot Work Guidelines</p>
<p>Date of Issuance: October 2019</p>	<p>Revision Date: October 2024</p>
<p>Revision Number: 1</p>	<p>Prepared by: EHS</p>

1. Purpose

The Environmental Health and Safety (EHS) Department supports the mission and values of Carnegie Mellon University (CMU) by sustaining and enhancing a safe and healthy environment within the CMU community. As part of this mission, EHS manages the hot work process to reduce the likelihood of fire or injury. From repairing utility systems with welding equipment to using torches to craft pieces of art in a studio, hot work is an integral part of the day-to-day operations at CMU. When performed safely, hot work can be accomplished without fires or injury. However, when hot work is not performed safely, it can have disastrous consequences that risk both lives and property.

2. Scope

This document sets forth the requirements for performing hot work, both indoors and outdoors, at all CMU owned and operated facilities throughout the Greater Pittsburgh campus. Equipment and activities that are out of the scope of this document include:

- a. Bunsen burners, soldering stations, lasers, ovens or furnaces used in research laboratories and makerspaces. Note: Handheld torches and other open flames used in these areas are within the scope of this document.
- b. Pyrotechnics or live fire effects used for events or performances.
- c. Food preparation equipment or the use of cooking fuels (such as “Sterno Cans”).
- d. Recreational fire pits or portable equipment used to provide comfort heating/warmth.
- e. Hot work performed in new buildings under construction that are not occupied by members of the public or the CMU community.

While these equipment and activities are outside of the scope of this document, additional guidelines or safety programs may be in effect. Refer to the Environmental Health and Safety (EHS) [University Safety Guidelines](#) page for more information.

3. Definitions

- a. **Campus partner:** Any department, team or individual community member at CMU.
- b. **Combustible material:** Any material that can be ignited or burned.

- c. **Confined space:** A space that is large enough that a person can enter and perform assigned work, has a limited or restricted means of entry or exit, and is not designed for continuous occupancy. Examples include, but are not limited to, tanks, underground utility vaults, and the interior of some equipment such as dust collectors and air handler units.
- d. **Fire watch:** A person who is responsible for continuously monitoring the hot work area, extinguishing any small fires that may occur, and alerting building occupants and first responders when emergencies arise.
- e. **High risk area or operation:** An area within a building or a proposed hot work process where the probability and/or severity of a fire is high. Refer to Section 5 of this document for additional information.
- f. **Hot work:** Any activity that produces open flames or sparks. Examples include, but are not limited to, welding, brazing, torch cutting, grinding and hot riveting.
- g. **Hot work area:** Any area within 35 feet of a hot work activity.
- h. **Hot work permit:** Written documentation issued by EHS that authorizes hot work to be performed.
- i. **Hot work supervisor:** A person assigned to a hot work area who is responsible for ensuring that all safety requirements of the hot work guidelines are met.
- j. **Project manager:** A campus partner representative who is responsible for planning or initiating a hot work activity. Examples include project management staff from Campus Design and Facility Development (CDFD), zone supervisors from Facilities Management Services (FMS), and other designated individuals from academic departments or student organizations.

4. Roles and Responsibilities

a. *Environmental Health and Safety (EHS)*

EHS is responsible for the development, implementation and maintenance of a written hot work program. As part of this responsibility, EHS will:

- i. Apply for and maintain the university's annual hot work program permit, issued by the City of Pittsburgh: Bureau of Fire.
- ii. Review requests for hot work and issue hot work permits when minimum permit requirements are met.
- iii. Conduct site safety inspections for high-risk hot work requests prior to hot work permit issuance.
- iv. Conduct annual safety reviews of dedicated hot work areas.
- v. Conduct incident investigations where injuries, fires, property damage, or impacts to business continuity occur due to hot work.
- vi. Provide fire extinguisher training to campus partners upon request.

- vii. Remain up to date on regulatory requirements and university insurance standards impacting hot work.
- viii. Communicate hot work program changes to campus partners.

b. *Campus Partners*

Campus partners who have a need to perform hot work play an important role in maintaining a safe and healthy environment at Carnegie Mellon University. Campus partners include, but may not be limited to, Facilities Management Services (FMS), Campus Design and Facility Development (CDFD), student organizations, and academic units/research laboratories.

Campus partners are expected to:

- i. Review and comply with the requirements of this program.
- ii. Communicate hot work requirements to contractors and vendors, where applicable.
- iii. Apply for and maintain copies of hot work permits.
- iv. Designate personnel to serve in the roles of hot work supervisor and fire watch.

c. *Contractors and Vendors*

Opportunities exist where campus partners may need to contract hot work to a third-party vendor. Where this is the case, third-party vendors are also expected to comply with the requirements of the program.

Campus partners may delegate the tasks of applying for hot work permits and designating personnel to serve in the roles of hot work supervisor and fire watch to the third-party vendor. However, ensuring that contractors understand their responsibilities and that these tasks are completed remains the responsibility of the campus partner sponsoring/contracting the hot work.

5. Hot Work Permit Process

Campus partners who need to perform hot work must submit a hot work permit request to Environmental Health and Safety (EHS) by emailing safety@andrew.cmu.edu. Requests for non-emergent hot work should be submitted a minimum of two business days prior to the start of the hot work. Where work will involve a high-risk area or operation, it is highly recommended that permit requests are submitted a minimum of five business days prior to the start of the hot work. This provides EHS with adequate time to review permit requests and conduct site safety inspections or coordinate additional support, as needed.

It is recognized that situations will arise where emergent hot work is needed that must begin before a hot work permit can be obtained. Where a delay in performing the hot work may result in an immediate threat to health and safety, or where there is an imminent threat to business continuity, hot work may begin prior to the issuance of the hot work permit. Notification of the emergent hot work must be submitted to safety@andrew.cmu.edu as soon as possible and all other requirements of this program must be followed.

a. General Information

When submitting a permit request to EHS, the following information is needed:

- i. Building name
- ii. Room number
- iii. Brief description of the room or area (mechanical room, kitchen, laboratory, office, exterior loading dock, etc.)
- iv. Presence of automatic fire sprinklers in the hot work area (yes or no)
- v. Type of hot work to be performed (welding, brazing, torch heating, torch cutting, grinding, hot tapping, hot riveting, etc.)
- vi. Days and times that the hot work permit is needed
- vii. Name of the department or company performing the hot work
- viii. Name, phone number, and email of the project manager (campus partner) planning and initiating the hot work
- ix. Name, phone number, and email of the individual assigned to fire watch
- x. Name, phone number, and email of the individual assigned as the hot work supervisor

Please note: If all the above information is not provided as part of the initial request, the issuance of a hot work permit may be delayed.

b. EHS Review

Once the hot work permit request is received, EHS will review the request and determine if a site safety inspection is required.

If a site safety inspection is required, EHS will coordinate and conduct the inspection with the permit requester (or their designee). If there are any hazards that need to be remediated, EHS will provide the information needed for remediation to the permit requester, hot work supervisor, and project manager.

c. Site Safety Inspections

For areas or operations deemed “high risk” by EHS, permits will not be issued until a site safety inspection and supplemental process review is completed. High risk areas and operations include, but are not limited to:

High Risk Area or Operation	Process Review
Welding or cutting on all pipelines, tanks, containers or other vessels that previously contained flammable liquids or vapors.	Confirmation that the interior environment of the vessel has been rendered free of flammable (ignitable) vapors that could cause fire or explosion.
Hot work in hazardous areas containing flammable liquids and gases, combustible dusts, or combustible materials that cannot be removed or relocated.	Confirmation that flammable liquids and gases, combustible dusts, or combustible materials are safely managed.
Any area not protected by a fire suppression system or where a fire suppression system is impaired.	Confirmation that interim fire protection and life safety measures are in place to protect people and property.
Torch-applied roofing operations	Confirmation that all Pittsburgh Bureau of Fire requirements are adhered to.
Hot work inside of any confined space	Confirmation that all work in confined spaces complies with the EHS Confined Space Program requirements. This includes ensuring the confined space is free of flammable (ignitable) vapors, toxic gases, oxygen deficiencies, or other hazardous conditions.
Any area deemed high-value or mission-critical by EHS or other campus partner	Confirmation that the assets, systems and/or operations within these areas are effectively protected against loss or interruption.

d. Permit Issuance

Once a hot work area has passed a site safety inspection, or if a site safety inspection is not required, EHS will issue a hot work permit. This permit will be generated in the “Campus Optics” system utilized by EHS and a PDF copy will be emailed to the permit requester, hot work supervisor, and project manager (if applicable). A copy of the hot work permit shall be maintained in the hot work area throughout the duration of the hot

work. This requirement may be satisfied by keeping a digital copy of the permit on a phone, tablet or laptop. It is highly recommended that a copy of the permit is distributed to all personnel in the hot work area.

An example of a hot work permit can be found in Appendix A.

e. Permit Extension

EHS will issue permits for the dates and times specified in the initial permit request, up to a maximum of 90 days. However, EHS may set more restrictive limitations based on the level of risk that the hot work presents. This will be based on the discretion of the fire safety specialist issuing the permit. The limitation of hot work permit timelines provides an opportunity for the periodic evaluation of the hot work site and distribution of safety guideline updates to project managers, hot work supervisors and fire watch personnel. Where permits will expire before hot work is completed, a permit extension request must be submitted to safety@andrew.cmu.edu.

f. Permit Suspension and Revocation

EHS reserves the right to suspend, or revoke permits and hot work privileges where deemed necessary. This may include, but is not limited to:

- i. Failure to follow hot work program requirements
- ii. Newly impaired fire protection systems in the hot work area
- iii. Scheduled special events within the building that the hot work is being performed in

When a member of EHS determines that a hot work permit must be suspended or revoked, they will send written notification via email to the hot work supervisor. For projects where a third-party vendor or contractor is performing the hot work, notification will also be sent to the campus partner sponsoring the hot work. EHS will then work with all parties involved to develop an action plan so that hot work may resume. Where repeat offenses occur, an individual's hot work privileges may be suspended indefinitely.

6. Hot Work Safety

a. Alternative Methods

Hot work should be avoided where safer alternative methods exist. For example, welding may be substituted for mechanical fastening techniques, cutting with torches or abrasive cut-off wheels may be substituted for reciprocating saws or hydraulic shears, and pipe soldering may be substituted with the use of compression fittings. Where hot work cannot be avoided, consideration shall be given to moving the hot work area outside.

b. Fire Prevention

To prevent fires and maintain a safe working environment, the following requirements must be met before hot work can be performed:

- i. The hot work area shall be kept free of combustible materials and floors shall be swept clean prior to hot work beginning.
- ii. Where combustible materials cannot be removed, they shall be shielded to prevent ignition from heat, sparks and/or flames. Combustible flooring and floor coverings shall be kept wet, covered in damp sand, or shielded with a fire-resistant covering. Where multiple fire-resistant blankets are used to cover a large area, all seams must overlap a minimum of 6 inches.
- iii. Any openings in the floor must be covered to prevent sparks or slag from dropping out of the approved hot work area.
- iv. All flammable liquids and gases, pyrophoric materials, and oxidizers must be removed from the hot work area or stored in an enclosed flammable storage cabinet. Where there are questions or concerns about how to safely manage these materials, EHS is available to provide consultation.
- v. Combustibles in adjacent areas must be assessed to ensure that they cannot be ignited from conductive or radiant heat.
- vi. Where hot work will occur on a surface that is painted or contains insulation, such as when repairing a pipe, these materials must be removed (stripped back) far enough to avoid direct contact with sparks and flames or ignition from conductive and radiant heat.
- vii. A fire extinguisher with a minimum of a 4A-40B:C rating must be provided within 30 feet of the hot work area. See Section 8 for additional information.
- viii. Care must be taken to ensure that fire sprinklers and smoke detectors are not inadvertently activated during hot work. When hot work is being conducted near fire sprinklers, or, where hot work will produce smoke, dust, or excessive fumes in areas containing smoke detectors, the hot work supervisor must contact EHS to determine if additional action is needed. No fire protection device may be removed, altered, or covered without EHS approval.
- ix. Hot slag and embers must be completely cooled before discarding them. Caution should be used when disposing in a garbage can, especially when indoors.
- x. Conveyors or exhaust systems that may carry sparks or embers outside of the hot work area must be shut down prior to beginning hot work. Exception: Ventilation/exhaust systems that are used for fume/vapor removal during welding or to maintain an overall safe working environment during hot work.
- xi. Where self-contained dust/fume collectors are used during welding and grinding processes, the collection unit must be rated for use with ignition sources. Wood dust or other combustible particulates may not be captured inside of the same collection unit.

- xii. Automated hot work processes such as robotic welding and grinding may not be left unattended. Each automated hot work process must contain a readily identifiable and accessible emergency stop button.
- xiii. All compressed gas cylinders must be secured from tipping over and kept a minimum of 10 feet away from any exit door. When not in use, compressed gas cylinders must be turned off and equipped with a cap to protect the cylinder valve.
- xiv. Where compressed gas cylinders do not contain a fixed shut-off wheel or handle, a wrench or other means to shut off the gas should be always provided at the cylinder.
- xv. Where flammable gases and oxidizers will be stored together, they must be separated by a minimum distance of 20 feet or separated by a 5-foot-tall non-combustible barrier containing a minimum 30-minute fire rating. Exception: Where a single flammable gas cylinder and a single oxygen cylinder are in use and secured to a cart, separation is not required.

c. *Injury and Illness Prevention*

The primary intent of this program is to address the inherent fire hazards associated with hot work activities. However, consideration must also be given to preventing injury and illness during these activities.

Individuals performing hot work are expected to ensure that they are wearing personal protective equipment (PPE) that is appropriate for the job task. A job hazard analysis should be completed prior to any hot work beginning to identify the type of PPE needed. This may include, but is not limited to, closed toe shoes, eye protection, gloves, and clothing that is fire-resistant.

Individuals performing hot work are also expected to ensure provisions are in place to address each of the following, where applicable:

- i. Welding Safety
- ii. Compressed Gas Safety
- iii. Ventilation, Environmental Controls and Indoor Air Quality
- iv. Fall Protection
- v. Confined Space Safety
- vi. First Aid
- vii. Hazard Communication

Please refer to the [EHS Workplace and Construction Safety](#) page for additional information or assistance.

7. Hot Work Supervisors

Each hot work project must have a hot work supervisor assigned. The hot work supervisor shall perform daily inspections of the hot work area(s) and oversee each of the following tasks:

- a. Maintaining responsibility for ensuring the requirements of this document are followed.
- b. Ensuring that access to the hot work area is limited to authorized personnel only.
- c. Ensuring that personnel performing hot work are trained in the safe operation of hot work equipment.
- d. Inspecting the hot work area daily to ensure that it is free from fire hazards in accordance with Section 6.
- e. Ensuring that a trained fire watch is in place during hot work, and all required firefighting equipment is present and in operable condition. In situations where personnel are limited, the hot work supervisor may also perform the responsibilities of fire watch.
- f. Communicating issues or needed hot work permit extensions to EHS.

8. Fire Watch

As a critical part of the hot work process, a person assigned to the role of fire watch is required.

The role of fire watch cannot be fulfilled by the individual who is performing the hot work unless the criteria for one of the following exceptions is met:

Exception #1	The hot work process will not produce sparks, spatter, or other ignition sources that may be out of the immediate field of view of the individual performing hot work. For example, brazing a copper pipe with a torch. <u>AND</u> The hot work is not being performed in an area that is high risk or part of a high-risk process listed in Section 5 of this document.
Exception #2	The hot work is being conducted in a dedicated hot work area in accordance with Section 9 of this document.

The intent of the fire watch is to continuously patrol the hot work area, checking for potential fires or smoldering embers and extinguishing them as needed and/or calling for fire

department assistance. A fire watch shall be in effect throughout the duration of the hot work, and for a minimum of 30 minutes after the hot work has stopped. This is due to the potential for small smoldering fires or fires in concealed spaces that would otherwise go unnoticed. For dedicated hot work areas meeting the requirements of Section 9, the 30-minute fire watch extension period is optional.

Where fire hazards from hot work cannot be directly observed by a single individual, such as projects requiring simultaneous hot work activities in different locations, multiple fire watches will be required.

a. *Fire Extinguishers*

Personnel assigned to fire watch must be trained in the use of portable fire extinguishers. An ABC fire extinguisher with a minimum 4A-40B:C rating shall be provided within 30 feet of the hot work area. The required rating can typically be achieved by selecting a 10# dry chemical fire extinguisher. The fire watch is responsible for ensuring that this fire extinguisher is operational and inspected at the start of each shift. Fire extinguishers that are installed throughout CMU buildings are not permitted to be relocated. However, if a fire extinguisher is installed within 30 feet of the hot work area, this will satisfy the requirement.

b. *Emergency Reporting*

Personnel assigned to fire watch must also be familiar with the following emergency reporting procedures. In the event of a fire, the fire watch must ensure that the building occupants and the CMU Police Department are notified in a timely manner. Fire watch personnel shall familiarize themselves with the location of the closest manual fire alarm pull station and how to operate it. In addition to activating the manual fire alarm pull station (if the building is equipped with one), a phone call must be placed to the CMU Police Department (412-268-2323) to report any fires that occur.

9. Dedicated Hot Work Areas

Areas exist throughout campus where hot work is routinely conducted, such as workshops and makerspaces. These areas may be designated by EHS as a dedicated hot work area upon completion of a safety review, at which time a continuous one-year hot work permit will be issued. Any campus partner wanting to have their space approved as a dedicated hot work area should reach out to safety@andrew.cmu.edu to initiate this process. To obtain this designation, dedicated hot work areas must meet all the following requirements:

- a. Equipped with automatic sprinkler protection
- b. Kept free of combustible materials and storage
- c. Walls and floors constructed of non-combustible materials



- d. Walls or partitions extended and secured to the floor to prevent the passage of sparks, slag or heat from the hot work area
- e. Warning signage posted at each entrance (See Appendix B)

It is recognized that there may be some dedicated hot work areas in existence prior to the development of this document that do not meet all the above requirements. EHS will evaluate any preexisting, nonconforming conditions and develop a plan to manage the risks in collaboration with the applicable campus partners.

10. Revisions

Date	Documented Changes	Initials
10/15/2024	Full revision to the program	EO

Appendix A: Hot Work Permit Example

	<h2>Hot Work Permit (October 22nd, 2024)</h2> <p>Carnegie Mellon University • Warner Hall • A27 Report Generated: October 14th, 2024 at 1:56 pm</p>	
<p>REQUESTER John Doe 412-468-9675 jdoe@abcmechanical.com</p>	<p>AUTHORIZER Evan Orowetz eorowetz@andrew.cmu.edu</p>	
<p>PERMIT STARTS 10/22/2024 - 6:00 am</p>	<p>PERMIT EXPIRES 10/22/2024 - 4:00 pm</p>	
<p>This hot work permit has been issued by Environmental Health and Safety (EHS) and is active during the timelines outlined above. Additional information about the type of hot work being performed, location of the approved hot work area, and contact info for the hot work supervisor can be found by scanning the QR code above.</p> <p>Anyone performing or managing hot work is expected to review and comply with the EHS Hot Work Guidelines. Failure to do so may result in revocation of this permit and/or suspension of future hot work privileges.</p>		

DEDICATED HOT WORK AREA

Anyone performing or managing hot work must review and comply with the EHS Hot Work Program. A copy of this document can be accessed by scanning the QR code to the right.



Keep all flammable and combustible materials away from the hot work area.

Prior to any hot work beginning, check all fire extinguishers to ensure they are in operable condition.

In case of fire, activate the closest fire alarm pull station and call the CMU Police Department at 412-268-2323.

For questions or concerns, please contact Environmental Health and Safety (EHS) at 412-268-8182 or safety@andrew.cmu.edu.