

Northwestern

Welding, Cutting, and Brazing
(Hot Work)

Environmental Health and Safety

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I. Purpose

This program establishes the minimum safe working procedures and guidelines for welding, cutting, brazing, grinding, soldering, torch-applied roofing, and any other similar operation on Northwestern property. It also covers the control of ignition sources, such as spark-producing tools and devices in hazardous areas. These procedures are intended to protect life, health, and property from fire and the byproducts of combustion that can result from flame- or spark-producing equipment.

II. Scope

This program applies to Northwestern employees, students, and contractors involved in the use of flame- or spark-producing equipment on Northwestern property. Reasonable diligence and effort must be made to avoid hot work, when feasible. This program does not apply to:

- A. Boilers and furnaces that are permanently installed,
- B. Bunsen burners and other flame operations in laboratories or spaces designed and supplied for this type of equipment,
- C. Chafing fuel for catering chafers,
- D. Electric soldering irons used for repairing electronics, and
- E. Stoves and other cooking operations.

III. Definitions

- A. **Department with Hot Work Approval Responsibility** – A Northwestern department with qualified personnel who are responsible for reviewing and issuing hot work permits and ensuring hot work is performed in accordance with this program, within their area of responsibility.
- B. **Designated hot work areas** – Designated areas approved by Environmental Health and Safety (EHS) where hot work is performed routinely and do not require a daily hot work permit (see **Section VII**).
- C. **Fire watch** – An individual whose job is to watch for fire during and after hot work activities and extinguish them if possible or activate the fire alarm. The fire watch must have immediate access to appropriate fire extinguishers and be trained in the use of the equipment (see **Section IX**). The fire watch must be performed in accordance with **Section VI**.
- D. **Hot work** – Any temporary operation involving open flames or producing heat and/or sparks. This includes, but is not limited to welding, cutting, brazing, grinding, soldering, and torch-applied roofing.
- E. **Hot work high-risk areas** – Areas that pose an increased level of risk in comparison with other areas. Additional required precautions may be necessary when conducting hot work in these high-risk areas due to the increased likelihood or severity of a fire or explosion.

IV. Responsibilities

- A. **Environmental Health and Safety (EHS)**
 - i. Review and revise this program as necessary.
 - ii. Provide paper hot work permits to departments, as necessary.
 - iii. Investigate hot work incidents (i.e., injuries, fires, and explosions) to determine root causes and corrective actions to prevent reoccurrences.

- iv. Provide guidance and consultation regarding this program.
 - v. Review and approve “Designated Hot Work Areas” (see **Section VII**).
- B. Departments with Hot Work Approval Responsibility**
- i. Adhere to the requirements of this program.
 - ii. Authorize and issue hot work permits within areas of responsibility, as necessary.
 - iii. Prior to authorizing and using a hot work permit, inspect hot work and surrounding areas and verify:
 - a. No fire detection or fire suppression systems impairments.
 - b. No environmental conditions exist that could be hazardous.
 - c. No conflicts are anticipated with other work, equipment, systems, or community impact.
 - iv. When hot work is complete each day:
 - a. Retrieve hot work permits (see **Section X**).
 - b. Verify jobsites are left in a clean and safe state.
- C. Contractors and Departments Requesting Hot Work**
- i. Adhere to the requirements of this program.
 - ii. Ensure that employees are trained (see **Section IX**).
 - iii. Notify departments with hot work approval responsibility at least 48 hours prior to the hot work being performed.
 - iv. When 48 hours’ notice is not provided (e.g., in emergency or urgent situations), hot work approval is at the discretion of a representative from the department with hot work approval responsibility.
 - v. On the day of, and prior to the hot work, meet with a designated representative from the department with hot work approval responsibility at the jobsite to ensure:
 - a. The work area is prepared in accordance with this program, and
 - b. The hot work permit is properly filled out, at which time the representative from the department with hot work approval responsibility will sign the permit to authorize the hot work activity.
- D. Hot Work Permit Holders (Individuals Performing the Hot Work)**
- i. Adhere to the requirements of this program and the hot work permit.
 - ii. Trained in accordance with **Section IX**.
 - iii. Post authorized hot work permits in a conspicuous location in the hot work area.
 - iv. Ensure qualified fire watch personnel are on the premises.
 - v. Cease all hot work operations immediately any time hot work permit requirements cannot be met, or as directed by representatives from Facilities, the department with hot work approval responsibility, or EHS.

V. General Requirements

- A. When means other than gas or electric arc cutting or welding could provide equal or superior work quality, the least hazardous means of performing the job should be used.
- B. Hot work permits are only valid for the day, operation, and area for which they are issued. Jobs with more than one shift (e.g., 8 hours) of hot work require a separate permit for each shift.

- C. A hot work permit must be issued by a designated representative from a department with hot work approval responsibility before any hot work in areas that are not Designated Hot Work Areas (see **Section VII**).
- D. When questions or doubt arise pertaining to the advisability of issuing a hot work permit (e.g., hazardous or hot work high-risk areas), work cannot proceed until authorized by a designated representative from a department with hot work approval responsibility and designated EHS representative.
- E. Unless approved by a designated EHS representative, hot work is not permitted when:
 - i. There is potential for heat transfer along or through walls, pipes, tanks, or other metal surfaces that may cause ignition or decomposition of ignitable or toxic substances in contact with the metal.
 - ii. There is potential for production of sparks, slag, or molten metal by welding or cutting within 35 feet of unprotected combustible or flammable substances that may cause fire.
 - iii. Hot work could result in the accumulation of smoke or hazardous gases in the space.
 - iv. Any individual involved in the work believes the hot work could result in undue hazards of any nature.
 - v. Proper engineering controls are not in place to prevent exposure to fumes of adjacent area occupants.
 - vi. Proper barriers are not in place to prevent people from inadvertently entering the area.
- F. Refer to the Northwestern [Confined Spaces Program](#) for additional hot work requirements in confined spaces.

VI. Fire Watch and Fire Monitoring

- A. A continuous fire watch must be performed during and after hot work activities.
- B. Fire monitoring must be performed following fire watch requirements, utilizing one of the following methods:
 - i. Automatic smoke detection system with a remote alarm that alerts University Police (i.e., an operational fire detection system inside a building).
 - ii. Personnel to patrol the hot work area for fire-safe conditions, at a minimum, at least every 15 minutes. Personnel must be trained in accordance with **Section IX**.
- C. Fire watch and fire monitoring requirements (e.g., duration, personnel) are dependent on the work area construction and occupancy factors, and are contained in the [hot work permit](#) and [FM Global Data Sheet 10-3 – Hot Work Management](#).

VII. Designated Hot Work Areas

- A. Designated hot work areas may include areas such mechanical spaces and workshops and encompass the point where the hot work is being performed and 35 feet beyond that point.
- B. Designated hot work areas must comply with all applicable fire protection regulations, [FM Global Data Sheet 10-3 – Hot Work Management](#), and this program.
- C. Designated hot work areas must be evaluated and approved by EHS, utilizing the [Designated Hot Work Area Approval Form](#).
- D. Departments must notify EHS of any space configuration and/or occupancy changes in a

- previously approved designated hot work area, which must be re-evaluated and approved by EHS.
- E. In the event of a fire detection or suppression system impairment, all hot work must be discontinued for the duration of the impairment.
 - F. Designated hot work areas must have signage posted (see **Appendix 1**) in a conspicuous location.

VIII. General Precautions

Hot work must adhere to the following general precautions, and any additional requirements set forth by the [hot work permit, FM Global Data Sheet 10-3 – Hot Work Management](#), Facilities, the department with hot work approval responsibility, and EHS.

- A. Hot work areas must be adequately guarded to prevent unauthorized access.
- B. Objects or equipment involved in hot work must be marked or barricaded as necessary to prevent individuals from contacting hot surfaces.
- C. Fire detection, suppression, notification, and associated equipment (e.g., fire pumps) are operational and in service.
- D. Where hot work is performed close to sprinklers, noncombustible barriers or damp cloth guards must shield the individual sprinkler heads and must be removed when the work is completed. If the work extends over several days, the shields must be removed at the end of each workday.
- E. Fire extinguishers of the appropriate class must be available, charged, and ready for immediate use.
- F. Safety data sheets (SDSs) must be available for all applicable products (e.g., welding rods, solder).
- G. Hot work equipment must be in good working condition, equipment operation manuals available, and used in accordance with the manufacturer's guidelines (e.g., grounding).
- H. The area is free of flammable and combustible liquids and materials (e.g., dust, lint, and oil deposits), compressed gas cylinders, and chemical hazards.
- I. The area is free of explosive, flammable, or other hazardous vapors, gases, or dusts.
- J. The appropriate [personal protective equipment](#) (PPE) is available and in use, such as:
 - i. Welding helmet with the proper shade of lenses
 - ii. Safety glasses with side shields or a face shield
 - iii. Body protection (e.g., apron or jacket)
 - iv. Gloves
 - v. Leggings and boots
 - vi. Hearing protection
 - vii. Respiratory protection
- K. Combustible waste (e.g., cardboard, plastics, rags) must not be allowed to accumulate on floors and other surfaces within the hot work area. Hot work-permitted areas, including designated hot work areas, must be regularly cleaned, and combustible waste must be disposed of in appropriate containers.
- L. Containers or equipment containing or have contained flammable liquids, gases, or solids, must be thoroughly cleaned, inerted, or purged before any hot work.
- M. Follow Northwestern's [Control of Hazard Energy \(Lockout/Tagout\) Program](#) before performing any maintenance or troubleshooting on hot work equipment.

IX. Training

Departments and contractors must ensure employees are trained as follows:

- A. All employees performing hot work must be suitably trained in the safe operation of their equipment and the safe use of the process (e.g., welding, brazing, torch cutting).
- B. Northwestern employees who perform hot work, are involved in hot work operations (e.g., fire watch, fire monitor), or review and approve hot work permits must be trained as follows:
 - i. Biennial online [hot work/arc welding awareness-level training](#)
 - ii. Fire Extinguishers
 - a. Annual online [portable fire extinguisher training](#)
 - b. [Hands-on portable fire extinguisher training](#)
- C. Northwestern employees reviewing and approving hot work permits must complete the annual online [hot work permit requirement](#) training.
- D. Contractor employees, including subcontractor employees, involved in hot work activities (e.g., welder, fire watch, fire monitor) must be suitably trained, and training records must be available upon request.
- E. Retraining must be provided to employees whenever:
 - i. There is a change in:
 - a. Job assignment,
 - b. Procedures,
 - c. Machinery, equipment, systems, or processes that present a new hazard.
 - ii. It is identified that the employee's knowledge or use of hot work procedures or equipment is lacking, such as if involved in an incident.
 - iii. Retraining must reestablish the appropriate level of knowledge needed to work safely.

X. Recordkeeping

- A. Department with hot work approval responsibility must maintain all hot work permits and any associated permits or forms (e.g., confined space entry permits, safe operating procedures) for at least one year.
- B. EHS will maintain training records in the myHR Learn system, but departments may maintain other training records outside the myHR Learn system.

XI. Regulatory Authority and Related Information

Northwestern and contractors will comply with Occupational Safety and Health Administration (OSHA) standards, National Fire Protection Association (NFPA) codes, and any other applicable codes and standards, including:

[OSHA 29 CFR 1910 Subpart Q – Welding, Cutting, and Brazing](#)

[NFPA 51B – Standard for Fire Prevention During Welding, Cutting, and Other Hot Work](#)

[FM Global Property Loss Prevention Data Sheets 10-3 – Hot Work Management](#)

[FM Global Hot Work Permit](#)

[Northwestern Confined Spaces Program](#)

[Northwestern Control of Hazardous Energy \(Lockout/Tagout\) Program](#)

[Northwestern Personal Protection Equipment \(PPE\) Program](#)

[Northwestern Contractor Safety Program](#)
[Northwestern Hazard Communication](#)

XII. Contact

For questions contact Environmental Health and Safety at ehs@northwestern.edu or (847) 467-6342.

Appendix 1 – Designated Hot Work Area Signage Example

