

California Institute of Technology

Hot Work Permit Program



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Purpose

This document describes the safety procedures and relevant guidelines to follow before, during, and after completion of **Hot Work** at Caltech to prevent the possibility of fires or explosions in conjunction with the performance of hot work. Hot work involves any operation that might create a spark, flame, or heat, or which has the capability of initiating fires or explosions. See the Hot Work Operation definition below. These operations require a Hot Work Permit.

This program describes the procedures and guidelines for both employees and contractors to perform hot work at Caltech. Section 1 includes definitions, general guidelines, and training requirements. Section 2 addresses the Caltech employee process for obtaining a Hot Work Permit. Section 3 addresses the contractor process for obtaining a Hot Work Permit. Caltech Managers and Supervisors oversee the Hot Work Program for operations under their supervision, and the Caltech Campus Inspector oversees the hot work program related to contractor-performed hot work.

Section 1- Definitions, General Guidelines, and Training Requirements

Definitions

- **Combustibles** – Wood, cardboard, paper, sawdust, etc. that will ignite if in sustained contact with a strong ignition source.
- **Flammables** – Liquids, vapors, and gases that have flash points below 100°F (37.8°C).
- **Permit Authorizing Individual (PAI)** - Any individual who has completed hot work safety training and is authorized to issue a Hot Work Permit.
- **Fire Watch** – Any employee who has successfully completed hot work safety training and is responsible for maintaining visual surveillance in the vicinity of the hot work, with particular focus on areas that are not visible to the person performing the hot work.
- **Hot Work Operators (HWOs)** – Employees who perform hot work operations. A HWO must always obtain a Hot Work Permit before beginning hot work.
- **Hot Work Operation** – Hot work involves welding, brazing, soldering, heat treating, sanding, cutting, grinding, hot riveting, and other similar applications that may produce a spark, flame, or heat, or which have the capability of initiating fires or explosions.

General Guidelines

- A Hot Work Permit is required to initiate hot work.
- Work should be performed using alternative methods other than hot work, whenever possible, to reduce the fire or explosion hazard.
- Hot work should be performed in designated hot work rooms whenever practical. A permit is not required for hot work rooms, such as maintenance, machine, or

technician shops, where hot work operations (e.g., grinding, welding, cutting, etc.) are routinely conducted, and proper fire prevention and protection safeguards are already in place.

- A Hot Work Permit is normally job-specific for only one job, and active through the expiration date and time on the permit, which is usually one day.
- The permit should be posted in the area of hot work for the duration of the activity.
- The permit is automatically void, and hot work is stopped immediately, if work area conditions change so that the area is no longer fire-safe. Work can resume only after the permit is re-signed and re-issued, or another permit is issued.
- A copy of every permit shall be filed by the PAI or Campus Inspector in a location designated by his/her Supervisor, and kept for a minimum period of one year.

Fire Safety Measures Required by the Hot Work Permit

- All flammable and combustible materials within a 35-foot radius of hot work must be removed.
- When flammable and combustible materials within a 35-foot radius of hot work cannot be removed, they must be covered with flame-retardant tarps, and a fire watch person must be stationed in the area.
- In case of elevated work or work in the upper floors of a building, the lower areas below the proposed hot work area must also be inspected.
- Floors and surfaces within a 35-foot radius of the hot work area must be swept free of combustible dust or debris. Floors must be wetted down if they are combustible.
- The equipment or material to be worked on must be thoroughly cleaned of all deposits of oil, carbon, dust, or other combustible/flammable residues.
- All openings or cracks in the walls, floors, or ducts that are potential transport passages for sparks, heat, and flames must be covered or sealed. Where sealing is not possible, cover the area below with fire-resistant tarps. Note: Sparks from welding and cutting operations that fall into a lower level are major causes of fires in construction and maintenance activities.
- Hot work equipment (e.g., welding machines) must be inspected prior to use, and in good working condition.
- Exhaust and return air fans for the Heating, Ventilating, and Air Conditioning (HVAC) system within 35 feet must be turned off.
- Hot work areas must be isolated with barrier tapes, barricades, traffic cones, or construction horses to warn personnel from walking into and under these areas when hot work is in progress, and to divert them from the hazards of falling sparks and flash burns.
- Compressed oxygen must not be used under any circumstances for the purpose of ventilation, comfort, cooling, blowing dust from clothes, or cleaning the work area.
- Hot work must be stopped, and the Hot Work Permit rendered void, if the fire alarm sounds, if work has stopped for more than two hours unless atmospheric testing indicates that 10% of the LEL is not exceeded, or if work has not begun within 60 minutes after the Hot Work Permit has been issued.

- Atmospheric testing for the presence of flammable vapors or gases must be conducted prior to welding storage tanks, vessels, or containers that previously held flammable materials. The proposed hot work shall not be performed if flammable vapors or gases are detected. If this type of work is contracted to an outside firm, the contractor must have properly calibrated instrumentation to complete this atmospheric testing requirement.
- Any difficulties encountered with the hot work must be noted on the Permit.

Fire Detection, Alarm, and Suppression (Sprinkler) Systems

- Portable fire extinguishers must be readily available and accessible in the hot work area. They cannot be the building fire extinguishers which are located nearby. They must be additional extinguishers that are appropriate for the fire potential of the hot work area.
- The entire building's smoke detection and alarm systems cannot be shut down. Instead, smoke detectors in the hot work area may be covered for the duration of hot work to prevent false alarms.
- Automatic sprinkler systems cannot be shut down to perform hot work. Instead, individual sprinkler heads in the hot work area may be covered with a wet rag for the duration of hot work to prevent accidental activation.
- Hot Work Permits must not be issued in areas that are affected by sprinkler system impairments. In the event of sprinkler system impairment during hot work, the area Supervisor or Contractor must stop hot work operations until the sprinkler system impairment can be corrected.

Fire Watch Requirements

- A Fire Watch must be stationed in the hot work area by a PAI or Contractor if the following conditions exist:
 - Flammable and combustible materials cannot be removed from within a 35-foot radius of the hot work.
 - Wall, floor, or duct openings within a 35-foot radius of the hot work expose flammable and combustible materials in adjacent areas, including concealed spaces in walls, floors, or ducts.
 - Flammable and combustible materials are located adjacent to the opposite side of partitions, walls, ceilings, or roofs.

Hot Work Safety Training

Caltech employees involved in hot work must complete hot work training, including Supervisors, Permit Authorizing Individuals, Hot Work Operators, and Fire Watch personnel. The following courses must be completed:

- Hot Work Permit Training – Required upon initial assignment, and refresher training required every 5 years.
- Portable Fire Extinguisher Training – Required initially and refresher training required annually. The hands-on classroom training component must be completed in the initial class.

Departmental Training

Managers and Supervisors shall train Caltech employees on departmental Hot Work Permit procedures and specific safety procedures for the type of hot work equipment used. This training shall be completed upon initial assignment, and cover the following subjects:

- Safety procedures specific to the hot work equipment used
- Required Personal Protective Equipment (PPE) for job tasks
- Identification of Permit Authorizing Individuals (PAIs), and how they can be contacted
- Where to file copies of completed Hot Work Permits
- Locations of designated hot work rooms where a Hot Work Permit is not required

Section 2 - Caltech Employee Process for Obtaining a Hot Work Permit

[Caltech Department Managers and Supervisors](#) oversee the Hot Work Permit program for hot work operations under their supervision. Managers and Supervisors are responsible for designating employees as Permit Authorizing Individuals (PAIs) who will issue Hot Work Permits. Any employee who has successfully completed hot work safety training may be a PAI. Hot Work Operators are allowed to be PAIs, but they are not allowed to issue their own Hot Work Permits.

Hot Work Operators who perform frequent or daily brazing and soldering operations at multiple sites will comply with the following process:

- A single, PAI-signed and laminated Hot Work Permit may be carried and used at multiple sites as long as it is posted at each site during the hot work, and all hot work requirements are followed.
- The Hot Work Permit shall have an expiration date of one year from the date of issue, at which time it will be turned in and annual hot work safety training will be repeated and a new Hot Work Permit will be issued.
- Copies of each issued Hot Work Permit will be kept in the individual employee's personnel file, or in a place designated by his/her Supervisor.

Hot Work Permit Process – Caltech Employee

Before starting any hot work operation

- A Hot Work Operator determines the need for hot work.
- The Hot Work Operator ensures that the area around the planned hot work activities is in compliance with the general guidelines and safety measures required by the Hot Work Permit, and the fire detection, alarm, and suppression system requirements listed above in Section 1
- The Hot Work Operator contacts a Permit Authorizing Individual (PAI).

- The Permit Authorizing Individual (PAI) inspects the hot work jobsite and completes the Hot Work Permit form.
- The Permit Authorizing Individual (PAI) stations a Fire Watch in the hot work area if the situation requires one as outlined by the Fire Watch Requirements listed above in Section 1.
- Once all Hot Work Permit safety guidelines have been met, the Permit Authorizing Individual (PAI) signs, issues, and posts the Hot Work Permit.

During and after hot work operation

- A Fire Watch person will be provided during the hot work, and for 60 minutes after completion of the hot work, including any coffee or lunch breaks.
- The Fire Watch person will be supplied with a portable fire extinguisher and properly trained in its use and the activation of the nearest local fire alarm pull station.
- The hot work area and all adjacent areas (including floors above and below it) must be monitored periodically for 4 hours after the hot work has been completed.
- If barricades are removed, hot materials must be marked to warn other employees, contractors, and visitors about the potential burn hazard.
- Following completion of the hot work, the PAI will conduct a final inspection of the hot work area, and sign off on Part 2 of the Hot Work Permit if the area is fire-safe.

Section 3 - Contractor Process for Obtaining a Hot Work Permit

Contractors and Vendors

All Contractors and Vendors must obtain a Hot Work Permit from the Caltech Campus Inspector when required as outlined above. Caltech's Project Managers should notify the Contractor or Vendor about this requirement during the Preconstruction meeting. Contractors should fill out the attached Hot Work Permit form, seek and obtain approval from the Caltech Campus Inspector, and retain their copy as proof of compliance.

Permits are valid as long as the same person(s) or crew member(s) are continuously working on the job, for a period not exceeding 48 hours.

Hot Work Permit Process – Contractor

Before starting any hot work operation

- The Caltech Campus Inspector inspects the work area for compliance with the general guidelines and safety measures required by the Hot Work Permit, and the fire detection, alarm, and suppression system requirements listed above in Section 1. The hot work will be confined to the area and/or equipment specified on the Hot Work Permit.
- The Caltech Campus Inspector will review all appropriate emergency procedures with the Contractor personnel performing the hot work.
- The Contractor will provide the Caltech Campus Inspector with a copy of the Contractor's hot work safety procedures.

- The Caltech Campus Inspector signs the Hot Work Permit. One copy is provided to the Contractor (Part 2) for posting in the hot work area. The posting is required to be visible throughout the hot work operation. The original copy (Part 1) will be kept by the Caltech Campus Inspector until the job is completed.

During and after hot work operation


- A Fire Watch person will be provided during the hot work, and for 60 minutes after completion of the hot work, including any coffee or lunch breaks.
- The Fire Watch person will be supplied with a portable fire extinguisher and properly trained in its use and the activation of the nearest local fire alarm pull station.
- The hot work area and all adjacent areas (including floors above and below it) must be monitored periodically for 4 hours after the hot work has been completed. Caltech requires the Contractor to notify Security after normal work hours by calling 626-395-4701.
- If barricades are removed, hot materials must be marked to warn other employees, Contractors, and visitors about the potential burn hazard.
- Following completion of the hot work, the Caltech Campus Inspector will conduct a final inspection of the hot work area, and sign off on Part 2 of the Hot Work Permit if the area is fire-safe.

HOT WORK PERMIT

STOP!

Avoid hot work or seek an alternative/safer method, if possible.

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. (Part 1A is for quality assurance documentation, if necessary.)</p> <p>C. Issue Part 2 to person performing hot work.</p> | | <p>Y NA</p> <p><input type="checkbox"/> The fire pump is in operation and switched to automatic.</p> <p><input type="checkbox"/> Control valves to water supply for sprinkler system are open.</p> <p><input type="checkbox"/> Hose streams and extinguishers are in service/operable.</p> <p><input type="checkbox"/> Hot work equipment in good working condition.</p> <p>Requirements within 35 ft. (11 m) of hot work</p> <p><input type="checkbox"/> Ignitable liquid, 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-resistant sheets.</p> <p><input type="checkbox"/> Remove other combustible material where possible.</p> <p><input type="checkbox"/> Otherwise, protect with FM Approved welding pads, blankets and curtains, fire-resistant tarpaulins or metal shields.</p> <p><input type="checkbox"/> All wall and floor openings covered.</p> <p><input type="checkbox"/> FM Approved welding pads, blankets and curtains installed under and around work.</p> <p><input type="checkbox"/> Protect or shut down ducts and conveyors that might carry sparks to distant combustible material.</p> <p>Hot 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"/> Combustible material on other side of walls, ceilings or roofs is moved away.</p> <p>Hot work on enclosed equipment</p> <p><input type="checkbox"/> Enclosed equipment cleaned of all combustible material.</p> <p><input type="checkbox"/> Containers purged of ignitable liquid/vapor.</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 one (1) hour after work, including any break activity.</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 up to an additional three (3) hours after the one (1) hour fire watch.</p> <p><input type="checkbox"/> Other precautions taken:</p> <p>_____</p> <p>_____</p> <p>_____</p> | | <p style="writing-mode: vertical-rl; transform: rotate(180deg);">9365357</p> | |
| <p>HOT WORK 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>_____</p> | | | | | |
| <p>IDENTIFY OBJECT/SPECIFIC LOCATION</p> <p>_____</p> | | | | | |
| <p>NATURE OF JOB</p> <p>_____</p> | | | | | |
| <p>NAME (PRINT) AND SIGNATURE OF PERSON PERFORMING HOT WORK</p> <p>_____</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>NAME (PRINT) AND SIGNATURE OF FIRESAFETY SUPERVISOR/OPERATIONS SUPERVISOR</p> <p>_____</p> | | | | | |
| <p>TIME STARTED: _____ TIME FINISHED: _____</p> <p style="text-align: center;">a.m. p.m. a.m. p.m.</p> | | | | | |
| <p>Permit Expires _____ DATE _____ TIME _____</p> <p style="text-align: center;">a.m. p.m. a.m. p.m.</p> | | | | | |
| <p>Note: Emergency notification on back of form. Use as appropriate for your facility.</p> <p>To order additional hot work permits or other FM Global resources, order online 24 hours a day, seven days a week, at www.fmglobalcatalog.com.</p> | | | | | |
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Warning!

HOT WORK IN PROGRESS WATCH FOR FIRE!

PART 2

INSTRUCTIONS

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 _____
 AM PM AM PM

PERMIT EXPIRES DATE _____ TIME _____ AM PM

FIRE WATCH SIGNOFF:
Work area & all adjacent areas to which sparks & 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-resistive sheets.
- Remove other combustibles where possible. Otherwise protect with fire-resistive tarpaulins or metal shields.
- All wall and floor openings covered.
- Fire resistive 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 & in sounding alarm.
- Fire watch may be required in adjoining areas, above & below.
- Monitor Hot Work area for 4 hours after job is completed.

Other Precautions Taken:

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WARNING!

**HOT WORK IN PROGRESS
WATCH FOR FIRE!**

IN CASE OF EMERGENCY:

CALL: _____

AT: _____

WARNING!

