California Institute of Technology

HOT WORK PERMIT PROCEDURES

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PURPOSE

These Procedures describe the relevant guidelines to follow before, during, and after the completion of Hot Work at Caltech, to prevent the possibility of fires or explosions in conjunction with the performance of hot work.

These procedures fulfill the requirements of Cal/OSHA Title 8 §6777 and 2022 California Fire Code (CFC), Chapter 35.

SCOPE

The Hot Work Permit Procedures apply to all Institute personnel and Contractors who will be engaging in hot work activities, including but not limited to brazing, soldering, welding, grinding, cutting, and burning.

RESPONSIBILITIES

CALTECH EMPLOYEES

- Follow procedures for obtaining a hot work permit.
- Ensure a fire watch is assigned.
- Immediately report any signs of smoldering flames.
- Wear all appropriate personal protective equipment during hot work.

CONTRACTORS/SUBCONTRACTORS

- Follow procedures for obtaining a hot work permit.
- Ensure a fire watch is assigned.
- Provide the appropriate hot work safety procedures to the Caltech Project Manager/ Building Inspector.
- Wear all appropriate personal protective equipment during hot work.

PERMIT AUTHORIZING INDIVIDUAL (PAI)

- Ensure a fire watch is assigned.
- Ensure an appropriate fire extinguisher is present at the site.
- Maintain documentation of completed permits.

PROJECT MANAGERS

- Provide a copy of each contractor's hot work safety procedures to EH&S.

MANAGERS/SUPERVISORS

- Oversee the hot work procedures for operations under their supervision.
- Maintain documentation of completed permits.
- Ensure employees wear all appropriate personal protective equipment during hot work.

CALTECH BUILDING INSPECTOR

- Oversee the hot work procedures related to contractor-performed work.
- Maintain documentation of completed permits.

ENVIRONMENTAL HEALTH AND SAFETY

- Conduct periodic review of these procedures.

DEFINITIONS

- **Brazing and Soldering** – Soldering and brazing uses molten metal to join two pieces of metal. The metal added during both processes has a melting point lower than that of the workpiece, so only the added metal is melted. Brazing produces a stronger joint than does soldering, and often is used to join metals other than steel, such as brass. Brazing can also be used to apply coatings to parts to reduce wear and protect against corrosion.
- **Combustibles** – Wood, cardboard, paper, sawdust, etc. that will ignite if in sustained contact with a strong ignition source.
- **Cutting and Grinding** – Any process which produces sparks capable of igniting combustible or flammable materials and transmits heat to the work material from a hot gas.
- **Fire Protection System Impairment** – A condition where a fire protection system, unit, or portion thereof is out of order or needs to be shut off for repair/maintenance.
- **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.
- **Flammables** – Liquids, vapors, and gases that have flash points below 100°F (37.8°C).
- **Hot Work** – Operations such as welding, cutting, burning, heating, grinding, slag, or intense heat producing activities that are capable of igniting combustible materials or flammable atmospheres by providing source of ignition for a fire.
- **Hot Work Operators (HWOs)** – Employees who perform hot work operations. A HWO must always obtain a Hot Work Permit before beginning hot work.
- **Permit Authorizing Individual (PAI)** – Any individual who has completed hot work safety training and is authorized to issue a Hot Work Permit.
- **Shielding** – Non-combustible welding drapes, used in hot work areas. Visible signs should be displayed on shielding while hot work is being performed.
- **Smoldering** – A slow combustion of material without visible light and generally evidenced by smoke and an increase in temperature.

- **Soldering** – Soldering uses metals with a melting point below 800 degrees Fahrenheit. Soldering is commonly used to join electrical, electronic, and other small metal parts.
- **Torch Operations** – A plasma torch is used as an advance tool for welding and cutting operations. Intense ultraviolet radiation, high noise levels, and gases are generated during this process.
- **Welding** – Welding is the most common way of permanently joining metal parts. In this process, heat is applied to metal pieces, melting, and fusing them to form a permanent bond. The following lists the most commonly practiced forms of welding:
    - **Oxygen-Fuel Gas Welding** – The act of joining metal by generating extremely high heat during combustion.
    - **Resistance Welding** – The act of joining or cutting metals by generating heat through resistance created by the flow of an electric current.
    - **Arc Welding** – The act of joining or cutting metals by generating heat from an electric arc that extends between the welding electrode and the electrode placed on the equipment being welded.
    - **Gas Tungsten Arc (TIG) Welding** – Often used with stainless steel or aluminum. TIG uses welding rods, where the welder holds the welding rod in one hand and an electric torch in the other hand. The torch is used to simultaneously melt the rod and the work piece.
    - **Gas Metal Arc (MIG) Welding** – Uses a spool of continuously red wire, which allows the welder to join longer stretches of metal without stopping to replace the rod. The welder holds the wire feeder which functions like the alligator clip in arc welding. Instead of using gas flux surrounding the rod, TIG and MIG protect the initial weld from the environment by blowing inert gas onto the weld.

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 risk of a fire or explosion.
- 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 job-specific for each hot work activity. Hot work permits are valid through the expiration date and time on the permit.

- 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 a new permit is issued.
- A copy of every permit shall be filed by the PAI or Campus Building Inspector in a location designated by their Supervisor and kept on file for a minimum period of six months.
- Performing hot work, wearing personal protective equipment, and indoor/outdoor temperature are all risk factors for heat illness. Please refer to the Institutes Heat Illness Prevention Program for more information.

FIRE SAFETY MEASURES REQUIRED BY THE HOT WORK PERMIT

- All flammable and combustible materials within a 35-foot radius, in either the horizontal or vertical direction, of hot work must be removed.
    - If the materials cannot be removed, the combustibles must be covered by a listed or approved welding curtain, welding blanket, welding pad, or equivalent 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 by the Fire Watch/Monitor.
- 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 prior to work start.
- 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 flame-retardant tarps. Note: Sparks from welding and cutting operations that fall into a lower level are major causes of fires in construction and maintenance activities.
- 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, or traffic cones 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 stop, and the Hot Work Permit rendered void, if the fire alarm sounds.

- 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.
- For Hot Work in confined spaces, the following shall also apply:
    - Keep access to the space clear, and if possible, provide more than one means of workspace access.
    - Ensure that there is no hazardous atmosphere in the space and that there is adequate ventilation.
        - Hot work is prohibited within a confined space with a common wall, floor, or ceiling that contains, or is likely to develop, oxygen enrichment or dangerous air contamination due to flammable and/or explosive substances.
    - If the space is permit required, refer to the Institutes Confined Space Program to obtain a 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 fire protection system impairments. In the event of fire protection system impairment during hot work, the area Supervisor or Contractor must stop hot work operations until the fire protection system impairment can be corrected.
    - A Permit Authorizing Individual must submit a work order to the Fire Alarm Shop at least three (3) business days prior to issuing a permit to advise them of the planned hot work in the area, as well as to ensure that any fire protection systems in the area are not impaired.

- The Fire Alarm Shop will notify any workers conducting hot work if a fire protection system in the hot work area were to become impaired.

FIRE WATCH REQUIREMENTS

At least one individual dedicated solely to the look out and control of stray fires. A fire watch shall always be present during hot work.

During Hot Work:

- There shall be a continuous fire watch during any hot work.

Post Hot Work:

- A continuous fire watch should be completed for one (1) hour post work.
- Fire monitoring should be completed for three (3) hours post work.

The times listed above for fire watch and fire monitoring post hot work are sufficient for the majority of hot work scenarios.

Use the table below (also listed on the back of the hot work permit) for information on "Construction and Occupancy Factors for Post-Work Fire Watch and Monitoring Periods."

[This Area Intentionally Blank]

Table 1. Construction and Occupancy Factors for Determining Post-Work Fire Watch and Fire Monitoring Periods [1, 2]

Occupancy Factors	Construction Factors: Noncombustible construction or FM Approved Class 1 or Class A building materials		Combustible construction without concealed cavities [3]		Combustible construction with unprotected concealed cavities [4]	
	Watch	Monitor	Watch	Monitor	Watch	Monitor
Noncombustible with any combustibles contained within closed equipment (e.g., ignitable liquid within piping)	30 min.	0 hours	1 hour	3 hours	1 hour	5 hours
Office, retail, or manufacturing with limited combustible loading (e.g., HC-1 or HC-2)[5]	1 hour	1 hour	1 hour	3 hours	1 hour	5 hours
Manufacturing with moderate to significant combustible loading (e.g., HC-3) except as noted below [5]	1 hour	2 hours	1 hour	3 hours	1 hour	5 hours
Warehousing	1 hour	2 hours	1 hour	3 hours	1 hour	5 hours
Exceptions: Occupancies with processing or bulk storage of combustible materials capable of supporting slow-growing fires (e.g., paper, pulp, textile fibers, wood, bark, grain, coal or charcoal)	1 hour	3 hours	1 hour	3 hours	1 hour	5 hours

[1] When performing torch applied roofing, apply Section 2.5.2.2.11 and conduct a minimum 2 hours fire watch and 2 hours fire monitoring. If an infrared camera is utilized, reduce to a 1 hour fire watch and 1 hour fire monitoring.

[2] When performing hot work on/in equipment containing non-removable combustible linings or parts, apply Section 2.5.2.3.6 and conduct a minimum 1 hour fire watch and 3 hours fire monitoring within the equipment, and in the surrounding areas per Table 1.

[3] This construction-type does not contain small combustible wall or ceiling cavities where smoldering fires can grow undetected. For example, open wood frame walls (sheathed on one side), exposed wood joists, beams, or trusses, or non-FM Approved insulated metal panels.

[4] This construction-type allows for smoldering fires to grow undetected within small combustible wall or ceiling cavities. Typically these cavities are sufficiently small to not warrant sprinkler protection or subdivision via fire barriers. For example, enclosed wood frame wall (sheathed on two sides), EIFS, or channels created between combustible floor and joist with ceiling construction tightly fastened underneath.

[5] HC-1, HC-2 and HC-3 refer to a group of occupancies listed within Data Sheet 3-26, *Fire Protection Water Demand for Nonstorage Sprinklered Properties.*

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, with annual refresher training.
- Portable Fire Extinguisher Training – Required initially and refresher training required annually.

CALTECH EMPLOYEE PROCESS FOR OBTAINING A HOT WORK PERMIT

Caltech Department Managers and Supervisors oversee the Hot Work Permit procedures for hot work operations under their supervision. Managers and Supervisors are responsible for

designating employees as a Permit Authorizing Individual (PAI) 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 PAI's, but they are not allowed to issue their own Hot Work Permits.

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 activity 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 in the *General Guidelines* section.
- The Hot Work Operator contacts a Permit Authorizing Individual (PAI).
- If hot work is in a sprinklered area, the PAI creates a work order/phase for the Fire Alarm Shop to inform them of the planned work and to confirm that there are no fire protection system impairments.
- The PAI inspects the hot work jobsite and completes the Hot Work Permit form.
- The PAI stations a Fire Watch in the hot work area if the situation requires one as outlined by the Fire Watch Requirements listed in the *General Guidelines* section.
- Once all Hot Work Permit safety guidelines have been met, the 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) must be monitored periodically for three (3) 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. Part 2 is kept on file for a minimum of six (6) months.

CONTRACTOR PROCESS FOR OBTAINING A HOT WORK PERMIT

All Contractors and Vendors must obtain a Hot Work Permit from the Caltech Building 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 Hot Work Permit, obtain approval from the Caltech Building Inspector, and post their copy at the site during hot work.

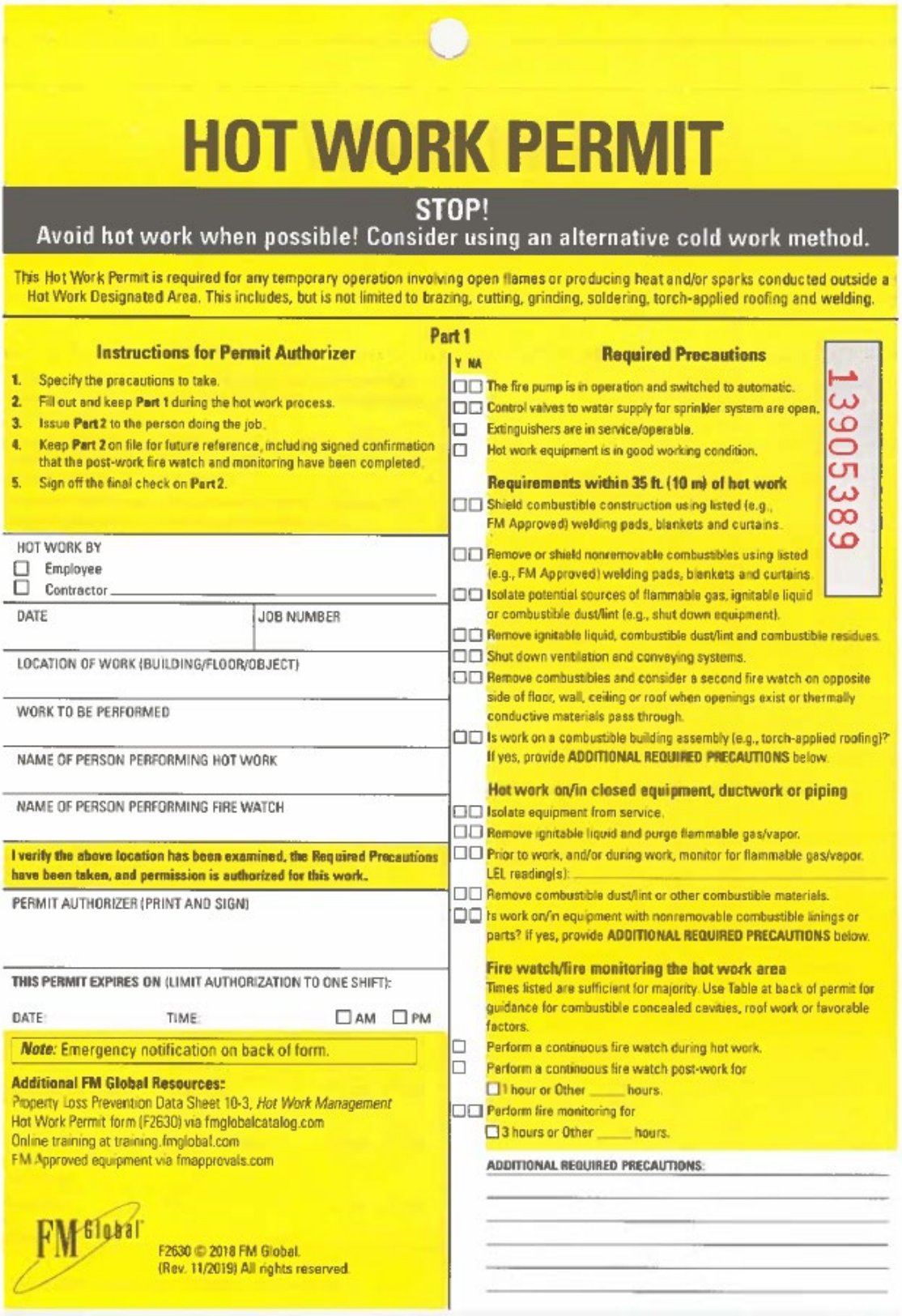
BEFORE STARTING ANY HOT WORK OPERATION

- The Caltech Building 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 in the *General Guidelines* section.
- The hot work will be confined to the area specified on the Hot Work Permit.
- The Caltech Building Inspector will review all appropriate emergency procedures with the Contractor personnel performing the hot work.
- The Contractor will provide a copy of their hot work safety procedures.
- If hot work is in a sprinklered area, the Caltech Building Inspector creates a work order/phase for the Fire Alarm Shop to inform them of the planned work and to confirm that there are no fire protection system impairments.
- The Caltech Building 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 Building 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) must be monitored periodically for three (3) hours after the hot work has been completed. Caltech requires the Contractor to notify Security Dispatch after normal work hours by calling 626-395-4701.
- Following completion of the hot work, the Caltech Building 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. Part 2 is kept on file for a minimum of six (6) months.

HOT WORK PERMIT (FRONT) PART 1



HOT WORK PERMIT

STOP!
Avoid hot work when possible! Consider using an alternative cold work method.

This Hot Work Permit is required for any temporary operation involving open flames or producing heat and/or sparks conducted outside a Hot Work Designated Area. This includes, but is not limited to brazing, cutting, grinding, soldering, torch-applied roofing and welding.

Part 1

Instructions for Permit Authorizer

1. Specify the precautions to take.
2. Fill out and keep **Part 1** during the hot work process.
3. Issue **Part 2** to the person doing the job.
4. Keep **Part 2** on file for future reference, including signed confirmation that the post-work fire watch and monitoring have been completed.
5. Sign off the final check on **Part 2**.

HOT WORK BY
☐ Employee
☐ Contractor _____

DATE | JOB NUMBER

LOCATION OF WORK (BUILDING/FLOOR/OBJECT)

WORK TO BE PERFORMED

NAME OF PERSON PERFORMING HOT WORK

NAME OF PERSON PERFORMING FIRE WATCH

I verify the above location has been examined, the Required Precautions have been taken, and permission is authorized for this work.

PERMIT AUTHORIZER (PRINT AND SIGN)

THIS PERMIT EXPIRES ON (LIMIT AUTHORIZATION TO ONE SHIFT):

DATE: TIME: ☐ AM ☐ PM

Note: Emergency notification on back of form.

Additional FM Global Resources:
Property Loss Prevention Data Sheet 10-3, *Hot Work Management*
Hot Work Permit form (F2630) via fmglobalcatalog.com
Online training at training.fmglobal.com
FM Approved equipment via fmapprovals.com

FM Global

Required Precautions

Y NA

☐☐ The fire pump is in operation and switched to automatic.
☐☐ Control valves to water supply for sprinkler system are open.
☐ Extinguishers are in service/operable.
☐ Hot work equipment is in good working condition.

Requirements within 35 ft. (10 m) of hot work

☐☐ Shield combustible construction using listed (e.g., FM Approved) welding pads, blankets and curtains.
☐☐ Remove or shield nonremovable combustibles using listed (e.g., FM Approved) welding pads, blankets and curtains.
☐☐ Isolate potential sources of flammable gas, ignitable liquid or combustible dust/lint (e.g., shut down equipment).
☐☐ Remove ignitable liquid, combustible dust/lint and combustible residues.
☐☐ Shut down ventilation and conveying systems.
☐☐ Remove combustibles and consider a second fire watch on opposite side of floor, wall, ceiling or roof when openings exist or thermally conductive materials pass through.
☐☐ Is work on a combustible building assembly (e.g., torch-applied roofing)? If yes, provide **ADDITIONAL REQUIRED PRECAUTIONS** below.

Hot work on/in closed equipment, ductwork or piping

☐☐ Isolate equipment from service.
☐☐ Remove ignitable liquid and purge flammable gas/vapor.
☐☐ Prior to work, and/or during work, monitor for flammable gas/vapor. LEL reading(s): _____
☐☐ Remove combustible dust/lint or other combustible materials.
☐☐ Is work on/in equipment with nonremovable combustible linings or parts? If yes, provide **ADDITIONAL REQUIRED PRECAUTIONS** below.

Fire watch/fire monitoring the hot work area

Times listed are sufficient for majority. Use Table at back of permit for guidance for combustible concealed cavities, roof work or favorable factors.

☐ Perform a continuous fire watch during hot work.
☐ Perform a continuous fire watch post-work for
☐ 1 hour or Other _____ hours.
☐☐ Perform fire monitoring for
☐ 3 hours or Other _____ hours.

ADDITIONAL REQUIRED PRECAUTIONS: _____

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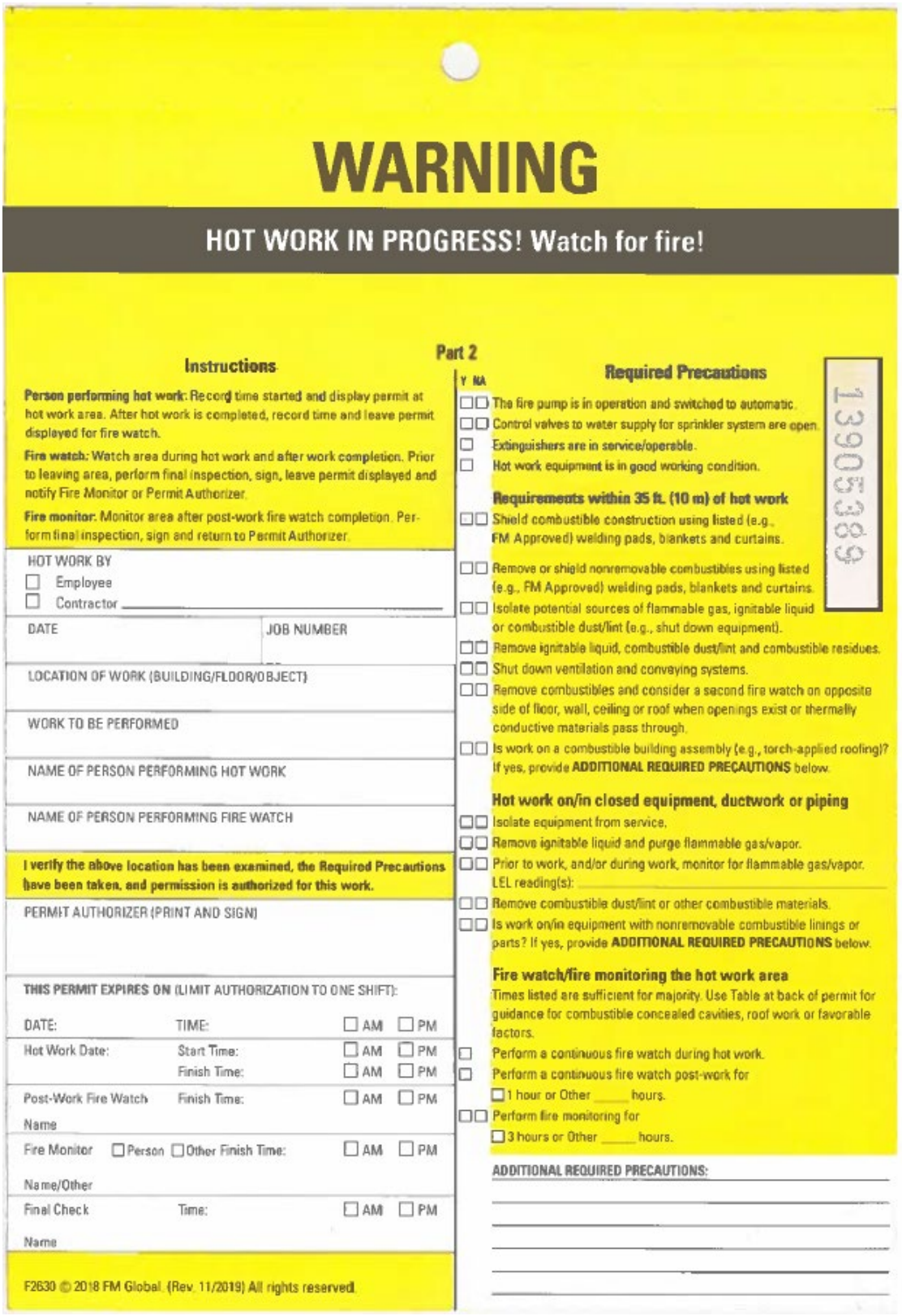
HOT WORK PERMIT (FRONT) PART 2



WARNING

HOT WORK IN PROGRESS! Watch for fire!

Part 2

Instructions

Person performing hot work: Record time started and display permit at hot work area. After hot work is completed, record time and leave permit displayed for fire watch.

Fire watch: Watch area during hot work and after work completion. Prior to leaving area, perform final inspection, sign, leave permit displayed and notify Fire Monitor or Permit Authorizer.

Fire monitor: Monitor area after post-work fire watch completion. Perform final inspection, sign and return to Permit Authorizer.

HOT WORK BY
☐ Employee
☐ Contractor _____

DATE | JOB NUMBER

LOCATION OF WORK (BUILDING/FLOOR/OBJECT)

WORK TO BE PERFORMED

NAME OF PERSON PERFORMING HOT WORK

NAME OF PERSON PERFORMING FIRE WATCH

I verify the above location has been examined, the Required Precautions have been taken, and permission is authorized for this work.

PERMIT AUTHORIZER (PRINT AND SIGN)

THIS PERMIT EXPIRES ON (LIMIT AUTHORIZATION TO ONE SHIFT):

DATE: TIME: ☐ AM ☐ PM

Hot Work Date: Start Time: ☐ AM ☐ PM
Finish Time: ☐ AM ☐ PM

Post-Work Fire Watch Finish Time: ☐ AM ☐ PM
Name

Fire Monitor ☐ Person ☐ Other Finish Time: ☐ AM ☐ PM
Name/Other

Final Check Time: ☐ AM ☐ PM
Name

Required Precautions

Y NA

☐☐ The fire pump is in operation and switched to automatic.
☐☐ Control valves to water supply for sprinkler system are open.
☐ Extinguishers are in service/operable.
☐ Hot work equipment is in good working condition.

Requirements within 35 ft. (10 m) of hot work

☐☐ Shield combustible construction using listed (e.g., FM Approved) welding pads, blankets and curtains.
☐☐ Remove or shield nonremovable combustibles using listed (e.g., FM Approved) welding pads, blankets and curtains.
☐☐ Isolate potential sources of flammable gas, ignitable liquid or combustible dust/lint (e.g., shut down equipment).
☐☐ Remove ignitable liquid, combustible dust/lint and combustible residues.
☐☐ Shut down ventilation and conveying systems.
☐☐ Remove combustibles and consider a second fire watch on opposite side of floor, wall, ceiling or roof when openings exist or thermally conductive materials pass through.
☐☐ Is work on a combustible building assembly (e.g., torch-applied roofing)? If yes, provide **ADDITIONAL REQUIRED PRECAUTIONS** below.

Hot work on/in closed equipment, ductwork or piping

☐☐ Isolate equipment from service.
☐☐ Remove ignitable liquid and purge flammable gas/vapor.
☐☐ Prior to work, and/or during work, monitor for flammable gas/vapor. LEL reading(s): _____
☐☐ Remove combustible dust/lint or other combustible materials.
☐☐ Is work on/in equipment with nonremovable combustible linings or parts? If yes, provide **ADDITIONAL REQUIRED PRECAUTIONS** below.

Fire watch/fire monitoring the hot work area

Times listed are sufficient for majority. Use Table at back of permit for guidance for combustible concealed cavities, roof work or favorable factors.

☐ Perform a continuous fire watch during hot work.
☐ Perform a continuous fire watch post-work for
☐ 1 hour or Other _____ hours.
☐☐ Perform fire monitoring for
☐ 3 hours or Other _____ hours.

ADDITIONAL REQUIRED PRECAUTIONS: _____

HOT WORK PERMIT (BACK)

WARNING

HOT WORK IN PROGRESS!
Watch for fire!

In case of emergency, call the contacts listed below before attempting to extinguish the fire.

Contact	Number

Construction and Occupancy Factors for Post-Work Fire Watch and Monitoring Periods

		Construction Factors					
		Noncombustible construction, or FM Approved Class 1 or Class A building materials		Combustible construction without concealed cavities		Combustible construction with unprotected concealed cavities	
		Watch	Monitor	Watch	Monitor	Watch	Monitor
Occupancy Factors	Noncombustible with any combustibles contained within closed equipment (e.g., ignitable liquid within piping)	30 minutes	0 hours	1 hour	3 hours	1 hour	5 hours
	Office, retail or manufacturing with limited combustible loading	1 hour	1 hour	1 hour	3 hours	1 hour	5 hours
	Manufacturing with moderate to significant combustible loading except as noted below	1 hour	2 hours	1 hour	3 hours	1 hour	5 hours
	Warehousing	1 hour	2 hours	1 hour	3 hours	1 hour	5 hours
	Exceptions: Occupancies with processing or having bulk storage of combustible materials capable of supporting slow-growing fires (e.g., paper, pulp, textile fibers, wood, bark, grain, coal or charcoal)	1 hour	3 hours	1 hour	3 hours	1 hour	5 hours

When performing torch-applied roofing, apply additional precautions and conduct a minimum 2-hour fire watch and 2 hours fire monitoring. If an infrared camera is utilized, reduce to a 1-hour fire watch and 1 hour fire monitoring.

When performing hot work on/in equipment containing nonremovable combustible linings or parts, apply additional precautions and conduct a minimum 1-hour fire watch and 3 hours fire monitoring within the equipment, and in the surrounding areas per Table above.

FM Global