



Safety

Hot Work Safety: Curbing the Risks of Flame-Generating Tools

James Langford | Nov 02, 2023

Getting a hot work permit to tackle routine maintenance in a manufacturing facility might sound like another layer of red tape—if you don't consider the deadly risks that the paperwork is meant to curb.

Welding, soldering and other types of hot work—basically any task that involves open flames or generates sparks or heat—led to an average 3,396 building fires each year from 2017 to 2021—more than half of them in businesses, according to a *report* from the National Fire Protection Association.

Some 52 percent of the blazes were linked to welding, while another 25 percent involved cutting torches, illustrating why the association calls for permits in places where hot work isn't done regularly in its *Standard 51B*, which is included by reference in *U.S. Occupational Safety and Health Administration rule 1910.252* covering welding and brazing work.

The permits, generally issued by a supervisor, aren't required for areas such as a welding shop, where hot work is performed routinely, because a variety of safeguards should already be in place there to comply with relevant federal and state regulations.

"Hot work continues to be one of the most significant industrial hazards facing the world," Holly Burgess and Matthew Barker of the National Fire Protection Association warned in a *blog post in October*. Techniques used in such tasks "have the potential to ignite flammable materials, gas or vapors in the surrounding environment, leading to fires or explosions if proper precautions are not taken."

In March, for example, a Buffalo, New York, firefighter was killed when a building partially collapsed during a *four-alarm fire* that federal investigators said started when flames from a propane torch ignited material in a costume shop. A month later, two people were injured in Missouri when they cut into a metal drum that exploded, according to the post.

One extreme case captured worldwide attention: In *August 2020*, an explosion that killed 218 people in the port city of Beirut, Lebanon, and left 300,000 people homeless was later tied to welding repairs on a building where a large number of fireworks had been stored along with thousands of tons of explosive ammonium nitrate, the same material used in the *1995 bombing* of a federal building in Oklahoma City.

Hot Work Deaths

In the U.S., the government's *Chemical Safety and Hazard Investigation Board* says hot work is among the most common causes of worker death in cases it investigates, with many accidents caused by hot work near tanks or containers with flammable materials.

"When you are performing hot work, there is potential to bring together the three parts of the fire triangle: oxygen, fuel and an ignition source," the fire protection association warns.

Two parts of that triangle are virtually inescapable: The Earth's atmosphere is rich in oxygen, and it's present everywhere hot work is done. Ignition sources, meanwhile, come from the hot work itself: flames or sparks generated by welding, cutting and burning as well as heat radiating through the air or metal surfaces.

The piece of the triangle that's more controllable during hot work is fuel sources, or combustible materials from insulation and roofing materials to flammable liquids such as paint or cleaning solvents, and rags, paper and dust. One that's often overlooked, according to the fire protection association, is the object that's being maintained or repaired.

3 Steps to Minimize Fire Hazards

To avoid fires, explosions and the related risks of injuries and fatalities, a permit should be completed prior to any hot work, the organization says.

That helps to ensure that workers and managers alike follow the fire protection association's *three simple steps* to minimize fire hazards:

- **Recognize:** Determine whether fire risks exist before starting work.
- **Evaluate:** Determine what hazards are present: flammable and combustible liquids and gases, for instance, or materials that might catch fire.
- **Control:** Take appropriate steps to eliminate or minimize the hazards.

Areas where hot work is done can be protected with equipment such as welding pads, blankets and curtains as well as by removing any combustible materials within a 35-foot radius of the work, the organization notes.

Since fires can start even after a hot job is finished, the National Fire Protection Association requires a fire watch to remain in the area for at least an hour following completion of the work.

"The permit-authorizing individual could require the fire watch to remain on site longer," the group notes, "depending on the conditions of the work site."

Items that commonly catch fire during hot work on business sites include organic materials such as crops, grass and shrubs (32 percent of cases), signs and recreational material (19 percent); liquids, piping or filters (13 percent); and garments or other soft goods (7 percent), according to the association's report.

Cutting or welding too close to combustible materials was the cause of 32 percent of the blazes from 2017 to 2021, while placing heat sources too close to flammable items sparked another 21 percent. Smaller numbers of fires were started by an arc or spark from operating equipment and incorrect use of tools.

Hot Work Permit No. _____

ABC Biofuel Company

NO WORK IS ALLOWED EXCEPT THAT WHICH IS SHOWN ON THIS PERMIT

Date of Issue: _____ Time Issued: _____

Time Permit Expires: _____

Equipment involved in Hot Work: _____

Description of Hot Work to be done:

Location: _____ Department Doing Work: _____

Personnel involved in Hot Work: _____

	Yes	No	Initials
1. Has the equipment/line been thoroughly cleaned and purged? Cleaned by: _____			_____
2. Is equipment isolated and tagged?			_____
3. Have electrical switches been locked out and tagged?			_____
4. Are blinds in place?			_____
5. Lock out / tag out in place?			_____
6. Combustible gas meter reading in work area: _____			_____
7. Is work area thoroughly ventilated?			_____
8. Fire Watch duty assignment: _____			_____
9. Are all sewers protected from falling sparks?			_____
10. Are all combustibles in the work area protected from falling sparks?			_____
11. Have combustible waste materials been removed from the area?			_____
12. What fire protection is on hand at work site? (Type of fire extinguisher) _____			_____
13. What departments have been advised of Hot Work? _____			_____
14. Has the equipment/line been inspected to ensure all parts are free of hazardous materials?			_____
15. List required PPE being used in work area. _____ _____			_____
16. Has a joint inspection of the work site been conducted with Maintenance? Maintenance Personnel: _____			_____

WARNING: THIS HOT WORK PERMIT IS FOR ILLUSTRATION PURPOSES ONLY AND SHOULD NOT BE USED

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Date of Issue: _____ Time Issued: _____

Time Permit Expires: _____

Equipment involved in Hot Work: _____

Description of Hot Work to be done:

Location: _____ Department Doing Work: _____

Personnel involved in Hot Work: _____

	Yes	No	Initials
17. Do unit and atmospheric conditions permit safe work?			_____
18. Is permit receiver aware of MSDS for materials previously contained in equipment/line?			_____
19. Are combustible gas tests required during the job progress?			_____
20.[Insert site/process specific questions here]			
21.[Insert site/process specific questions here]			
..... [Insert site/process specific questions here]			

AGREEMENT: I HAVE CHECKED BOTH THE PERMIT AND THE WORK TO BE DONE. I UNDERSTAND THE NATURE AND EXTENT OF THE WORK. I UNDERSTAND THE PRECAUTIONS TO BE FOLLOWED IN COMPLETING THE WORK. I UNDERSTAND THE WORK IS NOT COMPLETED UNTIL OPERATIONS HAS SIGNED OFF ON COMPLETION OF THE WORK.

Permit Issued by: _____ Job Title: _____ Time: _____

Permit received by: _____ Job Title: _____ Time: _____

PERMIT WORK COMPLETED and Inspection of Work Completed:

Work Complete : _____ Job Title: _____ Time: _____

Permit Issuer: _____ Job Title: _____ Time: _____

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To perform hot work as safely as possible, training materials compiled by the nonprofit New Jersey Work Environment Council recommend the following steps:

- A permit must be issued before work begins; it should record that safety requirements were met as well as the results of monitoring for combustible gases and vapors. Remember, a hot work

permit is an important tool, but it doesn't make unsafe work safe.

- The permit issuer should check the work site for:
 - Explosive atmospheres
 - Nearby combustible materials
 - ***Fire protection equipment***
 - Safe condition of surrounding areas
 - Notification of all people involved
 - Establishment of a fire watch
- The worker performing hot work can't do his or her job and watch the area, too. At least one well-trained fire watch should be posted in each hot work area.
- Hot work areas should always be monitored for flammable gases before hot work is performed, but the highest level of protection comes from ***monitoring the site continuously***.
- Hot work outside a designated area, such as a welding shop, is always a risk and should only be a last resort. Move the job to a safe site whenever possible.

What precautions does your business take when performing hot work? Tell us in the comments below.

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