



## Best Practices for Hot Work (Burning and Welding)

### Scope

Hot Work procedures are regulated by OSHA under 29 CFR 1910.252 and NFPA 51B, incorporated by reference. The reader must be thoroughly familiar with this regulation and the specific risks at their facility. In addition, risk management companies such as Factory Mutual provide hot work permits that meet minimum requirements for a hot work permit. Although this best practice provides commentary on certain aspects of the regulation, it is not intended to be used in lieu of the regulation.

Hot work is any work that involves burning, welding, using fire- or spark-producing tools, or that produces a source of ignition. An effective hot work program will prevent fires associated with burning and welding activities. Also, an effective program will provide protections for welders' health from fumes associated with welding activities.

### Key Points

- There are many types of spark-producing activities in addition to burning and welding. See the following section for more examples. Ensure your Hot Work Program encompasses these.
- While the hot work permit offered by Factory Mutual is useful, your site will need a more detailed permit with additional provisions if there are electrically classified areas present.
- In areas where there is a risk of flammable vapors, best practice is to monitor the area with continuous LEL (lower explosive limit) monitors during the hot work activity.
- Hot work permits cannot be issued from an authorizer's desk. The permit must be issued at the job site so that a proper inspection of the area can occur.
- Performing hot work inside a confined space presents an array of unique hazards. Best practice is to issue the hot work permit with enhanced review and approvals. For example, if the hot work permit is normally issued by a single individual, consider having a team of two or more supervisors review and approve the hot work permit. Clearly, the Entry Supervisor must be involved as well.
- Do not allow compressed gas cylinders for hot work to be located inside a confined space. Also, ensure compressed gas hoses are removed at breaks and when no longer needed. This is to prevent the accumulation of unsafe and potentially flammable vapors inside the confined space.
- Setting up permanent hot work areas can be helpful. Moving hot work from the field or production area to a permanent hot work area will provide safer and more controlled conditions for the hot work activity.

### What Constitutes Hot Work?

The spark-producing activities specifically indicated in the regulation are cutting, welding, and brazing. However, best practice is to include ALL spark producing activities under this program.

Other spark producing activities include but are not limited to:

- Burning
- Thawing frozen pipes with an open flame
- Torches applied to asphalt or roofing
- Any open flame of any size for any purpose
- Soldering
- Brazing
- Grinding metal
- Drilling metal or drilling into concrete, since rebar may be contacted
- Installing screws with a drill driver where there will be metal-to-metal contact, e.g. installing a sheet metal screw into sheet metal.
- Using portable equipment with internal combustion engines such as pressure washers
- Using portable heating equipment powered by burning a fuel.
- If your facility has electrically classified areas, also consider the following activities as spark producing. See additional commentary under the section, “Electrically Classified Areas.”
  - Use of non-intrinsically safe devices (e.g., cameras, cell phones) in electrically classified areas.
  - Opening an intrinsically safe electrical enclosure in a classified area.

### Hot Work Program

It is best practice to have a documented Hot Work Program, but it is not specifically required by the regulation. This is typically in the form of a documented safe work practice specific to this subject. Key points are:

- In addition to making sure your safe work practice/program meets the elements described in the regulation, make sure the program is a living and useful document for the workforce.
- Have clear roles and responsibilities defined.
- Ensure contractors follow your program requirements.
- Conduct an annual review of the program and review hot work incident history.
- Ensure your program has integrated the best practices described in this document.

### Hot Work Permit

The hot work permit requirements are described in 29 CFR 1910.252(a)(2)(iv). The regulation states that hot work authorization is “preferably” in the form of a permit. A typical hot work permit is provided by Factory Mutual, but this permit only meets the basic requirements. Key points are:

- Audit completed permits to ensure that they were completely and correctly filled out. Due to the size of the permit, there are many opportunities to make errors.
- Ensure contractors use your hot work permit. If they have a policy of using their own permit, require the use of both permits.



- Consider alternatives to hot work when there are additional risks or fire hazards that cannot be removed from the hot work zone.
- When possible, perform the hot work in a remote location or designated hot work area. For example, if it is necessary to make a weld repair on a pipeline in a process area, consider unbolting the section of pipe, moving it to a remote or designated area to perform the weld repair.
- Hot work permits cannot be issued from a supervisor's desk. The supervisor/approver must inspect the area in accordance with the checklist items on the permit.
- Communicate to operators and other employees in the area of the hot work activity.
- Certain specific activities may warrant a specialized hot work permit. One example would be opening an electrical enclosure in an electrically classified area. See the "Electrically Classified Areas" section below.
- Designated hot work areas, described in the next section, may not require a hot work permit if safe conditions are maintained.
- Ensure that there's a fire extinguisher and/or charged water hose at the hot work area and that the emergency phone number is communicated to the personnel performing the hot work.

#### Designated Hot Work Areas

When possible, move the hot work activity to a designated permanent hot work area. This is typically in a maintenance shop located away from electrically classified areas and away from combustible materials. The designated area shall be free from combustibles and have appropriate firefighting equipment available. Best practice is to clearly define the designated hot work area with physical markings and/or a clear description in your Hot Work program.

#### Electrically Classified Areas

For hot work activities that occur in electrically classified areas, best practice is to consider additional precautions prior to hot work activities. Classified areas are parts of a facility that may contain flammable vapors or dust during normal production or during a system malfunction or failure. If so, each area will have a Class and Division, defined as follows.

- Class I - Based on the presence of flammable gases or vapors
- Class II - Based on the presence of combustible dusts
- Division 1 - Conditions may be present during normal conditions
- Division 2 - Conditions may be present during abnormal or upset conditions

Best practice is to include these additional precautions for hot work in a classified area:

- Use of a continuous atmospheric monitor for LEL (lower explosive limit) for any type of hot work.
- Consider work involving opening electrical enclosures above 50 volts as hot work if in a classified area. Either use the standard hot work permit or establish a specialized hot work permit for this activity. Note that since the ignition source is completely removed when the enclosure is closed, there is justification not to have a standard 30 or 60-minute fire watch.

### Fire Watch

The regulation is specific when a fire watch is needed in 1910.252(a)(2)(iii) and centers on the presence of appreciable combustibles in the area or adjacent/concealed areas and when there is a risk for more than a minor fire. Since a minor fire can quickly become a major fire, err on the side of safety when making a decision on whether a fire watch is needed.

Consider the following special cases.

#### **Multiple fire watches**

For elevated hot work, strongly consider having fire watches posted on various levels of a structure, particularly if significant sparks are generated, or if floors are pervious, such as grating. Also, it may be appropriate to barricade the lower levels while elevated hot work is in progress.

#### **Self-Fire Watch**

For hot work that doesn't involve open flame, arc or significant spark producing activities, a self-fire watch may be adequate. In addition, if the hazard is completely eliminated at the completion of the work, a 30 or 60-minute monitoring period may not be required. Examples of where this may be appropriate include:

- Opening an electrical enclosure
- Use of a non-intrinsically safe device in a classified area (e.g. cameras, cell phones)
- Drilling into concrete
- Using portable equipment with an internal combustion engine, such as a pressure washer
- Using a battery-powered drill or screwdriver to install metal screws in metal or to drill into metal.

### Hazardous Fumes from Welding

Depending upon the base and filler metals involved, welding fumes can be health hazards. As stated in the regulation, ventilation and respiratory protection must be used to protect employees. Best practice is to include checklist items on the hot work permit to trigger the use of adequate ventilation and/or respiratory protection.

### Training

The regulation only mentions training with regard to:

- Fire watchers being trained in the firefighting equipment that they would use,
- Welders being trained on the safe operation of their equipment, and
- Employees potentially exposed to hazardous vapors from fluxes, filler metals, etc. receive Hazard Communication training and have access to labels and safety data sheets.

Best practice is to provide initial training on your hot work program and provide refresher training every one or two years to all affected employees. Ensure contractors receive training on your program as well. Additional interim training may be required to address any changes made to the program when they occur. Note that best practice is that this training shall be documented and be available for inspection by employees, their authorized representatives



and regulators.

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