



PERSPECTIVES

**Hot Work:
Responsibilities,
Managing Hazards &
Identifying Alternatives**

Our perspectives feature the viewpoints of our subject matter experts on current topics and emerging trends.

INTRODUCTION

National Fire Protection Association (NFPA) statistics (taken from 2014-2018) indicate just how dangerous hot work (i.e., welding, cutting, grinding or other heat producing methods) can be to the public and first responders, and the potential financial damage it can cause. The 2021 NFPA report “Hot Work Structure Fires” revealed that a total of 4,580 structure fires involving hot work occurred per the years 2014-2018. Of those fires involving hot work, 57 percent occurred in or on non-residential properties, and 43 percent occurred in or on residential units. These resulted in a total of 22 civilian fire deaths per year from 2014-2018, 171 civilian injuries per year from 2014-2018, a total of 484 million dollars in direct property damage as a result of hot work per year from 2014-2018, and the deaths of 5 firefighters (2001-2018).

This article discusses what defines hot work, who is responsible for the safe operation of hot work activities, the potential hazards hot work creates and how to manage them, and how to identify alternatives to performing hot work. This information is valuable to insurance carriers, the construction industry, facilities managers, and property managers.

WHAT IS HOT WORK?

Hot work is work that involves burning, welding, or a similar operation that is capable of initiating fires or explosions—in other words, activity involving flame, spark production, or heat. Welding and similar processes include arc welding, oxy-fuel gas welding, open-flame soldering, brazing, thermal spraying, oxygen cutting, and arc cutting.

HOT WORK HAZARDS

Hot work is dangerous simply because it has the potential to readily and easily unite all three parts of the “fire triangle” (the factors needed to start a fire):

- **Oxygen** is present in the ambient air. Unsafe practices involving pure oxygen can cause oxygen enrichment (over 22 percent by volume) in the workplace.

- **Fuel** includes anything that can be ignited, and ignition sources can be as simple as the hot work itself. Examples of common fuels include the following:
 - Construction materials such as wood, plastic, insulation, and roofing materials, including those in concealed spaces.
 - Flammable and combustible liquids or gases such as fuel, paint, or cleaning solvents.
 - Simple combustibles such as rags, paper, cardboard, lumber, or furnishings.
- **Ignition** results when any heat source sufficient to ignite a fuel does so. It can occur through the direct or indirect application of heat.
 - **Direct application** of heat includes welding, cutting, and burning.
 - **Indirect application** includes heat conducted through metal surfaces to fuel sources on the other side (e.g., through a bulkhead) and sparks travelling to a distant fuel source (e.g., to a pool of liquid or other combustible material).

RESPONSIBILITY FOR HOT WORK

As per NFPA 51B:

The management shall be responsible for the safe operations of hot work activity. In conjunction with management, the PAI (Permit Authorizing Individual) shall be responsible for the safe operation of hot work activities.

The PAI shall ensure the protection of combustibles from ignition by the following means:

(1) Considering alternative methods to hot work

(2) Moving the work to a location that is free from combustibles

(3) If the work cannot be moved, moving the combustibles to a safe distance, or having the combustibles properly shielded against ignition

(4) Scheduling hot work so that operations that could expose combustibles to ignition are not begun during hot work operation

Fire Watch

A fire watch shall be required by the PAI when hot work is performed in a location where other than a minor fire might develop or where any of the following conditions exist:

(1) Combustible materials in building construction or contents closer than 35 ft (11 m) to the hot work operation

(2) Combustible materials more than 35 ft (11 m) away from the hot work operation but easily ignited by sparks

(3) Wall or floor openings within a 35 ft (11 m) radius that expose combustible materials in adjacent areas, including concealed spaces in walls or floors

(4) Combustible materials adjacent to the opposite side of partitions, walls, ceilings, or roofs and likely to be ignited

NFPA 51B, Section 5.6.1.1 states:

A fire watch shall be maintained for 1 hour after completion of hot work operations in order to detect and extinguish smoldering fires.

Fires can start after the hot work is complete. The fire watch must remain on site for a minimum of 60 minutes to monitor for smoldering fires, per NFPA 51B. The permit authorizing individual could require the fire watch to remain on site longer depending on the conditions of the work site.

MINIMIZING HOT WORK HAZARDS

The two methods that can minimize hot work hazards are the “Recognize, Evaluate, and Control” and choosing other alternatives to hot work.

The “Recognize, Evaluate, and Control” Process

One process to reduce hot work hazards is called, “Recognize, Evaluate, and Control.” This process is covered in NFPA 51B and focuses on the following:

- **Recognize** – Determine if fire risks exist before hot work is started.
- **Evaluate** – Determine if hazards are present, especially hazards that could fuel a fire (flammable and combustible liquids or gases and simple combustibles).
- **Control** – Take appropriate steps to eliminate or minimize the hazards.

Identify Alternatives to Hot Work

Hot work hazards can be avoided if there is an alternative method to complete the job. Some options include using the following methods in lieu of hot work:

- Screwed, flanged, or clamped pipe
- Manual hydraulic shears
- Mechanical bolting or pipe cutting
- Compressed air-actuated fasteners

CONCLUSION

Hot work fires result in avoidable deaths, injuries, and hundreds of millions of dollars in property loss each year. When everyone follows safe hot-work practices, these fires are preventable. The risk with hot work is high because it introduces a hazard—an ignition source—to environments which contain oxygen and, often, one or more flammable fuels. The top safety recommendations to minimize hot work hazards include using the “Recognize, Evaluate, and Control” process and considering whether there is an alternative work method to avoid hot work.

ACKNOWLEDGMENTS

We would like to thank Pat Earley, IAAI-CFI(V), NFPA-CFPS for providing insight and expertise that greatly assisted in this research.

Patrick Earley is a Senior Investigator in J.S. Held's Fire Origin & Cause Practice. He has over 25 years of experience in the fire and emergency services, serving in many capacities in the fire service industry from firefighter (volunteer) to fire inspector, fire investigator, and fire official (acting), along with being an emergency medical technician, fire instructor, and fire protection specialist. He also serves on several technical committees for the National Fire Protection Association. Besides being a subject matter expert in fire and life safety by the NFPA, Mr. Earley offers a wide array of knowledge in fire investigation, fire protection systems, and life safety codes.

Pat can be reached at pearley@jsheld.com or +1 917 779 0161.

REFERENCES

1. Mary Athens (August 2019), NFPA'S "Structure Fires Caused by Hot Work Supporting Tables" Quincy, MA. National Fire Protection Association Research
2. National Fire Protection Association (2019). Standard for Fire Prevention During Welding, Cutting, and Other Hot Work.

This publication is for educational and general information purposes only. It may contain errors and is provided as is. It is not intended as specific advice, legal or otherwise. Opinions and views are not necessarily those of J.S. Held or its affiliates and it should not be presumed that J.S. Held subscribes to any particular method, interpretation or analysis merely because it appears in this publication. We disclaim any representation and/or warranty regarding the accuracy, timeliness, quality, or applicability of any of the contents. You should not act, or fail to act, in reliance on this publication and we disclaim all liability in respect to such actions or failure to act. We assume no responsibility for information contained in this publication and disclaim all liability and damages in respect to such information. This publication is not a substitute for competent legal advice. The content herein may be updated or otherwise modified without notice.