



# HOT WORK SAFETY

Hot work fires result in avoidable death, injury, and hundreds of millions of dollars in property loss each year. When everyone follows safe hot-work practice, these fires are preventable. The risk with hot work is high because it introduces a hazard—an ignition source. That’s why the number one safety recommendation is to determine whether there is an alternative to hot work and by avoiding hot work, you minimize the risk.

## What Is Hot Work?

- Work involving burning, welding, or a similar operation that is capable of initiating fires or explosions.
- Activity involving flame, spark production, or heat.
- Welding and allied processes include arc welding, oxy–fuel gas welding, open-flame soldering, brazing, thermal spraying, oxygen cutting, and arc cutting.

## Hot Work Hazards

Hot work has the potential to unite all three parts of the fire triangle: oxygen, fuel, and an ignition source.

**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. Examples of common fuels include the following:

- Construction materials such as wood, plastic, insulation, roofing materials, including those in concealed spaces
- Flammable and combustible liquids or gases such as fuel, paint, cleaning solvents
- Simple combustibles such as rags, paper, cardboard, lumber, furnishings

**Ignition** sources can be as simple as the hot work itself. 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 to the other side of a bulkhead) and sparks travelling to a distant fuel source (e.g., to a pool of liquid or other combustible material).

## Case Study: Partnering for Safety

- In March of 2014, a fire in Boston, MA, took the lives of fire fighter Michael Kennedy and Lieutenant Edward Walsh. The cause of the fire was determined to be unpermitted welding, where the workers did not take factors such as high winds and nearby combustible material into account.
- The city of Boston responded by passing an ordinance requiring individuals in certain roles to obtain a hot work safety certificate. The Boston Fire Department and City of Boston’s Inspectional Services Division partnered with NFPA to create a training and certificate program.
- A similar regulation was adopted by Massachusetts, effective July 1, 2018. Other states and jurisdictions are exploring implementing a similar approach.

## DID YOU KNOW?

NFPA 51B is required by reference, and therefore, compliance is not optional. OSHA references NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, in 29 CFR 1910 Subpart Q, and NFPA 1, *Fire Code*, requires compliance with NFPA 51B in Chapter 41.

## HOT WORK DANGER: FACTS AND FIGURES

When looking at data from 2013-2017, it is clear just how dangerous hot work can be to the public as well as to first responders. The 2019 NFPA report, “Structure Fires Caused by Hot Work,” found the following statistics.\*

**4,630**

Structure fires involving hot work per year

Of the fires involving hot work...

**57%** were in or on non-home properties

**43%** were in or on homes



**15**

Civilian deaths are caused per year from these fires



**198**

Civilian injuries are caused per year from these fires



**\$355M**

In direct property damage results from these fires per year



**5**

Number of firefighter fatalities (between 2001–2018)

\*These statistics do not include near miss fire events from improper hot work. Near miss events include those where the fire department was not contacted because the fire watch dealt with the fire event, or those where no open fire resulted but there was localized scorched or charred material following improperly performed hot work.

HOT WORK SAFETY CONTINUED**Ways to Minimize Hot Work Hazards**

## Use “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.

The hot work permit helps the permit authorizing individual, hot work operator, and fire watch recognize potential hazards. Areas can be protected with the use of welding pads, blankets, or curtains, clearing combustibles from a 35-ft (11-m) radius space around the hot work, or moving the hot work to an area free of combustibles.

**Identify Alternatives to Hot Work**

Hot work hazards can be avoided if there is an alternative method to complete the job. Some options include the following:

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

**RESOURCES**

- ▶ Get free access to NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work* at: [nfpa.org/51B](https://nfpa.org/51B).
- ▶ 29 CFR 1910 (Occupational Safety and Health Standards) Subpart Q (Welding, Cutting, and Brazing)
- ▶ 29 CFR 1926 (Safety and Health Regulations for Construction) Subpart J (Welding and Cutting)
- ▶ ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, 2012

**WHAT YOU SHOULD KNOW**

If you are a **code official**, you must know and enforce the requirements of NFPA 51B.



If you are a **building owner** or **facility manager**, you must have a procedure in place for documenting hot work hazards and for advising all contractors about site-specific potential fire hazards. You also need to know any jurisdiction-specific regulations you need to comply with.



If you are a **contractor** or **someone working on a job site**, you should know the specific combustible hazards within a client property, where manual fire-fighting tools are located, and where hot work is not allowed.

**DID YOU KNOW?**

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.

**NEXT STEPS YOU CAN TAKE**

- ✓ Download “[Structure Fires Caused by Hot Work](#)” report.
- ✓ Get your hot work safety training and certificate at: [nfpa.org/hotwork](https://nfpa.org/hotwork).
- ✓ Access the latest information and resources, including a sample hot work permit at: [nfpa.org/51BNews](https://nfpa.org/51BNews).



IT'S A BIG WORLD.  
LET'S PROTECT IT TOGETHER.

This information is provided to help users navigate NFPA® 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2019 edition. It is not intended to be a comprehensive list of requirements under NFPA 51B. Check with the local jurisdictions for specific requirements. This material does not represent the official position of NFPA or its technical committees on any referenced topic, which is represented solely by the NFPA documents in their entirety. For free access to the complete and most current version of all NFPA documents, please go to [nfpa.org/docinfo](https://nfpa.org/docinfo). NFPA disclaims liability for any personal injury, property, or other damages of any nature whatsoever resulting from the use of this information. In using this information, you should rely on your independent judgment, and when appropriate, consult a competent professional.