

# Understanding the Hazard



## Hot Work

### Understanding the Hazard

This series of publications is designed to help you understand the everyday hazards present at your company's facilities. For more information on how you can better understand the risks your business and operations face every day, contact your FM Global engineer.

### UTH topic categories:

Construction

Equipment

Fire Protection

**Human Factor**

Natural Hazards

Process Hazards

### Hazard or Risk?

Hot work can be a severe hazard. The way you manage hot work in your facility can be the difference between a minor, temporary risk and a major threat to your business's future. FM Global engineers can help you understand the hot work risk your company faces.

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### The Hazard

Businesses become successful because their management takes calculated risks built from research and planning. Yet, every day these same businesses are willing to risk their very livelihood by allowing uncontrolled hot work in their facilities.

Hot work is any temporary operation involving open flames or producing heat and/or sparks. This includes, but is not limited to, brazing, cutting, grinding, soldering and torch-applied roofing.

By its nature, uncontrolled hot work is a roving fire hazard in your facility. The trend toward outsourcing complicates this issue when contractors are hired who don't have the needed expertise on the process or knowledge of construction hazards at your facility.

### Science of the Hazard

Hot work can range from welding to grinding, and all forms can ignite combustible material.

### Heat Source Temperature Ratings

Electric Arc Welder	10,900 F (6,038 C)
Oxygen/Acetylene Cutting Torch	6,330 F (3,499 C)
Propane Torch	3,595 F (1,979 C)
Welding Torch Slag	> 2,000 F (1,093 C)
Electric Heat Gun	600 – 1,350 F (316 – 732 C)
Radial Metal Cutting Saw	> 1,000 F (538 C)
Wheel Grinder	> 1,000 F (538 C)

### Ignition Temperature

Styrene	914 F (490 C)
Typical Asphalt	905 F (485 C)
Polyurethane Foam	824 F (440 C)
Lubricating Oil (Motor/Mineral)	500 – 700 F (260 – 371 C)
Mineral Spirits	473 F (245 C)
Wood Products	380 – 800 F (193 – 427 C)
Corrugated Paper	380 – 500 F (193 – 260 C)

## What You Can Do at Your Facility

### Now:

- Call your local FM Global office or engineer if you have any questions about planned hot work activity.
- Maintain high levels of house-keeping throughout the facility.
- Do not allow hot work in any area where automatic sprinklers are not in service.
- Implement the FM Global *Hot Work Permit System*.
- Require the use of FM Approved welding pads, blankets and curtains when hot work activities are performed at your facilities.
- Require all contractors to follow the same standard.
- Restrict hot work in areas identified as not suitable.
- Consider alternative methods.

### Soon:

- Establish a policy for hot work that clearly states:
  - Required procedures
  - Authority given to the person responsible
  - Disciplinary action for noncompliance
- Develop and implement a contractor hot work policy that states your company requirements, specific safety issues and insurance coverage expectations. This should be part of contractor training.
- Designate specific facility personnel to manage your hot work and provide ongoing training for all personnel involved.
- Conduct internal audits of your hot work process.

The hot work ignition source can access areas that are not easily seen, such as:

- Operating HVAC systems
- Openings around pipes extending through walls/floors
- Openings in floors
- Concealed spaces with combustibile construction
- Equipment with combustibile linings
- Conveyors

A fire in a hidden area often can go unnoticed until it's well-established. Many hot work fires will smolder for several hours before breaking out in open flames—potentially long after your facility is shut down for the day.

Outside contractors bring a level of expertise to the areas of work they perform. But, these contractors specialize in their particular business activity and not in property loss prevention or the hazards specific to your facility. FM Global loss history shows the risk of fire can more than double when outside contractors perform hot work without facility supervision. During the last 20 years, contractors have accounted for 74 percent of hot work losses at FM Global-insured properties. Continuing hot work losses indicate that contractors often don't understand what can burn in your facility or how the hot work they perform can initiate fire.

## Loss Experience

Hot work is an increasing cause of fire and explosions throughout the world. FM Global losses clearly show there is no industry or type of facility immune to this hazard. During the past 10 years, one out of every 20 fire losses reported by FM Global clients was started by improperly managed hot work. And, each was preventable.

Hot work is one of the three most common causes of fires at FM Global-insured properties. In a recent 10-year period, FM Global experienced 535 recorded hot work losses for a staggering gross dollar amount of more than US\$739 million—or an average of US\$1.4 million per loss.

## All Hot Work Fires Are Preventable

There are many points in the hot work process where people have the opportunity to stop a fire before it starts. Effective hot work management starts at the top. When management understands the hazards involved and is committed to managing the risk created every time hot work is conducted, every hot work fire is preventable. But, being able to implement an effective control for any human factor process requires support from all employees involved. The key is teamwork, education and a clear understanding of the associated hazards and risks.

## But What About . . .

...FM Global's requirement for four-hour monitoring after welding? You're the only organization I know of that wants to occupy my staff that long. We do not guess at these requirements. During the 10 years from 1992 to 2001, 62 fires initiated by hot work started one hour or more after the operation was completed, leading to losses of US\$191 million. Forty of these, responsible for US\$86.5 million of the total losses, started three or more hours after the hot work was finished. That's almost US\$200 million of business lost because of failure to watch an area for an hour, and monitor it for three more hours, after a hot work operation.

### ...having the personnel available?

Hot work is a hazardous operation in the best of conditions. Taking shortcuts to safeguard a hot work activity only increases the hazard and the risk you willingly create at your facility. Because hot work often is conducted during off shifts or weekends, the hazard is increased because your facility is more vulnerable to a fire going unnoticed. Management needs to make the commitment that hot work will be supervised at all times. It is important that management commit adequate personnel to manage hot work activities, or wait until you can better manage this hazardous work.

### ...the fact hot work is not performed at our facility?

Hot work may not be performed today or tomorrow, but what about next year or the year after? No facilities are completely exempt from hot work unless management has restricted this type of work. Hot work is not just cutting or welding with an oxy/acetylene torch or using an arc welder. Other, less obvious, forms of hot work often are overlooked and, consequently, not managed. Which of these other forms of hot work are being conducted in your facility?

- A roofing contractor using a propane torch to heat-seal the asphalt sealer around your roof drains
- A maintenance person using a propane torch to sweat-solder copper fittings on building plumbing or the cooling lines for air conditioning systems
- A contractor employing an electric heat gun during renovation to remove wall coverings

By recognizing these lesser-known forms of hot work and managing them, you will further reduce the fire hazards involved.

## Hot Work Alternatives

- Install equipment assembled with mechanical connections vs. welded connections.
- Design changes for existing equipment—bolted assembly vs. welded.
- Use alternative equipment:
  - Reciprocating saw, manual hydraulic shear or hand saw vs. cutting torch or powered radial saw
  - Self-tapping screws vs. tack welding or brazing
  - Threaded pipe vs. sweat-soldered pipe

### For Less Hazardous Hot Work, Use:

- Heliarc welding vs. electric arc-stick welding
- Electric heat gun vs. open-flame torch
- Electric soldering iron vs. torch soldering
- FM Approved welding pads, blankets and curtains. These are fire-resistant covers that prevent the ignition of combustible material.

*These options still require hot work management.*

### Designate a Hot Work Area

Designate an area specifically constructed, protected and arranged to accommodate safe hot work. These areas do not require any permit system, but appropriate firesafe conditions should be maintained.

## Need More Information?

Ask your FM Global engineer about the following:

- Exemplary hot work management in similar-sized facilities
- Contractor management strategies
- Effective use of the FM Global *Hot Work Permit System*
- FM Global Property Loss Prevention Data Sheet 10-3, *Hot Work Management*

## Ordering Information

### For Understanding the Hazard

For additional copies of *Understanding the Hazard* publications, contact your FM Global engineer or client servicing team.

### For all other

### FM Global publications

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## Know the Hot Work Requirements

Hot work management is not just good business sense, but often a requirement of local codes or national standards, such as those instituted by the National Fire Protection Association (NFPA), Occupational Safety and Health Administration (OSHA), and BGVR (the German equivalent of OSHA). The need to manage hot work activities to prevent fires/explosions is clearly stated in NFPA 51B; OSHA 1910.252, *Welding, Cutting and Brazing*, and 1910.119, *Process Safety Management*; and the National Fire Code of Canada. Check with your local, state and national government to see what requirements may govern hot work in your area. Because of the hazards created by hot work, there are many other risks that need to be considered beyond a property loss incident.

Allowing uncontrolled hot work within your facility is risky business at best. You may be lucky, but how close to a near fire condition do you want to come? Management of the hot work hazard is good business practice—you don't need to get burned to know that having a preventable fire is not good for your business.

Considering all the risks uncontrolled hot work can create in your facility, can you really afford to not manage it? The cost of taking that chance can be the most expensive business decision your company makes.

## Don't Let This Happen to You



*Failure to properly manage hot work can result in a catastrophic fire.*