PARAGON
RISK ENGINEERING

Hot Work

INTRODUCTION

Hot work is defined as any operation that involves open flames or produces heat or sparks, e.g. cutting, grinding, brazing, soldering, welding, chipping, or hot riveting.

Inadequately controlled hot work is a major cause of fire. Hot slag from a welding torch can easily ignite combustibles 35-ft. (11-m) away from the work area, and the resulting fire can grow undetected. Taking suitable precautions would seem to be the obvious solution. However, it is human nature to cut corners, and the loss history clearly demonstrates that the only way to effectively manage this risk is to develop and implement a formal policy.

The main concern is when hot work is performed outside of designated safe areas. Contractors are of particular concern because they are unfamiliar with buildings and processes and are often unsupervised. Any hot work conducted outside of these dedicated areas should be monitored with a hot work permit.

When hot work needs to be routinely performed in non-dedicated areas, as is sometimes the case with new construction projects, an acceptable alternative to using a permit is to temporarily classify an area as a dedicated hot work area. In these areas, safety requirements should exceed what is required for permitted hot work, particularly with respect to the 35-ft (11-m) rule. These areas should be inspected routinely to assure compliance. A prudent inspection frequency should be established in each case. Hot work should not be permitted in the event of noncompliance.

LOSS EXAMPLE

On the afternoon of August 14, 1997, heat and sparks from a cutting torch, being used by two maintenance employees, ignited the inside of a steel pickling plant. Within a matter of minutes, most of the plant was involved in the fire. It took firefighters over four hours to bring the blaze under control. The non-indexed loss was $90M combined property damage and business interruption.

Highly combustible construction and the lack of automatic sprinkler protection were the primary contributing factors. The roof construction was standing seam with expanded polystyrene and spray-on polyurethane on top. Spray-on polyurethane foam had also been installed on the interior in some areas to prevent corrosion.

This loss accentuates the need for a hot work policy, and demonstrates the increased hazard potential associated with highly combustible areas that are not provided with adequate fixed fire protection systems.

HOT WORK POLICY

A hot work policy should include the following:

- ❑ A document that mandates use of a formal hot work permit to monitor all hot work performed outside of designated safe areas.
- ❑ Senior management support and endorsement for the policy.
- ❑ The policy should stipulate specific penalties for non-compliance.
- ❑ The policy should be effectively communicated to contractors and employees.
- ❑ Designated safe areas, as well as those areas where hot work is prohibited, should be identified and documented.
- ❑ The policy should be reviewed and improved periodically.
- ❑ Competent personnel should be trained to authorize hot work.
- ❑ A comprehensive checklist of precautions should be applied.

It is considered critical that only competent personnel be selected to authorize hot work. These personnel should receive training so that they are familiar with the fire and explosion hazards and protection features at the site. They should also fully understand their operational responsibilities,which includes initially site inspection, permit issuance and a final check after the prescribed monitoring period. These individuals should be closely involved in the periodic policy review process. Non-compliance issues and loss history should be periodically reviewed.

INITIAL CONSIDERATIONS

Before hot work is permitted the following questions need to be considered by the person responsible for authorizing the hot work permit. If the answer to any one of these questions is yes, hot work should not be permitted, and no permit issued.

- ❑ Hot work can be performed in a safer location (outside, designated area, etc.).
- ❑ Alternate fastening methods are practical (bolting, gluing, etc.).
- ❑ This is a prohibited area, or is otherwise considered to be inherently unsafe.

The person authorizing the hot work should always inspect the site prior to issuing a permit. Remote issuance should not be permitted.

PRECAUTIONS

If the decision is to allow hot work, the person responsible for authorizing the hot work should physically inspect the site to ensure that the following precautions are being taken. If the answer to any one of these questions is no, and the precaution is required to ensure safety, hot work should be prohibited and no permit should be issued.

- ❑ Combustibles eliminated or otherwise safeguarded within 35-ft (11-m) of the work area.
- ❑ Floor penetrations properly protected.
- ❑ Required fire protection, detection, and alarms systems are functional.
- ❑ Hot work equipment is in good repair.
- ❑ Adequate portable extinguishing equipment provided.
- ❑ Dedicated fire watch during the operation.
- ❑ Area monitored after completion for a period of one hour.

Safeguarding of combustibles can involve draining, cleaning, and purging tanks or piping systems containing flammable liquids or gasses. This could involve sampling the air with combustible analyzers, or using of an inert gas to safeguard the hazard if the situation dictates. Cleaning of dust deposits, relocating combustible materials, covering combustible materials with fire retardant tarps, wetting down combustible floors, and general area cleanup may also be required. The combustibility of building materials such as wall or roof insulation should not be overlooked. In multi-level structures floor penetrations need to be protected to ensure that sparks do not ignite combustibles on the lower levels.

Be sure that hot work equipment is in good repair and adequately arranged. Check all valves, regulators, hoses, and torches. Secure gas cutting and welding cylinders so they will not be upset or damaged and replace protective caps on all cylinders not actually in use. Use portable stands to elevate welding hose or cable off floor areas where it can be easily damaged.

Portable extinguishing equipment should be suitable for the task. Consider using water-charged hose lines if the situation warrants.

Hot work should always be conducted with at least two people. One person should be responsible for the hot work, and the other(s) should watch for fires. To ensure that this important job is given the attention it deserves, it is recommended that the fire watch be conducted by employees, not contractors. The fire watch should continue through lunch breaks, shift changes, etc.

SIGN OFF

After hot work has been completed and the area has been monitored for a period of one hour, the permit should be returned to the person or department who authorized the work. The time that the work was completed, and the time that the monitoring ended, should be recorded and the permit signed by the person(s) doing the work. The person or department who authorized the work should also sign off. Hot work permits should be maintained on file for documentation purposes.

SAMPLE PERMIT

The attached permit is included to assist the clients of Paragon Risk Engineering in developing their own hot work permit. This permit can be amended as required. It is suggested that a two-part permit be employed. The person who authorizes the hot work should retain one copy for follow-up, and the other should be retained at the site of hot work. For smaller locations, or at locations where hot work is seldom performed, printouts with copies could accomplish the same objectives.

HOT WORK PERMIT

Paragon Risk Engineering

If any of the items below are true, do not issue a permit.

- Hot work can be performed in a safer location.
- Alternate fastening methods are practical.
- This is a prohibited area, or is considered to be inherently unsafe.

If hot work is permitted, document the scope of the work to be performed:

Work performed by		**Location**
Description		
Date	**Start time**	**End time**

The person authorizing the hot work should verify that the following precautions are to be taken. Physical inspection of the site is required:

- ❑ __ Combustibles eliminated or otherwise safeguarded within 35-ft (11-m)
- ❑ __ Floor penetrations properly protected.
- ❑ __ Required fire protection, detection, and alarms systems are functional.
- ❑ __ Hot work equipment is in good repair.
- ❑ __ Adequate portable extinguishing equipment provided.
- ❑ __ Dedicated fire watch during the operation. (trained employee recommended)
- ❑ __ Area monitored after completion for a period of one hour.

Indicate NA in space provided if not applicable.

The above location has been examined, adequate precautions are being taken, and permission is authorized for this work:

Signature	**Title**
Date	**Time**

The personnel who conducted the hot work should document the time when hot work was completed and the time that the monitoring period ended.

Time complete	**Monitoring complete**
Signature	

The permit should be returned to the authority that authorized the hot work for sign off:

Signature	**Title**
Date	**Time**

(BACK OF FORM)

CAUTION
HOT WORK TAKING PLACE