University of Central Lancashire
Safety, Health & Environment Section

Procedural Guidance for
Hot Work

Document Number: FM/SHE 004
Revision Number: 0
Review Date: October 2003
Prepared by: GL
Approved by: 
Reviewed by: N/A
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1.0 Introduction

Most hot work operations involve a number of parties, all of whom have responsibilities for ensuring that the work is carried out safely. Contractors and/or maintenance staff must consult and liaise with the departmental staff in the area that the hot work is to be performed.

2.0 Scope

This procedure applies to all hot work on University premises that poses a risk to employees, students, visitors, contractors and members of the public.

3.0 Purpose

The purpose of this procedure is to ensure that:

- hot work is identified;
- when hot work is performed, all hazards have been considered and there are sufficient safe systems of work and emergency arrangements in place to reduce the risk of injury;
- there is no contact between sparks, flame or heat, and fuel sources;
- compliance with relevant legislation.

4.0 Definitions

Hot work: The use of open fires, flames and work involving the application of heat by means of tools or equipment. This includes the unintentional application of heat by the use of power tools, hot rivets or hot particles generated from cutting or welding operations.

The sources of heat most commonly involved include:

- gas/electric welding and cutting apparatus;
- blow torches/blowlamps;
- bitumen/tar boilers;
- grinding wheels and cutting disks.

5.0 Legal requirements

5.1 The Management of Health and Safety at Work Regulations 1999.

An assessment of the risks in all work activities is required to formulate safe systems of work.

6.0 Hazards

Since hot work tools are highly portable ignition sources, improperly conducted hot work is a major cause of fires and explosions.
6.1 Burns

Burns can be caused by the heat radiated from hot working, either by direct contact with hot surfaces or from sparks generated from cutting or grinding operations.

6.2 Eye damage

The eye can be damaged by radiation generated from welding or brazing operations.

6.3 Fire

Hot work can cause flammable vapours and combustible materials to ignite.

6.4 Welding Fume

Fumes are a natural by-product of welding, and arise from even simple welding operations. Welding work requires the use of respiratory protection and/or good ventilation, as even simple operations may create fumes such as carbon monoxide, nitrogen oxide, and ozone. Extra precautions are required during the welding of metal coated with or containing zinc, cadmium, chromium, copper, fluoride, lead, manganese, or vanadium, as the resulting fumes can lead to metal-fume fever.

Hazardous fumes released during welding operations are generally derived from:

- base material being welded or the filler material that is used;
- coatings and paints on the metal being welded, or coatings covering the electrode;
- shielding gases supplied from cylinders;
- chemical reactions resulting from the action of ultraviolet light from the arc, and heat;
- process and consumables used;
- contaminants in the air, for example vapours from cleaners and degreasers.

Exposure to welding smoke has serious short-term and long-term health effects often affecting the lungs, heart, kidney, and central nervous system.

6.5 Explosions

These can arise through working in explosive atmospheres or through flashback to an acetylene-welding cylinder. (See Take Care with Acetylene INDG 327)

6.6 Hazards arising out of work activity

- hazards may arise due to the nature of the work area e.g. because of ineffective isolation of plant nearby;
- ladders may need to be used to access the work;
- environmental hazards, (noise, heat, lighting etc);
- the work may be in a confined space;
- hazards from work in a nearby area;
• toxic or flammable chemicals.

These and many other hazards may be present as part of the operation being performed and must be considered as part of a risk assessment.

**7.0 Procedure**

**7.1 Risk Assessment.**

Employers are legally required to assess risks and to take all reasonably practical precautions to ensure the safety of workers and others affected by their activities. A risk assessment must be undertaken and recorded in line with University Procedures and must give consideration as to whether hot working is really necessary or whether alternative options should be considered e.g.:

• the use of cold cutting or cold repair techniques;
• replacing rather than repairing.

The remaining risks from any hazards identified must be reduced as much as possible.

It is the responsibility of the Maintenance Manager to ensure that risk assessments are in place and that personnel from the area where the hot work is to be carried out have been consulted.

**7.2. Permit to Work**

A permit to work system is a formal written system that controls and authorises high-risk activities/tasks. It specifies the work to be done and the precautions to be taken, forming an essential part of a safe system of work and allowing work to start only after safe procedures have been defined. It also provides a clear record that shows all foreseeable hazards have been considered.

A permit for hot working is required for all non-regular hot working in the University. If regular hot working is undertaken then a risk assessment must be completed in the area concerned and the area designated a safe working zone. Such an area might be a welding shop, designed for welding with appropriate extraction and fire precautions. The permit-to work system, applies to contractors and subcontractors as well as the University's own staff, and students (where applicable).

Hot work is permitted only in controlled areas (i.e. one where safe conditions are created by moving or protecting combustibles). Permits to work are the key to ensuring that safe hot work procedures are followed, so it is essential that those who issue permits to work or carry out associated analysis or environmental monitoring are competent to do so. The information that should be contained in a permit to work for hot work will depend on the job to be done. Generally it should include:

• the location and nature of the hot work;
• the proposed time and duration of the work;
• the limits of time for which the permit is valid;
the precautions that should be taken before the work starts; during the work; and on completion of the work;

the person in direct control of the work.

It is essential that all those involved in the work are aware that conditions may change once a permit to work is issued. If this occurs, for example if other work is to be carried out in the vicinity, the permit to work should be withdrawn, the situation reviewed and, if appropriate, a new amended permit to work issued. If the timescale of changes can be foreseen, the period of validity of the permit to work should be correspondingly limited. This may well be less than the full duration of the proposed work.

Regardless of the location or type of area all hot work must be inspected before work starts and a ‘Hot work Permit’ (appendix 1) issued before work commences.

7.3 Precautions for Hot Work

Minimum safety standards include:

- combustibles must be moved at least 35 feet away;
- flammables must be moved at least 50 feet away;
- two fire extinguishers (suitable for the area) must be on the site;
- a fire watch is required on every job;
- the fire watch must stay on the job site for 30 minutes after the hot work is finished.

Every year major fires occur due to hot particles generated by cutting or welding operations igniting combustible materials. Where it is not practicable to remove such materials, e.g. for very short maintenance operations, it may be sufficient to ensure that they are temporarily covered by non-combustible material. This will be determined by a risk assessment of the area and the task to be performed. Personal Protective Equipment (P.P.E) and or other risk controls identified in the risk assessment must be implemented.

- No hazardous or combustible materials (e.g. flammable, toxic, very hot, steam, or very cold) must enter the hot work area during the operation unless they are needed as part of the operation and considered in the risk assessment;
- The atmosphere must be, and must remain, safe to breathe. The concentration of toxic substances should be as low as reasonably practicable and in all cases below the relevant occupational exposure limit. Many hot work processes generate toxic fumes (see 6.4), where it is not reasonably practicable to provide adequate ventilation appropriate respiratory protective equipment should be worn. Particular care should be taken before entry into enclosed spaces;
- Any other necessary personal protective equipment must be provided and worn. This may include protective footwear, overalls, gloves and eye protection;
appropriate fire-fighting equipment must be available adjacent to the work area together with an identified person trained in its use. If areas not visible to persons carrying out hot work pose a risk, a person with a suitable fire extinguisher must keep watch;

- when work stops any cylinders of flammable gas, oxygen, or hoses and torches attached to them, must be removed;
- no smouldering residues must remain after the work has been completed.
- the sites of such work should be visited periodically until all likelihood of ignition has passed;
- after the permit to work has been signed, a copy should be given to the person in direct control of the hot work and where appropriate a copy should be displayed at the site of the work. A record of the issue and withdrawal of permits to work should be kept.

3.0 Emergency Arrangements

No hot work must be undertaken unless emergency plans are in place. It is the Maintenance Manager’s responsibility to ensure an assessment of the emergency requirements has been made and actioned as appropriate. It is the supervisor’s responsibility to ensure any measures deemed necessary are in place and tested prior to hot work being carried out.

9.0 Training and supervision

All persons involved in hot work operations should receive adequate instruction, training and supervision, and understand:

- hazards associated with the work and the precautions to be taken;
- operation of relevant permit to work systems; and
- actions to be taken in the event of any unintended fire or other emergency.

Detailed training should be given to persons responsible for issuing permits to work to ensure that they are aware of all relevant hazards and that these are considered before the permit is issued.
10.0 Summary of Responsibilities.

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11.0 Further guidance

- Hot Work on Vehicle Wheels Engineering - Sheet No 1
- Hot work (welding and cutting on plant containing flammable materials) Health and Safety Series Booklet HS (G) 5
- Take Care with Acetylene INDG 327
- Hot Work on small tanks and drums INDG 314
- Hot Work at Docks, Docks Sheet No 6 HSE Information Sheet