Hot Work Procedures

Many aspects of maintenance and engineering work involve Welding, Burning, Cutting, Grinding and working with Bitumen boilers etc. When these activities are carried out in direct contact or in close proximity to flammable or combustible substances there is the risk of explosion, fire and the production of toxic substances, with the potential consequences of serious injury, ill-health and or damage to property and the environment. It is therefore necessary to have a control procedure to reduce the risks associated with Hot Work to an acceptable level.

This document aims to outline the procedure that Schools and Departments should adopt to ensure the risks are adequately controlled.

1. Introduction

Hot Work comprises work activities that involve the application or generation of heat during their execution. Such activities include cutting, welding, brazing, soldering and the use of blow-lamps.

Hot Work, in the main, is associated with the application of heat either directly to, or adjacent to plant, tanks, vessels, pipes etc, that contain or have contained any explosive, flammable or toxic substance. However, for completeness, due to the fire risks intrinsic to any Hot Work Activity, and the risk of personal injuries due to hot debris, toxic fumes etc., Hot Work is as defined in the above paragraph.

2. Hazards

The hazards arising from Hot Work comprise:

(i) The ignition of flammable vapour within a confined space can produce pressures well above the safe working pressure of most types of tank used for liquid storage. Even tanks designed to be pressure vessels are not normally designed to withstand shock pressures generated by an internal explosion. An explosion within a tank is therefore liable to cause violent failure of the vessel. Parts of the tank may be propelled as missiles, and a flame front, hot gases and burning liquid may be expelled.

(ii) The risk to the building or surroundings as a result of work activities that generate sparks and heat, such as Grinding, Burning and Welding etc., in areas containing combustible and flammable materials.

(iii) Risk of eye injury including ultra-violet damage (i.e. "arc-eye"), burns and heat exhaustion.

(iv) Asphyxiation by gases and vapours and/or asphyxiation or poisoning by toxic fumes.

3. Risk Assessment for Hot Work

All Schools/Departments that carry out Hot Work must ensure that these activities have been adequately covered by their risk assessments. These should be carried out by a suitably competent person(s). An **Authorised Person** is someone who has sufficient technical knowledge, training and practical experience of the Hot Work Processes and their associated hazards to undertake a Hot Work Risk Assessment (see duties, Appendix 3).

Hot Work should only be undertaken if alternatives have been discounted, i.e. mechanical fixing, sawing, adhesives etc.

If the Hot Work involves or produces substances hazardous to health, e.g. cleaning solvents, acids, welding fumes etc. then the work must include any additional control measures as necessary under the Control of Substances Hazardous to Health Regulations.

4. Safety Procedures for Hot Work

To control the risks associated with Hot Work operations, activities must be carried out in accordance with either a **Standard Operating Procedure** or a **Permit to Work,** depending upon the circumstances.

All Hot Work must be performed by competent and authorised persons who have received:

- Awareness training of the hazards and precautions associated with Hot Work (a 21-minute video "Hot Work Risks" is available from the Safety Office),
- Instruction in the Standard Operating Procedures and application of the Permit-to-Work procedure.

A **Competent Person** is one that is trained and experienced in the actual Hot Work activity and has duties as specified in Appendix 3.

All the control and preventative measures stipulated in the standard operating procedure or permit to work must be rigorously followed by the Competent Person and the other members of the team (where appropriate).

The work area should be made as safe as possible before the work starts, and all the prescribed preventative precautions must be taken whilst the work is in progress. Refer to Appendix 1 for details.

On completion of the hot work, the area must be made safe and properly cleared up. The person in charge of the work/team must decide whether to re-visit the work area, after a suitable period of time (usually one hour), to ensure that there are no signs of possible causes of fires. This should be stipulated as part of the procedure or permit if appropriate.

4.1. Routine operations in designated areas - Standard Operating Procedure

Lower risk, routine Hot Work operations should be carried out in accordance with a **Standard Operating Procedure** that has been derived from a risk assessment that covers these predictable activities. A lower risk operation is one that does **not** involve:

- Stability hazards associated with the structure,

- Hazardous residues that may be present within or on the item being subjected to heat,
- Work in locations that contain, or are in the vicinity of, highly flammable or highly combustible materials,
- Work in confined spaces.

The types of activities that would fall within this category include:

- Operations in designated facilities i.e. welding bays
- Operations in general workshop areas that are designated for routine operations,
- Operations that are carried out in areas that will not be affected by the hot work.

4.2. Non-routine operations - Use of Permit to Work

Operations that are of a non-routine nature must be assessed by the Authorised Person to identify whether it may give rise to significant risks to those engaged in the work or to the building or to others that may be in the vicinity. Where this is the case then this must be carried out in accordance with a **Permit-to-Work.** (See Permit form, Appendix 4)

A Permit-to-Work involves a methodical assessment of the task to identify and specify the precautions to be taken. Examples of situations for which a Permit-to Work should be issued are as follows:

- Work on vessels, including tanks and pipes, that have contained flammable materials or are lined or coated with flammable or combustible materials,
- Work on vessels that may release harmful gases, fumes or vapours,
- Work in areas that contain flammable or combustible materials that cannot be protected by following the Safe Operating Procedure alone,
- Work in locations that could expose other users of the area to hazards, e.g. work above building entrances or on circulation routes (unless this is a regular activity for which a Standard Operating Procedure is available).

If the work is to be carried out in a confined space then a **Confined Space Permit** should be completed.

The Permit-to-Work should be issued by an **Authorised Person** responsible for carrying out the risk assessment of the job. He/she is responsible for specifying the necessary precautions, e.g. isolations, site preparations, emergency procedures. The precautions should be discussed with the senior person carrying out the hot work (**Competent Person**) to ensure that the nature of these and the hazards is clearly understood. It is the joint responsibility of the **Authorised Person** issuing the Permit and the Competent Person receiving it to fully understand the contents, limitations and scope of the Permit and its full implications, prior to commencement of work.

The Permit-to-Work should be validated for a maximum of one day only. If additional time beyond the expiry of the Permit is required then this should be formally extended on the Permit by the person who issued it, or in their absence another appropriate authorised person after reviewing the criteria under which it was issued.

Hot work carried out by contractors should be covered by the same procedures. Method statements should accompany complex jobs. Where contractors are engaged by the Estate Office it is essential that liaison occurs between the School/Department and the Estate Office if the hot work might affect the normal activities of the area. Permits should normally be issued by the occupier of an area unless the work is controlled by the Estate Office.

A copy of the permit should be available at the hot-work location.

Appendix 1

Operational Checklist for those involved in Hot Work

Typical Precautions for Safe Hot-Working

1. Care to be taken when using and storing materials used for ignition purposes, i.e. matches, lighters.

2. Hot-work equipment is in good repair and adequately secured. Gas welding and cutting equipment carries a "Hot Work Checklist" (see Appendix 2).

3. All combustible material of a portable nature shall be removed from the site of operations and floors swept clean of combustible materials. Flammable substances such as paints and adhesives must be removed from the Hot Work area.

4. All combustible material remaining in the vicinity shall be either a) thoroughly drenched with water or b) cover with damp sand or c) covered with non combustible sheets – *whichever is suitable.*

5. Combustible floors, walls, ceilings protected by wetting down and covering with damp sand or covered or screened by sheets of non-combustible material – *whichever is suitable.*

6. Where work is above floor level, non-combustible curtains or sheets suspended beneath the work to collect sparks.

7. All gaps in walls and floors through which sparks could pass covered with sheets of non-combustible materials.

8. Means for fire extinguishing must be in close proximity to the "Hot Work" operation. If a fire point is not in the immediate vicinity, then portable fire extinguishing equipment must be available at the site of operations.

9. Ensure that the correct Personal Protective Equipment is worn in relation to the task being carried out.

10. Smoke/heat detectors that could be affected by the "Hot Work" operation must either be a) isolated by the University electricians or b) "Bagged off".

    In both cases, Security must be informed that smoke/heat detectors are not in operation. When the work has been completed the smoke/heat detector must be put back into operation.

11. Those concerned have had the nearest fire alarm/telephone pointed out to them and have been told what to do in the event of a fire or other emergency.

12. Any pipes affected have been assessed for hazardous contents or residues, isolated and vented. Precautions have been taken to prevent the release of sparks or other hazardous emissions from open ends. Consider the potential for conduction of heat.

NOTE If considered necessary by the **Authorised Person**, a fire watcher shall be placed in charge whilst the "hot-work" operations are in progress and shall patrol in or about any structure of building close to the "hot-work" operations, where the risk of fire may arise. The **Authorised Person** must inspect the site of the "hot-work" operation at least once per day on the dates the permit is valid.

HOT WORK PERMITS ALONE DO NOT COVER WORK CARRIED OUT IN CONFINED SPACES

Appendix 2

Hot Work Checklist–to be secured to cylinder trolleys

- Condition of pipes/fittings checked?
- Enclosed fabrications (e.g. tanks, pipes) checked for hazardous contents?
- Combustible materials in area removed or covered?
- Combustible floors protected?
- Wall/floor openings protected?
- Where is the nearest:
    - fire extinguisher?
    - fire alarm call point?
    - internal phone?
- Smoke/heat detectors protected
    - Security informed?
- Check for signs of fire after work completed
- In the Event of Fire,

    - raise alarm,
    - phone Security Control - 8888 (internal tel.), state location,
    - use extinguishers if safe to do so.

(Contact the Safety Office for tags with the above information)

Appendix 3

Duties of the Authorised Person

An **Authorised Person** is someone who has sufficient technical knowledge, training and practical experience of the Hot Work Processes and their associated hazards to undertake a Hot Work Risk Assessment. The Authorised Person has the following duties:

(i) To assess the risks associated with the hot work activity and it's potential effect on the surrounding area and processes.

(ii) To decide whether the work can be carried out in accordance with a Standard Operating Procedure or whether a permit to work is required.

(iii) To issue the appropriate documentation to the Competent Person, discussing the practicalities of the safety precautions and control measures required.

(iv) To monitor that during the hot work activity, the work is carried out in line with the permit to work or standard operating procedure. Where the work extends beyond one day, to extend the permit if the conditions are still applicable.

(v) To ensure that on completion of the hot work the Competent Person has left the area in a safe condition and to cancel a permit if issued.

Duties of the Competent Person

A **Competent Person** is someone who is trained and experienced in the actual Hot Work activity and has duties as follows:

(i) Ensure receipt from the Authorised Person (Hot Work Assessor) of either a Standard Operating Procedure or a Hot Work Permit, prior to starting work.

(ii) If a permit is issued, discuss the safety precautions required with the Authorised Person (Hot Work Assessor). Sign for acceptance of the permit to confirm understanding of the requirements and the obligation to carry out the instructions correctly.

(iii) Work in compliance with the job instructions and control procedures.

(iv) Adhere to any provision in the Safety Document (Safe Operating Procedure or Permit to Work).

(v) Supervise, erect and maintain any barriers, screens or other protective measures.

(vi) Ensure/arrange communication and/or reporting procedures for emergency situations as appropriate.

(vii) Observe all fire precautions.

(viii) Comply with any monitoring required by the documentation.

(ix) Keep the Hot Work Area clean, tidy and free from any combustible materials.

(x) Restrict the use and application of heat to the stated points of work.

(xi) Leave the area in a safe condition if the hot work is suspended. The permit will need to be formally extended or a new permit issued if the hot work is to continue on a different day.

(xii) Comply with any requirements laid down in the Hot Work safety document to carry out a personal inspection after a specified period following the last application of heat.

(xiii) On completion or cessation of the Hot Work, confirm that the Hot Work area is safe and free from any source of ignition or any signs of any smouldering materials, tidy up the work area, remove/replace any fire fighting equipment, if a permit was issued, sign it off and return it to the Permit Issuer (Authorised Person).