



Play Training Module

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Hot Work Fire Prevention

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1. Fire Prevention for Cutting, Welding & other Hot Work

Welcome to Fire Prevention for Cutting, Welding and other Hot Work. During the next 15 minutes you will learn:

- How to prevent an accidental hot work fire,
- Simple controls you should always use while doing hot work,
- And how managers and supervisors can implement an effective hot work.

For the purposes of this Training Module, when we talk about hot work we mean any operation which produces hot slag, sparks or significantly heats up metal. This includes but is not limited to cutting, welding, braising, grinding and heat treating.

This Training Module covers general hot work fire prevention for most work situations. It is not a comprehensive guide and does not cover all work conditions, especially work in high hazard areas. For a more comprehensive understanding of hot work risks, controls and high hazard areas please see the references listed on this website and other appropriate references.

This Training Module is not focused on OH&S issues. Before you start hot work, you should be familiar with your own organisation's OH&S procedures.

Some conditions may require other work permits or procedures to be used. This training does not cover these other work permits and procedures. Other references should be consulted to implement these systems. These may include but are not limited to:

- Confined space entry work permits,
- Equipment isolation permits,
- Protection system impairment procedures,
- Excavation permits,
- Working at height permits.

Section 2 of this Training Module explains why the problem of hot work fires is so serious. Section 3 explains the principles of avoiding hot work fires. Section 4 explains how to be ready to detect and extinguish a fire if it starts. Section 5 discusses the use of hot work permits. Section 6 is designed to help managers and supervisors implement a hot work system.

2. Hot Work is Dangerous

One of the major causes of fires is hot work. Hot work starts hundreds of major fires each year which:

- kill and injure people,
- put people out of work,
- result in millions of dollars worth of losses and push up insurance premiums,
- and shut down businesses permanently despite insurance.

Surprisingly sites such as office buildings and shopping centres, which don't usually do Hot Work, experience major hot work fires, about as often as sites which do hot work all the time. This risk issue deserves your attention regardless of how often how work occurs at your facility.

Congratulations on correctly completing this section. The next section will describe general hot work loss controls which are designed to avoid starting hot work fires.

3. Hot Work Loss Controls – Avoid Fires

Because hot work is inherently a high risk operation it is important that you take precautions to reduce the risk. The following controls are designed to avoid starting hot work fires. The general controls are as follows:

- Hot work should only ever be done by trained, qualified and approved people with equipment that is in good condition.
- Contractors conducting hot work should always be supervised and inducted by an approved site representative. Inductions must make contractors aware of the hazards in the intended work area.

The next several controls are designed around one basic objective - Keep the hot stuff away from the stuff that can burn or explode. Hot work fires start when hot metal comes into contact with combustible materials, liquids or gases. In order to reduce the likelihood of a fire starting, you should use the following two key principles.

First principle - don't conduct hot work unless it is necessary. If it is at all reasonable, alternatives should be used such as cold cutting methods, drilling, bolts, clamps or moving the job to a safe area. This avoids getting the metal hot and avoids generating an ignition source in the first place.

Second principle - ensure separation between hot metal (eg sparks) and all combustibles. Combustibles should be separated by a minimum of 10m horizontally or by a non combustible barrier such as a welding screen or a welding blanket. Remember the principle is to prevent sparks or hot metal coming into contact with any combustibles. Some particular issues to consider are:

- Sparks are small and can bounce or fall long distances. When using barriers you should always ensure that there are no gaps where sparks can get through. For instance welding screens should extend all the way to the floor to prevent sparks escaping the work area. When using blankets they should completely cover combustibles and leave no gaps. Gaps in walls should be sealed.
- Remember to check below the work area where sparks may fall. Sparks can fall through cracks in the floor, into pits or fall long distances onto combustibles below. Always seal openings to pits and gaps in the floor within 10m of the work area. And remember always check below before starting hot work. If sparks can shoot upwards, use the same precautions above the work area. Combustible floors can also be wet down before, during and after, to reduce chances of a fire.

- Combustibles may be concealed behind or may be in contact with, the metal being worked on. Rubber lined tanks, rubber lined pipes and foam sandwich panels are examples of how combustibles can be concealed from a person conducting hot work. Also check that combustibles are not in contact, behind or inside the metal being worked on.
- To warn workers, place signs to identify areas which contain concealed combustibles.
- If the piece of work can be moved, consider conducting the hot work in a safer area.
- If hot work is conducted underground, in confined areas or in hazardous areas, combustible and explosive, gases and dusts should be monitored before, during and after the work. Remember there are higher risks involved in conducting hot work in these areas, so additional controls should be considered. Remember combustible gases and dusts are not obvious a lot of the time.
- Hot work should never be done in some hazardous areas, the risks are just too high – examples may include areas containing combustible or explosive, liquids, gas or dust. These hazardous areas should be signed as “No Hot Work” areas.
- Set up permanent hot work areas that have all the above controls in place permanently. If possible the equipment being worked on should be moved to a permanent hot work area to complete hot work.

Congratulations on correctly completing this section. The next section will describe general hot work loss controls which are designed to make sure you are ready to detect and extinguish a fire if it starts.

4. Hot Work Loss Controls – Detect Fires

The next few controls are designed to make you ready to detect and extinguish a fire if it starts. A lot of hot work fires start after the hot work is completed and people have left the area. This is because hot work fires can smoulder for long periods of time before bursting into flame. If a fire can be detected and extinguished while it is still smouldering or while it is still small the damage will be minimised.

The following controls will make sure you are ready to detect and extinguish a fire quickly.

- In order to quickly detect a smouldering fire before it gets out of control, it is imperative to comprehensively inspect the area for smouldering fires. The inspections should be conducted:
 - while the work is being completed,

- straight after work is completed
 - and 30 minutes after work is completed and then as appropriate.
- This may mean in some instances that hot work should be stopped 30 minutes, or more, before the end of a shift or the end of the work day.
- This is very important because most fires start after work has been completed and people have left the work area. A piece of hot metal can cause combustibles to smoulder for quite some time before igniting.
- Make sure that appropriate fire extinguishers, hose reels and hose lines are ready for immediate use in case of a fire. As a minimum an appropriate type and size of portable fire extinguisher should be made ready at the work area. Consideration should be given to how fast a fire could spread and how large it could become when selecting the appropriate manual fire equipment.
- In some instances wetting down the work area before and after the hot work, may be an effective control.
- Unless absolutely unavoidable hot work should not be conducted when the automatic fire sprinkler system is impaired. Where the hot work is unavoidable, additional controls need to be put in place to compensate.

Congratulations on correctly completing this section. The next section will describe general hot work loss controls relating to hot work permits.

5. Hot Work Loss Controls – Hot Work Permits

The final controls are:

- Unless the area is designated a permanent hot work area, hot work should never start until an authorised person inspects the work area and provides a signed hot work permit. A copy of the hot work permit should remain in work area for the duration of the work.
- A designated permanent hot work area should have appropriate hot work controls in place all the time. The presence and adequacy of these controls should be checked on an ongoing basis.
- A Hot Work Permit should be valid for only one shift and only one job. This is to ensure, the adequacy of controls are checked as conditions and locations change.
- After the final inspection for smouldering fires has been completed, and signed off by the person doing the inspection, the hot work permit should be returned to the authorised person. The authorised person should verify that the proper inspections were completed after work finished and that other required controls were in place during the work

- Contractors start a large percentage of hot work fires. Contractors should be supervised when doing hot work and should be told during induction that they are prohibited from conducting hot work without a permit.

Congratulations on correctly completing all the questions in this Training Module.

Please remember these are minimum guidelines only. Additional controls should be considered if the consequences of a fire are larger than normal or the likelihood is higher than normal

This training does not cover these other work permits and procedures. Other references should be consulted to comply with these requirements. This completes the compulsory sections of this training. The following section is designed for managers and supervisors, however it will be of interest to anyone involved in hot work.

6. For Supervisors – How to implement an effective hot work permit system

A hot work management system, like any system, is designed to ensure that people behave appropriately at all times and that an appropriate culture is developed. In this case behaving appropriately means that hot work loss prevention controls are in place every time. The implementation and maintenance of an effective hot work system revolve around a few simple principles.

- Gain senior management commitment. If the system is not openly supported by senior management it will not be effective
- Develop a hot work policy. The policy should quickly outline the objectives of the hot work system, responsibilities, training requirements and performance reviews. The policy should document serious consequences for employees and contractors who do hot work without a hot work permit or other wise do not comply with the hot work policy and rules. The policy should be signed by the senior management team and displayed. An example hot work policy has been provided.
- Allocate responsibility and authority to issue hot work permits. As few people as possible should be given authority to issue hot work permits, preferably only one person per site. If there is to be more than one person with authority, each person should be assigned specific areas and times they are responsible for. Care should be taken to ensure there are no overlaps in

authority to prevent confusion and misunderstandings. An example hot work permit has been provided.

- The hot work authorities should have appropriate training and experience in hot work fire prevention and also an appropriate knowledge of the site, its operations and potential fire risks. The hot work authorities should personally inspect an area, to ensure that appropriate controls are in place and that a fire watch has been arranged for, before a hot work permit is issued. The authorities should also ensure that the hot work permit is returned when the fire watch has completed the after work inspection of the work area. The used hot work permits should be kept on record.
- The authority should ensure that all hot work conducted outside a permanent hot work area, has a permit, that a copy of the permit is at the work area and that permits are only issued for only one job and only one shift.
- The authority should ensure that workers who conduct hot work are appropriately trained in fire prevention. This training module can act as the basis for this.
- The authority should ensure that only trained, qualified and responsible people are authorised to conduct hot work.
- The authority should ensure that all contractors are made aware that hot work is prohibited on site without a hot work permit. This can be done by including the rule in the contractor's site induction. The authority should ensure that contractors are appropriately supervised when conducting hot work. This may mean direct and continuous supervision of the contractor while doing hot work.
- The authority should designate permanent hot work areas and ensure that hot work controls are permanently maintained in these areas.
- The authority should designate areas where hot work is prohibited. These areas should be appropriately signed and brought to the attention of employees and contractors. An example sign has been provided.
- The effectiveness of the systems should be reviewed on a scheduled basis including the performance of individuals in completing their allocated duties.

This is the conclusion of this Training Module.