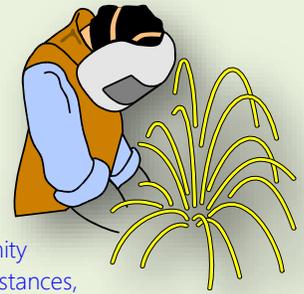




Managing Hot Work



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. "Hot work" is a term used to describe a task or operation that generates heat, sparks, or an open flame, such as welding, cutting, grinding, soldering, torch applied roofing, heat guns, and similar activities.

If hot work operations are performed within an area, we must know that most hot work processes release large amounts of hazardous air contaminants, which may include lead, manganese, hexavalent chromium (known to cause cancer), nickel, and other hazardous air contaminants. Electric arc welding also generates hazardous ultraviolet (UV) radiation that can permanently damage your eyesight. Never look directly at a welding arc, except through a welder's helmet. Proper personal protective equipment and good ventilation is required for hot work processes. Welders and others who are responsible for hot work operations may be required to attend a special class to learn about hot work safety procedures. At a bare minimum, hot work operators must always keep combustible materials at least 35 feet away, keep a fire extinguisher readily available, make sure the jobsite has a hot work permit posted, and maintain a fire watch for at least 30 minutes after all hot work operations have ended.

WELDING AND CUTTING

Welding and cutting can create extremely dangerous conditions, both for those performing the work and for those who must work nearby. To prevent accidents and illnesses, it is strongly suggested that adherence with all welding and cutting regulations should be strictly followed. The appropriate material safety data sheets on the materials being used, such as welding rods, fuel gasses, paint coatings, etc. will alert about these potential hazards and prescribe the proper protective action. Airborne contamination can often be reduced to safe levels through increased ventilation. **Don't destroy eyesight** - insist on wearing eye protection with the appropriate lens filter shade that corresponds to the type of work being performed - **SUN GLASS ARE NOT Acceptable protection**. Both welding and cutting create sparks, and with eye protection in place one may fail to notice a fire below or near. This is why it's important to remove all flammable and combustible liquids or solids such as paper, cardboard, rags, weeds, lumber, etc. before work begins. **Fire watch** personnel should be on duty during the whole work period and for a reasonable period after work is completed.

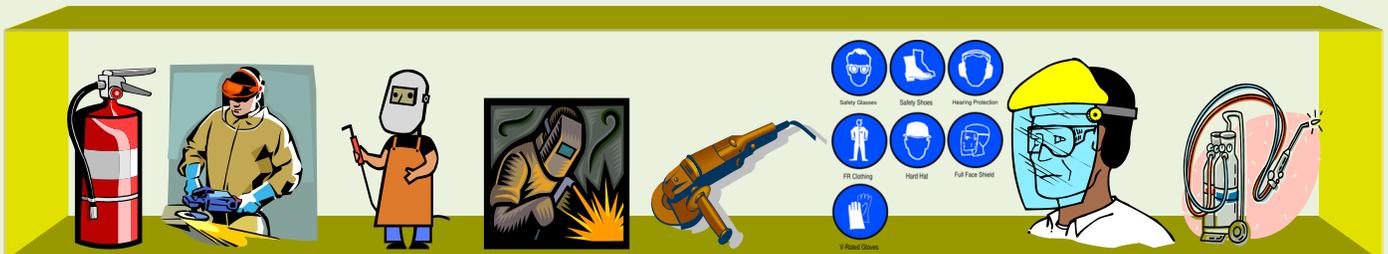
DANGER - oil, grease, coal dust, and other organic materials can ignite instantly when exposed to pure oxygen - It is not allowed to use oxygen as a substitute for compressed air. Defective equipment or leaking cylinders - should be stored and used in an upright position Standing in front of a regulator while opening a cylinder valve is also prohibited.

Hot work fire watch

A **fire watch** is a person assigned to observe ongoing hot work to identify and react to hazards. The hot work fire watch shall be ordered based on the assessment of risks caused by hot work. The hot work fire watch must continue throughout the entire hot work process, including breaks. When the hot work has been completed, the hot work fire watch must be continued in accordance with the hot work permit, but for at least one hour. The hot work plan shall specify how the hot work fire watch is arranged. The same person performing the hot work cannot be the hot work fire watchman who is on duty during work.

During the hot work fire watch, the hot work site and its adjacent areas must be monitored continuously.

Difference between Hot Work and Cold Work	
Hot Work	Cold Work
"Hot work" is work that could produce a source of ignition, such as a spark or open flame. Examples of hot work include welding, cutting, grinding and the use of non-explosion proof electrical equipment.	"Cold work" is work that cannot produce a source of ignition. Examples of cold work include valve adjustment and brush painting.



Precautions are required to perform hot work in dusty and misty conditions

The space should be ventilated or purged to reduce the combustible dust or mist airborne concentration to a level below that which may create a hazard of explosion.

If ventilation or purging cannot reduce the combustible dust or mist airborne concentration to a level below that which may create a hazard of explosion, the space must be rendered inert by adding an inert gas and be continuously monitored to ensure the atmosphere remains inert. Workers must wear adequate respiratory protective equipment and adequate equipment to allow persons outside the confined space to locate and rescue them, if necessary.

What precautions are required to perform hot work in the presence of an explosive or flammable gas or vapour?

In order to perform hot work in the presence of an explosive or flammable gas or vapour, the following precautions must be taken:

- ⊕ The space is purged and continuously ventilated to maintain an atmosphere of less than 5% of the LEL;
- ⊕ The space is purged and continuously ventilated to maintain an oxygen concentration of less than 23%;
- ⊕ The atmosphere in the confined space is continuously monitored;
- ⊕ The entry permit includes adequate provisions for hot work and details the appropriate measures to be taken; and
- ⊕ An adequate warning system and exit procedure are in place to provide adequate warning and allow safe escape if the levels in a) or b) above are exceeded. It is good practice to incorporate a safety factor that provides for adequate warning should the levels be approached.

Alternately, the space must be rendered safe by making it inert with an inert gas and continuously monitoring the atmosphere, particularly with regard to oxygen concentration. Workers must wear adequate respiratory protective equipment and equipment to allow persons outside the confined space to locate and rescue them, if necessary.

Common Welding Hazards...

- ⊕ burns
- ⊕ electrical shock and burns
- ⊕ eye injury from looking at the arc without eye protection
- ⊕ lung irritation or poisoning from toxic gases or fumes from the welding operation

Protection from Hazards...

- ⊕ No matter how small the job, wear all the protective clothing required for welding.
- ⊕ Inspect all equipment and fuel cylinders used before beginning a job.
- ⊕ Keep extinguishers or other fire fighting equipment at hand during welding.
- ⊕ Shield the welding area to prevent injury to the eyes of other workers.
- ⊕ Avoid welding drums or other containers that held flammable materials, unless those containers have been thoroughly cleaned.
- ⊕ In electric arc welding, make sure the electrode stays clear of the workplace.
- ⊕ To avoid hazardous fumes and gases, remove rust inhibitors, paints, degreasers or other coatings from metals to be welded. And be sure to have an appropriate ventilation system when working in an enclosed area
- ⊕ Use a spark lighter, not a cigarette, a match or a cigarette lighter, to ignite flames.
- ⊕ Keep oil and grease away from all oxygen valve connections, hoses and gauges.
- ⊕ In oxyfuel gas welding in a confined space, keep the gas cylinders outside the area and fastened securely. Shut off gas supply when leaving for a break.
- ⊕ Before leaving a job, make sure welded material has cooled, all hoses are depressurized and electrical power is shut off.

A Tool Box Talk (TBT) on / WELDING AND CUTTING (HOT WORKS)

- ⊕ Only suitably experienced personnel are permitted to carry out welding, or cutting activities.
- ⊕ Personnel should wear proper eye and face protection (i.e. goggles, face shield, apron, leather gloves...) when welding, grinding and cutting.
- ⊕ Supervisors and welders should check to see that the helpers are properly protected, at all times.
- ⊕ Preferably, use screens, to protect other people in the area, from weld flash & grinding sparks; if not available, then all personnel entering the hazardous zone, should wear proper PPE (eye/face protection, ear protection, and fire redundant clothes).
- ⊕ If welding, or cutting is being carried out, at more than one level, warning signs and barricade should be posted.
- ⊕ Use a suitable support for cutting and grinding. Ensure that both parts of the piece being cut, is supported and all personnel are clear, as the cut nears completion.
- ⊕ Always use the correct type of disk to perform cutting & grinding as it fit the grinder
- ⊕ If working in a confined space, use a fan, to ensure that there is sufficient air supply. Remember that the welding, or burning process produces toxic fumes.
- ⊕ Never allow flammable material (oil or grease) to come into contact with oxygen equipment.
- ⊕ Always consider a cylinder as full and handle it accordingly. Never drop cylinders or allow them to collide. Gas cylinders should always be in an upright position and secured.
- ⊕ All cylinders are to be secured in a vertical position. When not in use, cylinders must have safety caps on. Empty cylinders are to be removed from construction areas and properly stored. Never use cylinders that are not positively identified.
- ⊕ Before starting to cut or weld, inspect the working area, to ensure that sparks, or molten metal, will not affect personnel, or come into contact with combustible materials.
- ⊕ Ensure that suitable firefighting equipment is available.
- ⊕ Always check that the dead-man switch in the grinder is working.
- ⊕ The guard of the grinder should be in good condition.
- ⊕ Before welding or burning , check that ;
 - i. There are no bare cables, or cracked insulation.
 - ii. A good earth connection is made.
 - iii. Hoses are in good condition.
 - iv. All joints are secure.
 - v. Flash back arrestors are fitted.



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 authorized persons who have received:

- ⊕ Awareness training of the hazards and precautions associated with Hot Work
- ⊕ 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 specific duties.

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.

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.

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.

Non-routine operations - Use of Permit to Work

Operations that are of a non-routine nature must be assessed by the Authorized 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**.

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 [separate Confined Space Permit](#) should be completed.

The Permit-to-Work should be issued by an **Authorized 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 **Authorized 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 authorized 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.

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

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