

# TIP sheet

## Welding – hot work

T026 – APRIL 2008



### RTA minimum requirements

Managers and Supervisors must identify, register, risk assess and then eliminate or minimise all risks associated with hot work to as low as reasonably practicable prior to hot work being commenced.

A SWMS must be developed and documented for all tasks involving hot work based on the results of the risk assessment.

### Examples of hot work

Hot work includes all grinding, welding, thermal or oxygen cutting or heating, and other heat-producing or spark-producing operations.

### Welding and cutting hazards

- Fire and explosion.
- Electric shock incidents.
- Fumes and gases.
- Ultraviolet radiation.
- Heat.
- Manual handling.
- Confined spaces.
- Falls from a height.

### Hazards associated with grinding

- Sparks.
- Abrasive discs.
- Disintegrating discs.
- Vibration.
- Manual handling.
- Pneumatics.

### Risk assessment

Risk assessments shall be undertaken for all hot work activities that are to be undertaken at the work site. The risk assessment shall consider the following factors:

- Type of hot work to be undertaken.
- Equipment to be used.
- Flammable and combustible materials located in close proximity.
- The type, extent and location of any utilities in the area.
- Ventilation of the area – both natural and mechanical and surrounding vegetation.

### Risk controls

All risks identified and assessed through the risk assessment process are required to be eliminated or minimised to as low as reasonably practical through the introduction of risk control measures.

Risk control measures shall be implemented in accordance with the hierarchy of control set out within the *NSW OHS Regulation 2001*.

The following risk control measures shall be undertaken where practicable:

- A person shall be appointed to be in charge of the hot work activity.
- Signage shall be erected at all designated hot work areas.
- Safe access shall be provided to the work area.
- A pre-start check of the worksite shall be undertaken prior to commencing hot work activities.
- Welding screens shall be erected around the hot work area to protect people from exposure to ultraviolet radiation.
- The hot work area shall be provided with adequate natural or mechanical ventilation to protect persons against exposure to atmospheric contaminants.
- The work area shall be kept tidy and free from flammable and combustible materials, tangled leads, discarded off-cuts and electrode stubs.
- Power shall be turned off and electrode stubs removed prior to the welder leaving the work area.

### Competency Based Training

All personnel required to undertake tasks involving hot work must be trained in safe work methods. The training shall incorporate:

- The induction of all personnel on site in accordance with the OHS management plan.
- The nature of hazards involved, the means adopted to control the risks, and the emergency procedures in place.
- The requirements of AS1674.1 and AS1674.2.
- All plant required to be used during the demolition work.
- Use, care, maintenance and storage of PPE.
- SWMS associated with the hot work.

## Review

Risk Assessments, SWMS and work procedures must be reviewed and revised when:

- The original assessment is no longer valid or older than 3 years.
- Injury or illness results from demolition work.
- A significant change is proposed at the place of work, or in work practices or procedures to which the assessment relates.

## Personal protective equipment

Fit-for-purpose PPE as prescribed in the risk assessment and SWMS shall be available and:

- Meet the appropriate Australian Standard where applicable.
- Be appropriate for the person and task.
- Be used as per original equipment manufacturer directions.
- Be inspected regularly and before each use for wear, damage and use-by dates.

## Designated hot work areas

Any areas of the worksite where hot work activities are to be undertaken regularly shall be designated hot work areas. Hot work shall only be undertaken within these areas where practicable.

Designated hot work areas shall:

- Be isolated using appropriate screens and warning barriers.
- Be free from flammable and combustible materials.
- Be free from water and damp conditions.
- Have adequate natural or mechanical ventilation.

If hot work is to be undertaken outside of designated areas a hot work permit shall be used.

## Emergency preparedness

Emergency provisions are to be determined to minimise the effect of incidents, such as electric shock, contaminated atmospheres and fire. Emergency procedures should be developed that include:

- The need and placement of fire fighting and emergency equipment, including emergency drench showers.
- Contact details for external emergency services and the relevant on site personnel.
- Evacuation routes and emergency assembly points.
- The recovery of personnel trapped with a confined space.
- The provision of first aid facilities and officers.

## Fire safety – hazardous areas

A hazardous area is an area in which flammable liquids, vapours or gases, combustible liquids, dusts or fibres, or other flammable or explosive substances may be present. Guidance for classifying hazardous areas is given within the AS 2430 series.

If an area is classified as a hazardous area, the following precautions shall be met:

- The work shall be authorised via a hot work permit.
- A responsible officer shall be appointed to be responsible for the safe execution of the hot work.
- A firewatcher shall be appointed.
- Hot work shall not be undertaken alone.

## Fire watchers

If a fire watcher has been appointed for the hot work, the fire watcher shall:

- Be alert for any fire outbreak.
- Inspect adjoining areas if heat transfer is possible.
- Take immediate action to combat any outbreak of fire.
- Not allow hot work to proceed outside the area specified by the hot work permit.
- Immediately stop work if a hazardous condition is observed.
- Monitor changes in wind direction.
- Obtain fire extinguishers prior to the work commencing.
- Not leave the work area.

## Confined spaces

If hot work activities are required to be undertaken within a confined space, this work shall be completed in accordance with the requirements of AS 2865.

The work must be authorised by a confined space entry permit that takes into account:

- The concentration of flammable vapours or gases in the atmosphere or piping.
- The liquid or solid residues present within the confined space.
- Utilities that are present within the confined space.

Fire prevention measures shall be taken, including:

- Removal of all combustibles from the confined space.
- A fire watch person shall be appointed.
- No compressed gas cylinders, other than those used for SCBA, shall be located within the confined space.

Fumes shall be controlled by the following means:

- All surfaces covered with coatings that may produce toxic or flammable fumes shall be stripped from the area of heat application.
- Means shall be provided to exhaust contaminated air from the confined space.

## Oxy-acetylene equipment

At minimum, all oxy-acetylene equipment shall meet the requirements of AS4289 and AS 4839, and in particular, shall comply with the following requirements:

- The user shall inspect all oxy-acetylene equipment for signs of damage prior to use.
- All oxy-acetylene connections shall be kept free of grit, oil, grease and solvents.
- An appropriate gas pressure regulator shall be fitted.
- Flash-back arrestors shall be fitted at both the regulator and the blowpipe.
- Gas cylinders shall be secured in an upright position in a shaded, cool, dry and well ventilated location.
- Remove pressure regulators prior to transporting gas cylinders to prevent damage.
- All hoses used with oxy-acetylene equipment shall comply with AS1335.
- All hoses, blowholes, connections and regulators shall be suitable to the particular application.
- When pressurising hoses, open the oxygen and acetylene outlet point isolating valves slowly to avoid damaging the pressure regulators.
- Always use a spark lighter to ignite the blowpipe – do not use a naked flame.
- At any time there is a sign of leakage, fluctuation or starvation of gas supply, or

misshapen flame, shut the equipment down immediately.

- After using oxy-acetylene equipment, turn the regulator pressure on both gas cylinders to the zero delivery position, inspect the equipment for damage and, if safe, return the equipment to the storage area.

## Electric arc equipment

Electric arc welding equipment includes all manual metal arc welding (stick), gas metal arc welding (MIG), and gas tungsten arc welding (TIG) equipment. At minimum, all electric arc welding equipment shall meet the requirements of AS1674.2, and, in particular, shall comply with the following requirements:

- The frames of all electric arc welding equipment are to be earthed in accordance with AS3000.
- The user shall inspect all electric arc welding equipment for signs of damage prior to use.
- All electric arc welding equipment shall be fitted with voltage reduction devices that reduce the voltage between the electrode and the work when the machine is not striking an arc.
- Ensure that the current-carrying capacity of the work lead is not less than that of the electrode conductor.
- Securely connect the work lead directly to the work piece, as close as practicable to the where the arc will be struck.
- Avoid using building or other machines to return welding currents.
- Remove all used and unused electrodes from the electrode holder when not welding.

## Electric welding safety

Before welding, the work area environment shall be assessed and classified for risk of electric shock in accordance with AS1674.2. The following categories apply:

- Category A: Environments where:
  - The risk of an electric shock by arc welding is low.
  - Normal work practice is used.
  - It is not possible for any welder or any other worker to be in contact with the workpiece, in the event of being in contact with a live part of the welding circuit.
- Category B: Environments where there is a significant risk of the welder contacting the workpiece or other parts of the welding circuit.
- Category C: Environments where the risk of an electric shock by arc welding is greatly increased due to low body impedance of the welder (usually due to the presence of water, moisture or heat—particularly above 32°C) and of the welder contacting parts of the welding circuit.

Minimum risk control measures shall be applied to Category A areas:

- The electrode and workpiece shall be regarded as electrically live.
- Welding gloves shall be sound, dry and used on both hands.
- Welders shall wear appropriate dry fire proof clothing.
- Leather cushions, wooden duckboards or other means shall be used to insulate the welder from damp concrete floors.
- Leads and equipment shall be inspected prior to use.

- While tacking two pieces together, the arc shall be struck on the piece connected to the return lead.
- The electrode holder shall not be placed on the workpiece.

Minimum risk control measures shall be applied to Category B areas:

- Where practicable, efforts shall be made to convert the area to a Category A.
- The open-circuit voltage shall not exceed 68 V a.c. peak and 48 V a.c. r.m.s. or 113 V d.c.
- A competent safety observer shall be assigned to monitor the welder.

Minimum risk control measures shall be applied to Category C areas:

- Every effort shall be made to make the area as dry and cool as possible.
- A competent safety observer shall be assigned to monitor the welder.
- Maintenance of welding equipment shall not be undertaken within this area.
- The open-circuit voltage shall not exceed 35 V a.c. peak and 25 V a.c. r.m.s. or 35 V d.c.

## Grinding and abrasive equipment

The use of grinding equipment shall comply with the following requirements:

- The user shall inspect all grinding equipment for signs of damage prior to use.
- The correct type of grinding / cutting wheel or disc shall be used for the application (e.g. size and speed requirements).
- Grinding equipment shall not be used unless correct guards are in place.
- The maximum rotation speeds of grinding discs shall not be exceeded.

## References

- NSW OHS Act 2000.
- NSW OHS Regulation 2001.
- AS/NZS1270:2002 Acoustics – Hearing protectors.
- AS1319:1994 Safety signs for the occupational environment.
- AS1335:1995 Hose and hose assemblies for welding, cutting and allied processes.
- AS/NZS1338.1:1992 Filters for eye protectors – Filters for protection against radiation generated in welding and allied operations.
- AS1470 Health and safety at work – Principles and practice.
- AS1674.1:1997 Safety in welding and allied processes – Fire precautions.
- AS1674.2:2007 Safety in welding and allied processes – Electrical.
- AS/NZS2161.1:2000 Occupational protective gloves – Selection, use and maintenance.
- AS/NZS2210.1:1994 Occupational protective footwear – Guide to selection, care and use
- AS/NZS2430 Classification of hazardous areas series.
- AS2865:2001 Safe working in a confined space.
- AS4289:1995 Oxygen and acetylene gas reticulation systems.
- AS4839:2001 Safe use of portable and mobile oxy-fuel gas systems for welding, cutting, heating and allied processes.
- RTA Risk Management Policy 2.0.
- RTA Risk Management Procedure 2.0.