



Electrical switchboard & switchroom manufacture

August 11

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The manufacture of electrical switchboards and switchrooms uses many different work processes including metal work, electrical work and welding. In addition some workshops also powdercoat their product while others are involved in installing it at worksites across the state including remote and hot locations.

WorkSafe has produced this document to increase awareness of safety issues faced by your industry and to highlight the effect and importance of appropriate systems of work and safety management systems.

Please take the time to read the relevant parts of this publication and use the checklists to assist you in improving safety in your organisation.

What is a risk assessment?

The occupational safety and health laws require risk assessments to be carried out.

A risk assessment is the process of determining whether there is a risk associated with an identified hazard, that is, whether there is any likelihood of injury or harm. The process should include consultation with people involved in the task, as well as consideration of the experience and training of the operator, individual tasks to be performed and the length of time the operator is exposed to the identified hazards.

How do I use these checklists?

1. Use the checklists in this newsletter to inspect your workplace. You may see other hazards as you are going through – add them to the checklist.
2. Anything that you have ticked 'No' or added to the list needs to be fixed. So, look at each hazard using the table below to prioritise identified hazards.

Risk rating table – for working out level of risk Use the vertical and horizontal columns to consider both the likelihood of injury or harm to health and the consequences to work out the level of risk

Likelihood of injury or harm to health	Consequences of any injuries or harm to health			
	Insignificant eg no injuries	Moderate eg first aid	Major eg extensive injuries	Catastrophic eg death
Very likely	High	Extreme	Extreme	Extreme
Likely	Moderate	High	Extreme	Extreme
Moderate	Low	High	Extreme	Extreme
Unlikely	Low	Moderate	High	Extreme
Highly unlikely (rare)	Low	Moderate	High	High

Risk assessment is a 'best estimate' on the basis of available information. It is important the responsible person undertaking a risk assessment has the necessary information, knowledge and experience of the work environment and work process, or such a person is involved.

3. If the hazard falls into 'high' or 'extreme', based on your view of how likely it is someone will get hurt and what level of injury could happen, then you need to fix it straight away.

If it is lower down in the table – moderate or low – then plan when you will fix it.

Remember hazards have to be controlled – you can't ignore them.

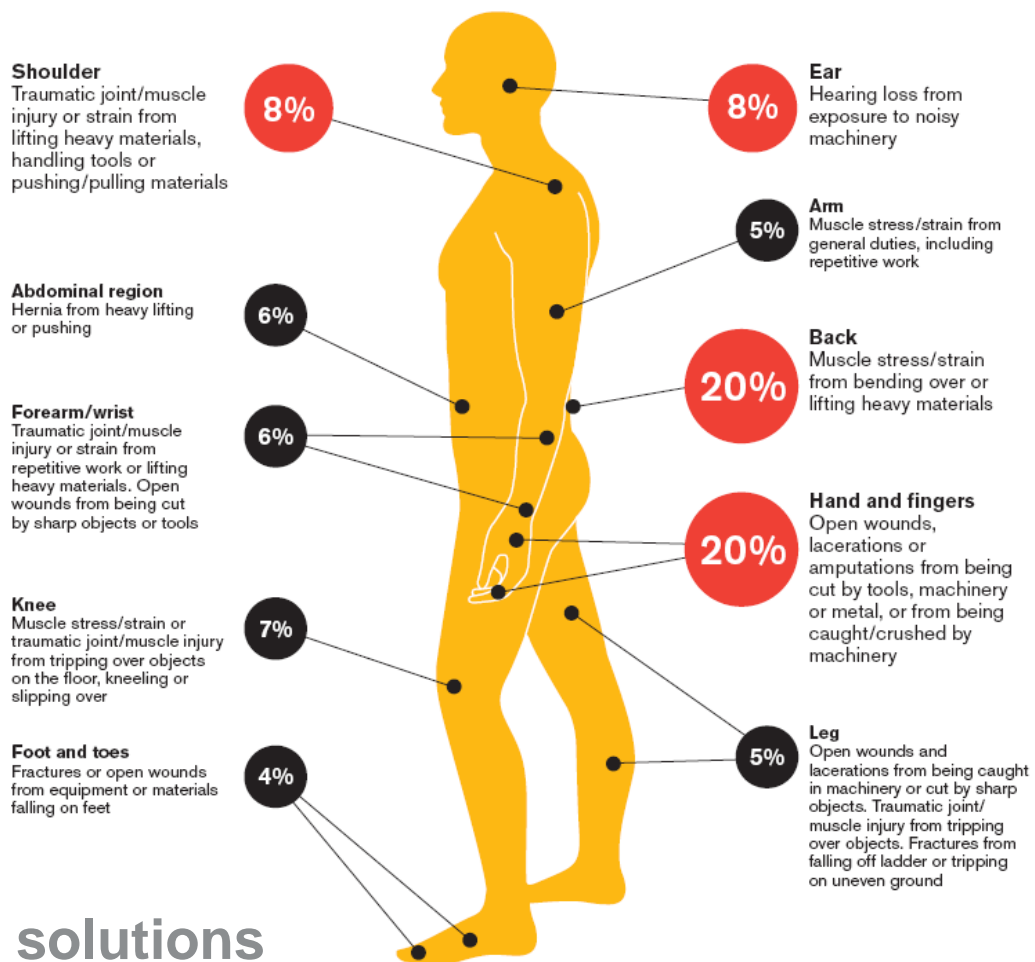


Injury Hotspots

2

Metal Manufacturing

These are the most common injuries and hazards for people working in metal manufacturing, as shown by injury claims



Safety solutions

Hotspots	Solutions
Lifting and bending	
<ul style="list-style-type: none"> Shoulder Back Abdomen Forearm/wrist 	<ul style="list-style-type: none"> Use mechanical means to lift heavy weights. All tasks should be conducted in the 'best working zone' (ie. between shoulder and knee height). Achieve this by raising, lowering or moving either the worker or the work. Empty pallets should not be lifted by one person. Use gloves for all manual tasks.
Pushing and pulling	
<ul style="list-style-type: none"> Shoulder Abdomen 	<ul style="list-style-type: none"> Use magnetic lifters or a forklift where necessary. Use a suitable mobile or overhead crane for bundled loads. Use a purpose-built vehicle for small loads.
Lacerations, amputations and fractures	
<ul style="list-style-type: none"> Hand and fingers Forearm/wrist Foot and toes Leg 	<ul style="list-style-type: none"> Use machinery guards appropriate to the level of access required. Wear suitable clothing (eg. overalls, long trousers, long sleeve shirt, safety boots). Don't use gloves when operating machinery, especially where the glove creates a risk of entanglement. Use gloves when working with hot equipment.
Slips, trips and falls	
<ul style="list-style-type: none"> Shoulder Knee Leg 	<ul style="list-style-type: none"> Ensure work procedures prevent or eliminate slipping/tripping hazards (eg. uneven surfaces or changes of level) and obstructions (including slippery and wet surfaces caused by liquid, dust or other contamination). Avoid kneeling by positioning work within the 'best working zone'.
Using hand tools	
<ul style="list-style-type: none"> Shoulder Hand and fingers Forearm/wrist 	<ul style="list-style-type: none"> Hand tools should be fit for purpose and maintained in accordance with manufacturer's specifications.
Hearing loss	
<ul style="list-style-type: none"> Ear 	<ul style="list-style-type: none"> Isolate noisy machinery or reduce noise levels (eg. enclose machinery, reduce vibration, use barriers and screens to block the direct path of sound, silence air exhausts and blowing nozzles). Noise assessment should be conducted if workers are exposed to excessive noise (eg. noise exceeds the exposure standard, workers have to raise their voices to communicate over a distance of one metre or have to wear hearing protection). Noise assessments should also be conducted if workers suffer a temporary reduction in hearing or ringing in the ears. Place warning signs in areas of excessive and continual noise, and wear hearing protection.
Repetitive work	
<ul style="list-style-type: none"> Arm Forearm/wrist 	<ul style="list-style-type: none"> Eliminate or minimise repetitive tasks involving bending through mechanical aids (eg. automatic in-feed) or limiting the pace or duration of work (eg. ensure work does not exceed 60 repetitions every two hours, job rotation). All tasks should be conducted in the 'best working zone'.

Manual tasks and SLIPS TRIPS AND FALLS

Manual tasks

Workplace injuries most commonly linked to manual tasks include sprains and strains, hernias and damage to the back.

Such injuries are a major cause of lost time at work and make up almost one-third of Western Australia's workers' compensation claims.

'Manual handling' is more than just keeping your back straight and knees bent, or lifting properly – it involves safely carrying, pushing and pulling, and holding or restraining.

Just as manual tasks involve more than just lifting, so the things that affect the risk of injury involve more than just the weight of the objects handled. Factors such as awkward movements, fixed postures and how long and quickly a task is performed are also very important.

Injuries can be the result of gradual wear and tear (eg from frequent or prolonged activities), or sudden damage (eg from a single lift of something very heavy or awkward to handle or from tripping and falling while carrying an object).

Because of the high potential for manual tasks to cause lost time injuries, WorkSafe WA has identified this as one of seven areas to be given priority when our inspectors visit your workplace.

What risk factors contribute to slips and trips incidents?

Slips and trips account for 20% of all lost time injuries every year. They can result in serious injuries and lengthy periods of time off work.

Risk factors that contribute to slips and trips injuries will vary according to the type of workplace and work tasks being completed.

Common risk factor categories include:

- Floor surface & condition
- Floor contamination
- Objects on the floor
- Ability to see floor/ walkways/ hazards
- Cleaning/ spill containment
- Space & design
- Stairs & stepladders
- Work activities, pace & processes
- Footwear & clothing
- Individual factors

How do I reduce the risk of injury from manual tasks?

The first step, in consultation with your workers, is to identify the manual task hazards for your organisation. This can be done by reviewing past hazard or incident forms; analysing previous injury records for staff; talking with workers about tasks they find difficult or demanding; and observing staff while they complete common tasks to collect information.

In their inspection, our inspectors will be looking for the key elements detailed in the checklists. Following the same checklist yourself will help you identify any shortcomings in your procedures or training and correct or update them; thus getting you started on meeting your health and safety requirements.

For each hazardous task identified identify the risk factors that are present for that task. Risk factors may be actions & postures; forces & loads; vibration; work environment; systems of work; and worker characteristics – please refer to the *WA Code of practice Manual tasks* for more information. Use the table on page one to rate the risk for each task.

Finally, for each hazard, determine what controls are needed to minimise risk. Controls may involve:

1. **eliminating the hazard or hazardous task**
2. **re-designing, modifying, altering or substituting the hazard or hazardous task**
3. **administrative controls where the above controls are not practical**

How can I reduce the risk of slips and trips in my workplace?

There are many controls that employers can use to prevent slips and trips in the workplace. Firstly though, it is important to complete hazard identification and a risk assessment in consultation with your staff. This will ensure that the right control is chosen for the hazards that are relevant in YOUR workplace.

Common safety measures used in workplaces include:

1. installing more power points to avoid cords on floor
2. widen aisles and walkways
3. resurfacing floors with less hazardous materials
4. restricting access to some work areas
5. improve lighting and use ramps instead of steps, where possible
6. ensure good housekeeping - clean up spills immediately and use signs for slippery or wet floors
7. proper footwear

Machine SAFETY

Machine guarding

Employers, manufacturers, designers and suppliers of machinery and equipment are legally required to make sure dangerous parts are safely guarded so that operators and others are protected from injury.

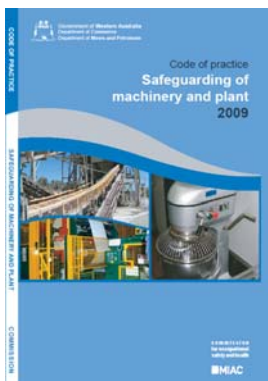
A guard may be any shield, cover, casing, physical or electronic barrier intended to prevent contact between a hazardous machine part and any part of a person or a person's clothing.

Control the risk

Old machinery is sometimes poorly guarded. Hazard areas may include extra moving parts like shafts, sprockets and pulleys that have been added for other uses. Original guarding may have also been removed for maintenance and not put back. There may be times when an operator may need to reach over, under, around or into a machine while it is running. If so, any moving parts or other hazards must be appropriately guarded from human contact.

Some of the hazards associated with machinery and likely to cause injury include:

- Rotating PTO and other shafts, for example joints, couplings, shaft ends and crank shafts.
- Gearing, including friction roller mechanisms, cables, sprockets, chains, clutches, cams or fan blades.
- Keyways, keys, grease nipples, set-screws, bolts or any other projections on rotating parts.
- Any pulley or flywheel that incorporates openings, spokes or protrusions, that renders it anything except totally smooth.
- Any crushing or shearing points, such as augers, roller feeds, and conveyor belts.
- Rotating knives, blades, tines or similar parts of power driven machines that operate in or near the ground.
- Any machine component that cuts, grinds, pulps, crushes, breaks or pulverises.
- Hot parts of any machine.
- Machinery being accidentally started during maintenance. (for more information see *Guidance note Isolation of plant.*)



The Commission for Occupational Safety and Health has released a code of practice for safeguarding of machinery. This publication is available on the WorkSafe's website www.worksafe.wa.gov.au

Lock-out and tagging

Locking out of equipment or machinery is the most effective way of preventing it becoming operational during maintenance. Its effectiveness lies in the "one key per lock, one lock per person" procedure.

If there is only one key per lock, the key has to be with the person carrying out the maintenance. Where more than one person is working on equipment or machinery a multi-lock system should be followed, ensuring that each person has attached a "personal" lock to the equipment or machine's multi-lock switch.

All workplaces must have a system unless the equipment or machinery is fully inoperative and then disconnected from the energy source.

Essentially, there are two types of tag, the "DANGER" tag and the "OUT OF SERVICE" tag.

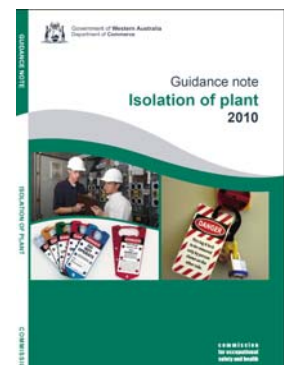
Australian Standard 1318 - 1985 recommends specific colours for the marking of physical hazards and the identification of certain equipment in industry. Colours used are red, yellow, green and blue.

- **RED AND WHITE:** Signifies danger and prohibition, fire protection equipment, stop buttons for electrical switches and emergency stop controls for machinery.
- **YELLOW AND BLACK:** Signifies caution and draws attention to such hazards as unfastened or removed machinery guards.
- **GREEN AND WHITE:** Denotes safety and location of safety or first aid equipment.
- **BLUE AND WHITE:** Is for information signs where there is no specific hazard.

Are isolating switches provided, and are lock-out and tagging procedures used during maintenance work on machinery such that:

- isolation switches are switched off?
- switches are locked out and tagged to inform others that maintenance work is being done?
- the only key to the lock is in the possession of the person carrying out the maintenance?

The Commission for Occupational Safety and Health has recently released a guidance note: Isolation of plant. This publication is available on the WorkSafe's website www.worksafe.wa.gov.au



METAL WORK

Metal cutting guillotines

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1. Guarding

Are the metal cutting guillotines in your workplace adequately guarded, in accordance with Australian Standard 4024.1. Safeguarding Machinery, General Principles.

- ensure that the guards are rigid, of adequate strength, and securely attached so they cannot be removed from the guillotine without tools.
- ensure that all openings and clearances in and around the guard designed to prevent fingertips reaching the holding clamps or blade; and
- the back of the guillotine guarded to prevent another person reaching the blade from the rear.

Are other dangerous moving parts, such as the flywheel, gears or shafts, also guarded?

Did you know?

The most common metal guillotine injuries are crushed or amputated fingers.

Most of these accidents are not caused by the blade of the guillotine, but by the clamps that hold the sheet of metal being cut.

Other injuries are from fingers jamming under the sheet of metal being cut, and strain injuries while handling large and awkward sheets of metal.

By law, guillotines must be guarded, operators must be trained and safe work procedures must be developed to prevent injuries.

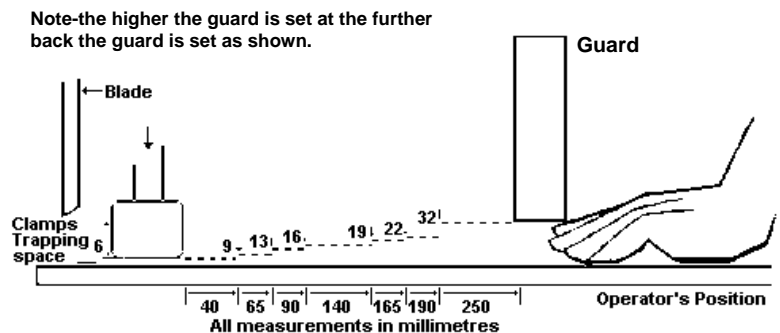
2. Safe work procedures

Safe work procedures should be developed in consultation with workers and health and safety representatives and reviewed regularly to make sure they remain effective.

It is an unsafe practice for two people to work at a guillotine unless both operators are provided with interlocked actuating devices (usually a foot control).

Does your workplace have written safe work procedures to describe the safe way of using the guillotine that ensure:

- guards or safety devices are NEVER removed or adjusted, except by an authorised person?
- the machine is always locked out and tagged if a guard or safety device is removed for inspection or maintenance work?
- the correct safety steps are known by all operators for starting and stopping the machine, especially in an emergency?
- all safety devices are checked before the machine is operated?



3. Other safety requirements

Is the guillotine in your workplace set up to reduce the risk of injury, with the following safety essentials provided?

- lighting of the trapping space must provide at least 400 lux, positioned to avoid direct glare or unwanted reflections in shiny surfaces, in accordance with Australian Standard 1680 Code of practice for interior lighting and the visual environment;
- emergency stop control must be within easy reach of the operator;
- shrouded foot pedal designed to minimise the risk of unintended operation;
- power indicator that gives visible evidence that the power is switched on;
- offcuts should slide down a skid plate onto a trolley so that operators don't need to reach in behind the blade; and

- design of the machine should minimise awkward postures, so the operator's work table and the machine bed are about waist high, and the controls are within easy reach.

Is there anything about the type of work you do that may cause injury?

- handling sheets of metal - are work materials laid out to minimise twisting, bending, stretching, reaching or carrying? Use a fork lift or pallet lifter to position sheets of metal at waist height next to the guillotine;
- cutting small objects - are guillotines used for cutting objects too small to be handled safely? A prominent notice warning against this should be fixed to the machine and clear instructions provided; and
- gloves - are gloves provided and worn for jobs that involve handling metal with sharp edges?

4. Instruction and training

Have all guillotine operators in your workplace been given appropriate training that includes:

- the purpose of guarding and safety devices, and how to check they are working correctly?
- hazards that occur during normal use of a guillotine, such as fingers getting crushed under sheet metal being fed into a guillotine?
- hazardous practices, such as riding the foot pedal?
- faults that may develop in a guillotine? For instance, faults in the clutch, brake and guard mechanisms may show symptoms that the operator needs to understand.
- the importance of immediately telling the person in charge when any fault or operating problem arises?
- NEVER attempting to personally correct any fault in the function of a guillotine?

5. Supervision

Are all trainee guillotine operators closely supervised by someone with a thorough knowledge of the mechanics and safety of the machine until they are fully trained in its use?

Is on-going supervision provided, to ensure safe work practices are being followed and the machines are working safely and efficiently?

Does supervision include:

- regular checks of the guillotine operator's knowledge and understanding of the mechanics and safe work procedures?
- regular checks to ensure all guillotines are mechanically sound and safe, and that safe procedures are being followed?
- talking to workers about the safety of their work and the machines they operate?

6. Maintenance

Is the guillotine in your workplace adequately maintained? Is there:

- an inspection and maintenance program aimed at keeping the guillotine and guards in a safe condition?
- a trained maintenance person, thoroughly familiar with the recommendations of the guillotine manufacturer, particularly those applying to guards, clutch and brake adjustment?
- a procedure to replace worn parts before they fail or cause an accident?
- a program of regular inspections, where details of inspections and maintenance are recorded for future reference?

Welding safety

Welding techniques number over 80 different processes. Shielded Metal Arc Welding being by far the most common, followed by Gas Metal Arc, Gas Tungsten Arc and Oxy - fuel welding. More than 50 percent of all welding jobs are performed using Shielded Metal Arc Welding.

Welding hazards include electric shock, burns, fire and explosions, radiation, heat, fumes & gases, noise and numerous other physical hazards. Exposure to any of all of these can be minimised by using an effective combination of control measures.

Training

Welders should be suitably trained and experienced for the work to be performed to minimise risks and hazards.

When choosing someone to do welding work make sure the person has the necessary level of competence to do the work safely.

Consider:

- the person's qualifications or statement of attainment;
 - if the person holds a certificate issued by the Welding Technology Institute;
- if the person can demonstrate recent experience and complete a weld test.

Personal protective equipment and clothing

Welders should consider using appropriate protective clothing which should include: a shield or helmet with a filtered lens; fire resistant gloves; a leather apron; boots; leather spats; a felt skull-cap or beret and preferably overalls.

All protective clothing and equipment should be kept clean and in working order to ensure its longevity and protection.

Dangers

The dangers associated with welding include:

- **The arc** - the temperature can reach 6000 degrees celsius. The intense ultraviolet and infra-red rays can be harmful to both the welder and anyone else nearby. It is not unusual for welders who are not wearing overalls to suffer symptoms similar to extreme sunburn.
- **The fumes** - depending on the item being welded, in the open air, fumes may be adequately dissipated. However, in confined spaces fumes may be hazardous to health and precautions should be taken. Where it is not possible to ensure good ventilation, a suitable respirator should be worn.
- **The volatile combination of heat and gas** - fatalities have resulted where drums and other containers have exploded as a result of some welding or cutting work. The nature of the previous contents should be established to ensure that any heating does not liberate toxic fumes or cause an explosion.
- **The finished work will be very hot.**
- **The electrical circuit** - the electrical circuit is perhaps the greatest hazard to the welder. The risk of electrical shock is high and welders should note the following points:
 - Never attempt to connect or change welding cables before switching off the power at the mains first.
 - Always install the welding machine as near as possible to the power point.
 - Always keep the welding machine terminals and cable connections clean and tight - only use welding cables that are fully insulated throughout their entire length.
 - Work on a well insulated floor wherever possible.
 - Wear rubber insulated shoes.
 - Always wear dry gloves when handling equipment that is live, eg. when placing an electrode in a holder.
 - Always get a qualified electrician to do any electrical repairs.
 - Do not attempt to use gas pipes or water pipes as part of the welding circuit as explosions or shocks to other workmates may result.

Gas welding

- Gas leakage is one of the greatest risks involved with gas welding. Leaking fuel gas is usually recognised by odour. Oxygen leaks are potentially more dangerous as they are usually not recognised easily.
- Leaking oxygen leads to an oxygen enriched atmosphere where normal events such as naked flames, cigarettes, sparks and electrical faults become more dangerous situations. Oils and greases may spontaneously ignite in the presence of pure oxygen.
- Under no circumstances should any fittings of oxy-acetylene equipment be allowed to be contaminated with grease or oil.
- Regulators can fail in two ways - by the controlled forward flow of gas which is known as regulator creep or by the reverse flow of another gas in the gas lines. Regular maintenance should avoid these situations.
- Either of these failures can be recognised by a higher than expected reading on the operational or low pressure gauge. The gauge needle creeps beyond the pressure set for actual welding or cutting.
- Excess pressure or the presence of a different gas in a regulator can cause fire and explosion in varying degrees of severity, resulting in damaged equipment and operator injury.
- Operators should never use equipment fitted with a regulator in which a creep condition is known to exist.
- Use the correct colour and type of hoses and fittings recommended by the manufacturers. Copper must never be used on acetylene lines as substances which may spontaneously detonate are formed.
- Flashback arresters should be fitted to all oxy-acetylene equipment to overcome the danger of flashback.
- Oxy-acetylene equipment should not be left near hot equipment or metals which could burn the leads. Gas leaks can be tested by using soap and water.
- Proper attention to maintenance of equipment is necessary to prevent accidents.
- Don't smoke when welding or near welding and don't keep your lighter in your pocket - it could explode. Simple prevention may save your life.

Source: Workplace Health and Safety Queensland Welding webpage

Further reading

In Western Australia the Welding Technology Institute of Australia Technical Note on Health and Safety in Welding has been adopted as a code of practice. It provides practical advice on managing the risks associated with welding.

Other information

- Guidance note: Gas welding safety flash back arresters
- Guidance note: Soldering in the workplace: Rosin Fluxes
- Guidance Note Metal welding safety- WorkSafe Victoria. This document is available from: www.worksafe.vic.gov.au

Safe movement of vehicles at workplaces

Vehicles and mobile plant moving in and around workplaces cause far too many occupational injuries and deaths in WA.

Reversing, loading, unloading and pedestrian movements are the activities most frequently linked to accidents.

To avoid incidents, traffic and pedestrian movement needs to be designed, planned and controlled.

Here are some tips for safe movement of vehicles:

- Design traffic routes so they are wide enough for the largest vehicle using them. They should be one-way (if possible) and have clearly signed traffic instructions.
- Separate pedestrian footpaths or walkways from traffic or make traffic routes wide enough for both vehicles and pedestrians. Use pedestrian barriers to prevent people walking in front of vehicles.
- Situate loading bays where vehicles can be manoeuvred easily and protected from adverse weather conditions. Raised loading platforms should be fitted with rails and raised wheel stop edges on the non-loading sides, to prevent people, forklifts or trolleys rolling over the edge.
- Mark reversing areas so drivers and pedestrians can see them easily. To reduce reversing accidents, place fixed mirrors at blind corners.
- Ensure that people directing traffic wear high-visibility clothing and that their signals can be seen clearly.

What can be done to stop such occurrences from happening?

- Make areas safe for pedestrians using exclusion zones, speed limiting, and traffic management systems.
- Make work areas safe for the use of forklift trucks – fit raised edges on loading docks, install warning signs or barricades, impose speed limits, provide adequate lighting and, if necessary fit secure ramps to access work areas.
- Make sure all forklift operators hold a licence to operate the forklift.
- Conduct training with all operators on forklift truck operation and maintenance before operating the forklift.
- Before starting each shift, conduct a thorough inspection of the forklift truck and attachments such as lift and tilt systems, steering, brakes, controls, tyres, warning devices, load arms, brake fluid, hydraulic oil, etc.
- Have safety procedures for fuel handling and storage, and battery changing and charging.
- Have a method for determining the weight being handled.
- Make sure load is safe and secure on the tynes before moving.

Is your licence to operate a forklift or a hoist current?

The National Standard for Licensing Persons Performing High Risk Work (the National Licensing Standard) requires operators of forklifts, cranes and hoists to hold a national licence.

Operators of a gantry crane or hoists may require a current High Risk Work licence for a dogman if judgment is required in lifting a load.

Is your training current?

If you or a member of your staff have a forklift qualification issued prior to 31 December 1998 you will need to obtain a National licence to perform high risk work. Listed below are the dates when certificates are required to have been converted to an high risk work licence.

Date of issue of the O.H.S. Certification Australia card and Western Australian 'State' Certificate of Competency	Date that certificate must be converted (commencement date being 1 October 2007)
Between 1 January 1999 – 31 December 2001	Please call WorkSafe on 1300 424 091
Between 1 January 2002 - 31 December 2004	Please call WorkSafe on 1300 424 091
Between 1 January 2005 - 30 September 2007	30 June 2012

How are workers getting hurt by forklifts

The major safety issues using forklifts are:

- co-workers/pedestrians being hit by moving forklifts or moving parts of a forklift;
- co-workers/pedestrians being trapped or caught between a moving forklift/moving parts of a forklift and stationary object;
- operators suffering muscular stress due to a combination of inappropriate seating, vibration and manual tasks;
- operators falling while getting into or out of forklifts;
- collisions between forklifts and other vehicles or stationary objects;
- forklift operators and others being hit by falling objects.

In addition, evidence suggests the following also cause injuries are caused by:

- the operator's body protruding from the cab and hitting an object; and
- forklifts tipping over.

Regular updates on OSH

WorkSafe has introduced a service that provides information on occupational safety and health direct to your email. By subscribing to these bulletins you can receive information that is specific to your areas of interest.

Would you like to subscribe to receive this service? Go to www.worksafe.wa.gov.au →services→mailing lists

Do not work on makeshift work platforms



Effects of noise at the workplace

Noise at the workplace is the major cause of noise-induced hearing loss in Western Australia. Noise can also create stress, and can be a safety hazard at work, interfering with communication, acting as a distraction and making warnings harder to hear. Reducing noise levels at the source provides the most effective way of protecting workers' hearing as well as providing numerous other benefits to workplaces.

Reducing the noise at source

The most effective and acceptable way to reduce noise in the workplace is to change the noise source (such as a machine) so that it makes less noise. This may mean using a quieter process instead of a noisy one (such as pressing rather than hammering), reducing the amount of metal to metal impact, treating radiating panels or using vibration isolation mountings. Regular maintenance is also important.

Some processes, such as metal and stone cutting and grinding produce very high noise levels. Noise reduced saw blades and clamping the work piece can help reduce noise levels but hearing protectors may still be needed.

If the noise cannot be sufficiently reduced at source then try to stop it from reaching people. This may be done by moving the item further away, by enclosing it or partitioning it off from quieter areas, by using sound-absorbing materials to reduce the build-up of noise or by using silencers.

What is the exposure standard for noise in WA?

In WA legislation sets a workplace exposure standard equivalent to 85 dB(A) averaged over eight hours, or a peak noise level of 140 dB(C). Where these values are exceeded, all practical measures should be taken to reduce the noise level by engineering noise control. Failing this, ways should be explored to reduce the exposure time by half for every 3 dB the level is above the exposure standard.

Using personal hearing protectors

When all practical control measures have been taken, but the reduced noise is still above the exposure standard, personal hearing protectors must be supplied and worn all the time the noise is excessive. They must also be supplied while control measures are being planned and implemented.

It is important that they should be chosen for their noise reduction characteristics, comfort and suitability for the job.

Remember: Uncomfortable equipment will not be worn.

Hazardous substances in MANUFACTURING

Lost time at work, illness and sometimes death are all outcomes of failing to store, use or dispose of hazardous substances properly.

Hazardous substances are any chemicals or other materials that may put people at risk. Some substances may cause allergic reactions and other medical conditions of varying severity. Other substances may be corrosive, harmful or toxic. In powder coating these substances include chromic acid; and also powder coatings that contain TGIC (for further information on TGIC refer to page 10) and hydrofluoric acid; (for further information refer to page 11)

Employers must identify any hazardous substances being used in their workplace and should question whether their use is essential. For example replace spotting agents containing hydrogen fluoride with a safer one.

Material Safety Data Sheets (MSDS) must be provided for each hazardous substance, identifying the ingredients, and giving health information and precautions for safe use and handling. Continual vigilance is essential.

During their inspection, inspectors will be looking for many of the common problems affecting the handling of hazardous substances that WorkSafe has found in workplaces.

The elements of the checklist do not cover all mandatory requirements under workplace safety and health laws. However, following the checklist will assist you to identify any shortcomings in your procedures or training and to correct or update them, thus helping you meet your safety and health responsibilities.

How do I know if a substance is hazardous?

The material safety data sheet (MSDS) should contain an upfront statement like:

- this product is hazardous according to the criteria of the National Occupational Health and Safety Commission (NOHSC)
- this product is not hazardous according to the criteria of the National Occupational Health and Safety Commission (NOHSC)).

Words, such as "WARNING", "POISON" or "HAZARDOUS", on the label or information in the health hazards section of the MSDS that the substance is "toxic", "corrosive", "a sensitizer", "a carcinogen", "a teratogen" or "a mutagen" usually indicates that it is hazardous.

If you are not sure whether you have a hazardous substance or not then contact your supplier or the manufacturer/importer and ask for the current MSDS. MSDS are updated regularly and must be less than 5 years old.

POWDER Coating

TGIC Information

10

General information

TGIC is used as a cross-linking agent in powder coatings in the metal finishing industry. TGIC is classified as a hazardous substance and is:

- a skin sensitiser;
- toxic by ingestion and inhalation;
- genotoxic; and
- capable of causing serious eye damage.

Powder coatings containing TGIC are applied by electrostatic spraying.

People at risk-Workers who perform the following tasks come into direct contact with TGIC powder coatings:

- filling hoppers;
- manually spraying powder coatings, including 'touch-up' spraying;
- reclaiming powder;
- emptying or cleaning industrial vacuum cleaners;
- cleaning spray booths, filters and other equipment; and
- cleaning up major spills of powder coating.

Controlling exposure-Exposure to TGIC can be controlled by a combination of:

- engineering controls;
- safe work practices; and
- personal protective equipment.

Further information on controlling exposure on page 2

Health surveillance-Health surveillance is required to be provided by the person in control of a workplace where:

- a workplace risk assessment identifies a person as being or likely to have been exposed to TGIC; and
- the exposure places the person's health at risk.

Regulation 5.23 requires that the person in control of the workplace appoint a medical practitioner to supervise the health surveillance.

Engineering controls

The most effective engineering controls for reducing worker exposure are enclosure, local exhaust ventilation and automation of the spray process. In particular:

- spray painting of TGIC powder coatings must be performed in a booth (see Australian Standard AS 3754-1990 Safe application of powder coatings by electrostatic spraying) where practical;
- local exhaust ventilation must be used when spraying, during filling of hoppers, when reclaiming powder and during clean-up;
- automatic spray guns, feed lines and feed equipment should be used;
- spray gun air pressure must be minimised to prevent overspray as this could result in unnecessary powder build-up within the spray booth;
- the power supply and powder coating feedlines must be interlocked with the air extraction system so that if a fault develops in the ventilation system, the powder coating and power supplies are cut off;
- the spread of dust within the powder coating building must be minimised.

Circumstances leading to draughts and air turbulence should be evaluated and controls implemented;

- opening powder coating packages, loading of hoppers and reclaiming powder are operations which must be contained to prevent or minimise the generation of dusts;
- the layout of the work station and the size of the hopper opening must be such that generation of dust is minimised in filling the hopper; and
- the following should be considered regarding the use of hoppers:
 - preference should be given to spray systems where the container in which the TGIC is supplied can be used as the hopper, thereby avoiding the need to transfer powder;
 - large hoppers should be used to avoid frequent refilling of smaller units; and
 - powder coatings supplied in drums, which allow mechanical transfer of the powder to hoppers, are preferred to manual transfer.

Safe work practices

Safe work practices are necessary to supplement the engineering control measures in order to minimise worker exposure.

Safe work practices must, where practicable, include:

- work practices designed to avoid the generation of dust;
- restricting access to spray painting areas;
- designing a safe workplace so that the spray painter is never between the object to be sprayed and the airflow of contaminated air;
- situating the articles to be sprayed sufficiently within the booth to avoid rebound;
- implementing good personal hygiene practices, for example, powder coating dust should not be allowed to collect on the face, exposed body areas should be thoroughly washed and overalls should be regularly cleaned;
- storing powder coating and waste powder in a designated area with restricted access;
- cleaning booths and surrounding areas on a regular basis;
- promptly cleaning-up spills of powder coatings to reduce the spread of TGIC;
- using a vacuum cleaner with a HEPA filter for clean-up operations and not using compressed-air or dry sweeping;
- using a spark-proof squeegee when a wet clean-up is required;
- emptying vacuum cleaners in the booth and under exhaust ventilation;
- taking care to avoid the generation of dust during disposal of waste powder;
- waste powder being baked in the original box for disposal to landfill as a solid;
- vacuuming as primary decontamination of work clothing;
- checking regularly the cleaning and maintenance of plant and equipment, including ventilation and spray equipment and filters; and
- proper induction training and general training of workers about the potential hazards of spraying with TGIC powder coatings and in the safe work practices necessary to minimise exposure.

Hydrofluoric acid

Hydrofluoric acid is very hazardous and the full extent of injuries may not be obvious for some hours. **Urgent first aid is very important**, even for minor exposure.

How can you be exposed

How can you be exposed		
skin	<p>Health Hazard</p> <p>Highly corrosive and toxic by skin contact. The acid is rapidly absorbed through the skin with toxic and potentially fatal effects. Skin contact produces deep and extremely painful burns, with destruction of underlying tissue.</p> <p>Absorption can decalcify bones and cause systemic toxic effects due to calcium and magnesium imbalance, because the HF binds to calcium and magnesium in the body. This can cause heart or other organ damage or failure.</p> <p>It has been estimated that skin exposure to concentrated HF over 2% of body area (about the size of a hand) can be fatal. Recovery from serious non-fatal burns may take a long time.</p> <p>Burns from strong solutions are felt immediately but weaker solutions spilled on the skin may not cause pain for several hours. Workers may have finished work and returned home before feeling pain and realising something is wrong.</p> <p>Fingernails not properly scrubbed can cause acid to be retained under the nails causing burns, absorption into the body and possible nail loss.</p>	<p>First Aid</p> <p>Wash Prompt decontamination is essential. Flush with running water to wash off all acid, for up to five minutes (preferably using a shower, otherwise a tap or hose.) Remove contaminated clothing, shoes, watch, rings etc as quickly as possible while still under the running water. Make sure that the acid does not spread to other parts of the body or onto the rescuers. Scrub under nails if contaminated.</p> <p>Calcium gluconate gel Wearing gloves, apply calcium gluconate gel to the burns as soon as possible after drenching. Gently rub the gel into the contaminated areas and continue to apply fresh gel for at least 15 minutes after the pain has stopped.</p> <p>Caution Prevent further contamination of injured person or rescuer. Rescuer protective equipment is essential during decontamination and early management. The injured person may need gloves to prevent hand contamination while showering and applying gel.</p> <p>Note: Even dilute solutions of hydrofluoric acid will rapidly penetrate the skin, destroying the soft tissue and bone underneath. Use of calcium gluconate gel helps to counteract this.</p> <p>Seek urgent medical attention.</p>
eyes	<p>Hydrofluoric acid fumes can dry out the eyes and cause a burning sensation, redness and secretions. Splashing into the eyes may cause severe and irreversible damage to the cornea, including possible blindness. Splashing into the eyes with dilute HF may cause delayed burns.</p>	<p>Immediately flush with water. Remove contact lenses if possible without causing further trauma. If only one eye is affected, make sure that contaminated water does not run into the other eye. Continue flushing with water or irrigate with normal (isotonic) saline during transport.</p> <p>Get to hospital as soon as possible. Continue flushing the eye with water or normal saline while travelling.</p> <p>Calcium gluconate gel supplied for skin burns is not suitable for use in eyes, however sterile 1% calcium gluconate solution may be used in eyes under medical supervision.</p> <p>Seek urgent medical attention. Consult an ophthalmologist (eye specialist)</p>

Chromic acid

Breathing an aerosol of chromic acid can cause cancer and this route of exposure has created most concern. But the nature of chromic acid (damaging DNA) suggests cancer can be caused through any form of contact. In addition, it is: toxic (poisoning) through skin contact and by ingestion; causes severe burns; and can cause allergic contact dermatitis and asthma.

You must, therefore, establish safe working practices to minimize any risk of contact.

All areas where exposure may occur need to be tackled – from storage through to disposal.

Important factors to consider are:

- Safe storage
- Personal hygiene standards
- Personal protective equipment
- Safe handling and use
- Emergency procedures for spills
- Health surveillance

Source: HSE-Prevention and control of exposure to Chromic Acid

Inorganic chromium (Chromium 6)

Inorganic chromium is a known carcinogen which can cause serious health effects (for more information see Chromic Acid above)

Pre-treatment solutions in the powder coating industry can contain inorganic chromium in the form of Chromic acid.

To identify if the solution you are using contains inorganic chromium check the Material Safety Data Sheets (MSDS) or contact the supplier.

Health surveillance

What does it mean to the employer?

The employer should permit the appointed medical practitioner to have access to the workplace assessment conducted for the *National Model Regulations for the Control of Workplace Hazardous Substances* [NOHSC:1005(1994)]. This should provide useful information on all workplace exposure factors.

Results of the health surveillance must be communicated to the worker and to the employer as soon as practical so that investigations and, where appropriate, remedial action can be taken.

Workers who have been removed from work with hazardous substances should continue to be provided with information concerning the results of workplace assessment and their health status. Employers should review their training programs.

Confidentiality and consent

Those providing health surveillance must maintain the confidentiality of the medical records of all employees past and present.

Consent for health surveillance should be sought from a worker before health surveillance commences. Consent should be separate from consent given for any other medical treatment.

Workers should participate in the health surveillance program unless there is some compelling reason to the contrary. In this case, the matter should be discussed with the appointed medical practitioner responsible for health surveillance.

The written consent of the worker has to be obtained before the results can be released to a third party not covered by professional confidentiality.

Health surveillance and inorganic chromium

Where there is a risk to health people working with inorganic chromium under the OSH regulations must be part of a health surveillance program. Health surveillance for inorganic Chromium requires:

- Demography, occupational and medical history and health advice.
- Physical examination with emphasis on the respiratory system and skin.
- Weekly skin inspection of hands and forearms by a responsible person

Electrical safety

Electrostatic spray painting brings with it electrical hazards and additional requirements for safe work practices are required. For example, all equipment, including spray guns and booths should be earthed. All hooks used to suspend objects to be sprayed should be cleaned prior to re-use in order to maintain effective metal contact.

Earthing of equipment, objects being coated and personnel ensures maximum coating efficiency, reduces free dust and prevents build-up of static charges capable of causing ignition.

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ThinkSafe Small Business Assistance Program

If you are a small business owner or manager (employing less than 20 full-time employees) and want to make your workplace safe, the ThinkSafe Small Business Assistance Program can help you. The ThinkSafe Small business Assistance Program offers an occupational safety and health audit of your business which is:

- free (up to three hours assistance);
- easy to obtain;
- provided by an independent and qualified OSH consultant; and
- is a simple process with clear and immediate outcomes.



To apply download and complete the online form from www.worksafe.wa.gov.au or telephone 1800 429 273

Electricity safety checklist			
check	yes	no	n/a
<p>Electrical installations</p> <p>Electrical installations are installed, constructed, maintained, protected (cover on switchboard) and tested to minimise the risk of electric shock or fire</p> <p>Evidence of maintenance and testing is in available</p> <p>Components on switchboard are clearly marked</p> <p>Switchboards are kept free from obstructions</p>			
<p>Residual Current Devices (RCDs)</p> <p>Hand held or portable equipment is protected by RCDs installed at the switchboard or into a fixed socket</p> <p>Switchboards or fixed sockets have signage to indicate they are RCD protected</p> <p>An RCD maintenance program is in place</p>			
<p>Flexible cords, plugs, sockets and extension leads</p> <p>Flexible cords and extension cords are used in a safe manner</p> <p>Plugs, sockets and extension leads are in good condition and protected from damage</p>			
<p>The work is organised for the safety of workers and others in the workplace</p> <p>Work in the vicinity of power lines and plant must be controlled</p>			

Hazardous substances safety checklist			
Check	yes	no	n/a
<p>Register of hazardous substances</p> <p>A register of hazardous substances is available and accessible for workers likely to be exposed to hazardous substances at the workplace</p> <p>The register of hazardous substances is complete – the register includes a contents list and current Material Safety Data Sheets (MSDS)</p> <p>The register of hazardous substances is current – MSDS are not older than 5 years</p>			
<p>Labelling</p> <p>Hazardous substances are properly labelled – eg. containers are labelled with manufacturers labels that are complete and legible</p> <p>Chemicals decanted into other containers are labelled with name, risk and safety phrases</p> <p>Empty food or beverage bottles are not used to store chemicals</p>			
<p>Risk assessment and control</p> <p>Risk assessments have been completed for all hazardous substances. – <i>when conducting a risk assessment, consider how the substances is used, where it is stored, is ventilation required, are directions in the MSDS followed, what personal protective equipment is required.</i></p> <p>A record is made in the hazardous substances register that the assessment has been done</p> <p>A risk assessment report is available where the risk is significant</p> <p>Practical control measures have been implemented and maintained taking into account the hierarchy of control</p>			
<p>Information, instruction and training</p> <p>Workers who may be exposed or work with hazardous substances have been provided with adequate information, instruction and training</p> <p>A record of the training is kept and includes health effects, controls, safe work methods, personal protective equipment and where applicable health surveillance</p>			



Manual tasks-lifting safety checklist			
check	yes	no	n/a
In consultation with workers, all hazards in relation to manual tasks have been identified			
Risk assessment has been conducted for all hazards related to manual tasks have been taken into account and include: <ul style="list-style-type: none"> • postures • repetitive movements • forces • duration and frequency of tasks • environmental conditions 			
Practical control measures have been implemented and maintained to eliminate or reduce risk associated with manual tasks after consulting workers: <ul style="list-style-type: none"> • altering the workplace environment, design, layout or systems of work • change the systems of work used • modify the load being handled or change the objects used to do the task • use mechanical aids 			
Everyone exposed to manual task hazards have been provided with adequate instruction and training (induction and ongoing training)			
Suitable mechanical aids are provided where necessary eg. suitable trolleys, pallet jacks, forklifts and other (lifting) equipment			
Trolleys and other mechanical aids are suitable for the job and are well maintained			

Mobile plant safety checklist			
check	yes	no	n/a
Mobile plant is maintained to minimise risks and maintenance records are kept			
Pre-start checks are recorded and log book are kept			
Evidence of training in the operation of mobile plant is available on site The operator has appropriate high risk work licence were required (eg. forklift, EWP)			
The plant is in a safe condition, eg. plant is registered with WorkSafe if required to do so, access to cab, seat and seat-belt, fall over or roll over protection systems as required, load chart, operator's manual, controls labelled, guarding of dangerous parts is in place			
Work is organised for the safety of workers and others. Pedestrian control, traffic management 2-way communication as required, and high-visibility clothing as required			
Site hazards are identified, assessed and controlled (ramps, slopes, rough ground, power lines, excavations, ground load limits, underground services)			

New and young workers safety checklist			
check	yes	no	n/a
Induction, information, instruction & training emergency/evacuation procedures			
Induction, information, instruction & training in hazard and accident reporting			
Induction, information, instruction & training in how to reduce the risk of injury or harm for hazards new/young workers may be exposed to in the course of their work			
Induction, information, instruction & training in use, maintenance & storage of PPE			
Supervision: ensure that new & young workers are working in accordance with safety instructions including instructions re. skylarking, initiation ceremonies, bullying			
Employers ensure the risk of injury or harm to (young) visitors is reduced by means appropriate for the workplace and the type of work activity			

Working from heights safety checklist

check	yes	no	n/a
Hazard identification and risk assessment of falls has been conducted Practical control measures have been implemented and maintained to eliminate or reduce the risk associated with work at heights (would a fall be arrested before the person hits the ground or a structure ?)			
Edge protection is required if could fall more than 2 metres from scaffold, fixed stairs, landing, suspended slab, formwork, or false work In any other case greater than 3 metres: fall injury prevention systems (eg. catch platform, scaffold, safety nets, safety mesh, or fall-arrest system) or edge protection are provided			
There is safe means of access and egress to the work being performed at heights Stairs, walkways, ladders, mechanical lifts etc are free of obstructions			
People required to work at height have been provided with adequate information, instruction and training for the work being performed			

Slips trips and falls safety checklist

check	yes	no	n/a
Floor or any stair or ramp has an unbroken and slip resistant surface			
Floor or any stair or ramp is free from any obstruction that may cause a person to fall (eg. electrical leads, hoses, tools and floor mounted power boxes in walkways, etc.)			
Access to egress from workplace safe and kept free from obstructions at all times			
Safe systems of work (eg. clean as you go) are in place to ensure that the floor is free from fall hazards or obstructions			
Warning signs available and erected near spills			
Guard rails or other safeguards are provided on ramps and stairs			
Appropriate protective equipment, such as slip resistant footwear, is required			
Ramps are available in areas where height of floor levels change and trolley access is required or items are carried regularly			

Hoses safety checklist

check	yes	no	n/a
There should be no damage that affects the structural integrity of the hose eg. Broken wires or kinking			
Bubbles or blisters in the outer covering that indicate leakage are reasons for discarding			
End fittings and crimping should be examined for cracks, damaged threads or other evidence for damage			

Pressure vessels safety checklist

check	yes	no	n/a
Pressure equipment categorized as hazard level A, B, C or D according to the criteria set out in AS 4343, but not pressure piping must be registered with WorkSafe			

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Machine guarding safety checklist

check	yes	no	n/a
Every dangerous part of fixed, mobile or hand held powered plant (for instance oat crushers, augers, mixers and horse walkers) is securely fenced or guarded, except where the plant is so positioned or constructed that it is as safe as it would be if fenced or guarded			
Adequate safe work procedures are provided and documented to set, test and use machinery during all cycles of production and maintenance: <ul style="list-style-type: none"> Pre-operational checks Presence sensing system: safe system of work documented and a clearly identified warning provided when guard is muted Presence sensing system: inspection and maintenance records are maintained Employer has provided appropriate isolation and lock-out procedures for maintenance Where setting, testing and start-up of machinery is required with the final means of safeguarding removed, interim safeguards have been provided Where fixed physical guards are provided, adequate provision is made for cleaning, maintenance, adjustment and repair Where it is not practical to guard machinery a safe system of work is in place for people operating or passing in close proximity			
Operators and maintenance personnel are properly trained, familiar with the operation and set up of the machinery and able to demonstrate the safety features			
Emergency stop buttons are appropriately fitted (accessible and available)			
Manufacturer's decals, manuals and operator instructions readily available and in the English language			
The highest level of guarding that is practical is provided and left in place during operation			

Other issues safety checklist

check	yes	no	n/a
Notifiable accidents reported to WorkSafe			
LTI/LTD accidents and notified hazards investigated			
Employees have received induction and on the job training			
Passages/walkways kept free of obstructions			
Access and egress (emergency exits) kept free of obstructions			
Emergency egress enable safe egress in event of emergency / exit signs provided			
Portable fire extinguishers provided and maintained			
Evacuation procedures & diagram available and displayed and practised and training in the use of fire extinguishers provided			
Warning signs provided			
Cleanliness and removal of debris			
Surface and floors are unbroken and slip resistant to prevent slips and falls			
Seating provided and maintained			
Workplace facilities provided			
Portable ladders according to AS 1892.1 (metal) or AS 1892.2 (wooden)			
Gas cylinders secured			
Flash back arrestors are fitted (oxy-acetylene or oxy-LPG)			
PPE provided where necessary			
Instruction, information, maintenance, storage of PPE, sign			
Noise <ul style="list-style-type: none"> Noise assessment conducted Control measures in place / avoid noise above exposure standard Provision of personal hearing protection (PHP) Instruction fitting, use, selecting, testing, maintenance and storage PHP Training on noise Signage PPE according to AS 1319			
First Aid box or facilities available and first aid trained person available			
No smoking in enclosed workplaces			
Location of any asbestos on site identified and the risk assessed			