

PLANT AND EQUIPMENT

1.0 Plant

Plant includes:

- a. Machinery, equipment, appliance, pressure vessel, implement and tool;
- b. Personal protective equipment; and
- c. A component of plant and a fitting, connection, accessory or adjunct to plant.

2.0 Specified High Risk Plant

Specified high-risk plant means:

- **Air-conditioning unit** which provides air-conditioning and that either:
 - a. Incorporates a cooling tower; or
 - b. Consists of one or more compressors and the power rating required for operation of the air-conditioning unit is 50 kW or more.
- **Amusement device** which is:
 - a. Used for commercial purposes; and
 - b. Used or designed to be used for amusement, games, recreation, sightseeing or entertainment, and on which persons may be carried, raised, lowered or supported by any part of the device (including, for example, any car, carriage, platform, cage, boat, plank, chair, seat or thing) while the part of the device is in motion.
- **Cooling tower** used to lower the temperature of water by evaporative cooling in which atmospheric air passes through sprayed water exchanging heat, and includes a device incorporating a refrigerant or water heat exchanger
- **Escalator** using a power driven inclined continuous stairway to raise or lower passengers, or a moving walkway
- **LP gas cylinder** with a water capacity of more than 0.1 kg, that contains liquefied petroleum gas under pressure
- **Lift**
 - a. Having a platform or cage, the direction or movement of which is restricted by a guide or guides; and
 - b. Used or designed for use for raising or lowering persons, goods or materials (and includes any and all machinery, supports and enclosures) and all equipment of them (whether or not detachable) used or designed for use for operating a lift.

2.1 Owners of Specified High Risk Plant

Generally, specified high risk plant is plant that may impact on the health and safety of the general public.

The owner of any of the following specified high risk plant must not install, use or allow anyone else to install or use, the plant unless a certificate of registration of registrable plant design is in force –

- a. An escalator
- b. An LP gas cylinder
- c. A lift
- d. A specified amusement device

3.0 Obligation of Owners of Specified High Risk Plant

3.1 Risk Management

The owner of plant must conduct a risk assessment to ensure that plant is safe and without risk to health and safety. The owner of the plant should:

- a. Carefully observe the tasks being performed including short cuts and improvisations;
- b. Consider what occurs when things go wrong, not just when the procedures are correctly followed;
- c. Conduct a risk assessment following changed work methods; and
- d. Involve those who work with the plant. This provides valuable input and a training opportunity.

Risks to be assessed by owners of plant are identical to those faced by other obligation holders. Please refer to Part 5 of this code of practice for control of risks associated with:

- a. Design and construction;
- b. Positioning plant in the workplace;
- c. Operation;
- d. Damaged plant;
- e. Dismantled/stored plant;
- f. Plant with moving parts;
- g. Auditing;
- h. Inspection;
- i. Servicing;
- j. Maintenance;
- k. Repair;
- l. Modification;

- m. Cleaning;
- n. Disengaged/stored plant;
- o. Transporting plant;
- p. Lighting;
- q. Ventilation;
- r. Wear, corrosion and damage;
- s. Providing information;
- t. Safe work practices;
- u. Records; and
- v. Registration of registrable plant and registrable plant design.

4.0 Risk Associated with High Risk Plant

4.1 Electrical Safety

The common electrical hazards and causes of electrical injury can be broken into three broad categories:

1. Electric shock causing injury or death;
2. Arcing, explosion or fire causing burns; and
3. Toxic gases causing illness or death.

Relevant persons should undertake a risk assessment to ensure that all electrical plant is safe to carry out the work it is designed for.

Electrically powered plant should:

- a. Not be used where the conditions create a risk to health and safety of any person from electricity, for example, where excess moisture might cause a breakdown of insulation and increase the risk of electrocution; and
- b. Be isolated from the electricity supply when cleaning, maintenance or repair of the electrically powered plant is to be undertaken. If it is not possible to isolate the electricity supply, control measures should be implemented to prevent energising of the plant, for example, through the use of a permit-to-work system.

4.2 Damaged Plant

When plant has been damaged, the relevant person should withdraw it from service until any risks to health and safety have been assessed and controlled.

4.3 Operation

A relevant person should ensure plant is used only where it is capable of performing safely within the design criteria and manufacturer's instructions. Where commissioning is applicable, the results of commissioning should support this.

Plant should be used in accordance with the manufacturer's specifications, that is:

- a. Design conditions;
- b. Design pressure;
- c. Design load;
- d. Production rate;
- e. Control capabilities;
- f. Maintenance schedule; and
- g. Replacement period.

A relevant person should consider and address the risks that may result from such things as:

- a. Operator fatigue;
- b. The performance of routine (repetitive) tasks;
- c. Misuse of plant; and
- d. Local conditions and working procedures.

4.4 Powered Mobile Plant

Powered mobile plant is plant that is provided with some form of self propulsion which is under the control of an operator. Examples of powered mobile plant within the industry include:

- Forklifts (both driven and pedestrian operated)

Risks associated with powered mobile plant include overturning, hitting or being hit by moving or falling objects, ejection of operator, being run over. To control the risks, the relevant person should ensure a combination of operator protective devices are provided, maintained and used.

Tasks carried out must be within the capability of the plant. For example when operating forklifts, loads must be strictly within the load capacity of the forklift and must be carried as near to the ground as possible.

Plant should be used in a way that prevents or minimises risks to health and safety of the operator which may arise from systems of work and the environment in which it is used. For example, a forklift should be fitted with a flashing light that operates when ever the forklift is being operated. When working around powered mobile plant, persons may need to wear high visibility vests.

Workers assigned to operate plant should be competent to do so. Competency can be confirmed by:

- a. The worker's qualifications;
- b. Information from referees;
- c. The worker's past work experience; and
- d. By assessment of theoretical and practical knowledge.

4.5 Maintenance, servicing and cleaning

Plant should be maintained, serviced and cleaned according to the manufacturer's specifications or, in the absence of such specifications, in accordance with other proven and tested procedures.

Plant should be isolated before maintenance, service or cleaning commences. Where plant is isolated and plant shutdown will result, any total or partial shutdown should not allow a hazardous situation to be created.

Where plant cannot be isolated, alternate means of preventing accidental operation should be implemented. In these situations, work should be conducted under controlled procedures to allow for maintenance, service and cleaning, e.g. controlled access permit, such as a permit to work in maintenance areas should be used.

Where cleaning and maintenance of filtering equipment or dangerous contaminant producing plant is to be carried out, manufacturers' instructions or proven procedures should be carefully followed.

All forms of guarding should be replaced prior to start-up of plant.

4.6 Modification

Modifications to plant may result in the modifier assuming the obligations of a designer or manufacturer of plant. A new plant design registration certificate may also be required. Prior to undertaking modifications the modifier should consult with the designer and manufacturer to ensure all relevant safety issues have been considered. Where the original designer and manufacturer cannot be contacted (older plant) – the modifications should be designed and completed by a competent person.

5.0 Contributing Factors – Minimising Human Error

Human or worker error is not always the result of carelessness or negligence, but follows from normal human characteristics. The desire for extra speed, less work and making tasks easier are some of the leading reasons why guards are bypassed or removed. Also, people naturally become bored and distracted with repetitious work, which may cause loss of concentration. Factors contributing to human error include, but are not limited to:

- a. Forgetfulness;
- b. Vigilance;
- c. Workers' diligence to 'get the job done' or to 'find a better way';

- d. Capacity to understand information;
- e. Ergonomics;
- f. Psychological or cultural environment;
- g. Habit;
- h. Fatigue; and
- i. Level of training.

5.1 Human Error Factors

Human or worker error is not always the result of carelessness or negligence, but follows from normal human characteristics. The desire for extra speed, less work and making tasks easier, are some of the leading reasons why injuries occur. Also, people naturally become bored and distracted with repetitious work, which may cause loss of concentration. Designers, manufacturers and employers should be aware of these factors in designing plant and developing safe work practices.

Factors contributing to human error include, but are not limited to:

- a. **Forgetfulness** - After first observing a hazard, a person can soon forget about it, especially if they are distracted, and not take adequate measures to control any risks that might be associated with that hazard. Vital controls should be interlocked to ensure they can only be operated in the correct order or at appropriate times.
- b. **Vigilance** - Vigilance refers to a worker's ability to be alert to danger or problems during operation, and is a higher requirement than 'staying awake'. It implies active interaction with and awareness of the work environment.
- c. **Diligence** - Workers are often keen to perform well in their work and have a strong desire to meet targets or deadlines. This may become problematic where productivity incentives or bonuses are offered. This desire to get the job done may encourage workers to cut corners, or to work more quickly but less safely. Workers may also display initiative in 'trying to find a better way' without duly considering the safety issues involved.
- d. **Information handling capacity** - Vital information can be overlooked if it is presented too quickly, or if it comes together with other information (information overload). If a person has to monitor more than one 'channel' of information at any one time, they should have a clear order of priority.
- e. **Ergonomics** - Ergonomics is the study of human and machine interaction. Poor operator comfort (no attention to the location of stools, buttons etc) can contribute to losses of concentration and error.
- f. **Psychological or cultural environment** - A corporate culture of safety will reduce human error based on fear of failure (to meet timetables or deadlines or quality standards). Workers who are not affected by bullies or harassment will also be more attentive and productive.

- g. **Habit** - People can continue a habitual activity despite indications of danger. Clear labelling of controls and clear, simple warning notices can help. People also get used to a particular arrangement of controls. Use standardised controls as much as possible, and ensure that location of the controls is appropriate. The action used to operate a control should also be compatible with the effect on the plant, for example, switching a control towards the left moves material into the plant in the same direction. This element deserves particular attention when considering the purchase of replacement plant: especially if the new controls are reversed or located differently.
- h. **Fatigue** - Long hours of work or long periods without adequate breaks can lead to loss of concentration, slow reflexes and increased risk of error. Excessive heat, poor ventilation, lighting and shift work also contribute to fatigue and should be taken into account when looking at plant.
- i. **Training** - It should not be assumed that people already know or can informally learn about plant safety. Training must be provided to workers on any required personal protective equipment, newly introduced equipment or modifications to existing plant. All persons who supervise, manage or operate plant should receive appropriate training and instruction for health and safety. Training should include safe operating procedures, and any precautions that may be needed to control the hazards of the plant they operate.

6.0 Guarding

A guard is a device designed to provide a physical or other barrier which prevents or controls access to dangerous areas of plant. **Personal protective equipment is not considered to be a guarding control measure.** Unguarded plant and equipment may present a serious hazard to workplace health and safety for workers and others in the workplace.

Guards should:

- a. Be designed to eliminate or reduce the risk;
- b. Be designed to prevent by-passing or disabling;
- c. Ensure operator visibility is not obstructed during operation;
- d. Cause minimum obstruction to the view of the process;
- e. Restrict access during normal operation yet allow for servicing, maintenance, installation and repair of moving parts to be undertaken with relative ease;
- f. Be regularly maintained; and
- g. Not introduce any other risks.