

Australian Standard™

Wood-processing machinery—Safety

Part 1: Primary timber milling machinery



This Australian Standard was prepared by Committee SF/7, Guarding of Woodworking Machinery. It was approved on behalf of the Council of Standards Australia on 15 September 2000 and published on 20 October 2000.

The following interests are represented on Committee SF/7:

- Australian Chamber of Commerce and Industry
- Australian Industry Group
- Australian Woodworking Industries Suppliers Group
- Construction, Forestry, Mining and Energy Union
- Department for Administrative and Information Services
- Department of Infrastructure, Energy and Resources (Tasmania)
- Department of Training and Industrial Relations, Qld
- Furnishing Industry Association of Australia
- Tasmanian Forest Industries Training Board
- Victorian Association of Forest Industries
- Victorian WorkCover Authority
- WorkCover New South Wales
- WorkSafe Western Australia

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Australian Standard™

Wood-processing machinery—Safety

Part 1: Primary timber milling machinery

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PREFACE

This Standard was prepared by the Standards Australia Committee SF/7, Guarding of Woodworking Machinery, to supersede, in part, AS 1473—1991, *Guarding and safe use of woodworking machinery*.

During its work, the Committee considered the draft *Code of Practice, for Sawmilling*, prepared by WorkCover New South Wales as well as a number of draft European Standards issued by the British Standards Institution.

There are difficulties involved in safeguarding machines used in the primary milling of logs. These difficulties include the fact that, because the logs vary in size and cross-section, the use of close-fitting guards around the machine is often near impossible. The result is that the safety of operators working with the machines, particularly the older machines, depends largely upon the skill and experience of these persons.

Interlocked perimeter fencing is often used to prevent access to the danger zone of modern machinery. The use of mechanical and fluid power systems for handling logs has reduced the need for persons to work in close proximity to the log and saw blades, however the fact remains that timber milling machinery is still dangerous.

The term ‘normative’ has been used in this Standard to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of a Standard.

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STANDARDS AUSTRALIA

Australian Standard

Wood-processing machinery—Safety

Part 1: Primary timber milling machinery

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the design, manufacture, guarding and use of milling equipment used for the primary milling of saw logs into green sawn timber products.

1.2 OBJECTIVE

The objective of this Standard is to provide designers, manufacturers, suppliers and users of timber milling machinery with the means of minimizing the risks to the health and safety of persons working with or otherwise near, woodworking machinery.

1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS	
1470	Health and safety at work —Principles and practices
1543	Electrical equipment of industrial machines
1657	Fixed platforms, walkways, stairways and ladders —Design, construction and installation
1755	Conveyors —Safety requirements
4024	Safeguarding of machinery
4024.1	Part 1: General principles
AS/NZS	
1269	Occupational noise management (series)
1680	Interior lighting
1680.2.4	Part 2.4: Industrial tasks and processes
2211	Laser safety
2211.1	Part 1: Equipment classification, requirements and user's guide
3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
4360	Risk management
61241	Electrical apparatus for use in the presence of combustible dust
61241.3	Part 3: Classification of areas where dusts are or may be present
NOHSC	
1001	National Standard for manual handling
1007	National Standard for occupational noise

1.4 DEFINITIONS

For the purpose of this Standard, the definitions below apply:

1.4.1 Bandsawing machine

A sawing machine having a saw blade in the form of a continuous band mounted on two or more pulleys.

1.4.2 Circular saw bench

A machine fitted with a single circular sawblade (other than a scoring saw) which is fixed during the normal cutting operation, and a horizontal table, all or part of which is fixed during operation. The sawblade is mounted on a horizontal spindle below the table.

1.4.3 Integrated feed

A feed mechanism for the workpiece or tool which is integrated with the machine and where the workpiece or machine element and incorporated tool are held and controlled mechanically during the machining operation.

1.4.4 Log bandsaw (Bandmill)

1.4.4.1 Conveyor feed log saw

An integrated feed bandsawing machine for the primary conversion of logs, and is usually fitted with a conveyor as the primary feed mechanism.

1.4.4.2 Moving head rig log saw

A bandsaw for the primary conversion of logs where the sawing unit moves past the stationary log.

1.4.4.3 Reciprocating carriage log saw

An integrated feed bandsawing machine for the primary conversion of logs, and fitted with a reciprocating carriage and dogging.

1.4.4.4 Travelling table log saw

A bandsaw for the primary conversion of logs, and fitted with either a manual or integrated feed in addition to a travelling table and dogging.

1.4.5 Rip-sawing machines

1.4.5.1 Multiblade rip saw

A machine with more than one circular blade where the workpiece is fed to the blades by an integrated power feed in the form of rollers or chain conveyor with manual or automated loading or unloading. The saw blades can be mounted on one or more than one saw spindle which may be either fixed in position or be capable of vertical or axial adjustment. The saw blades may be arranged so that they are—

- (a) all mounted above the workpiece support;
- (b) all mounted below the workpiece support; or
- (c) mounted both above and below the workpiece support.

1.4.5.2 Single blade rip saw

A machine with a single circular saw blade mounted on a fixed position spindle where the workpiece is fed to the blade by an integrated power feed in the form of rollers or a conveyor, with manual loading or unloading. The saw blade may be mounted either above or below the workpiece support.

1.4.6 Shall

Indicates that a statement is mandatory.

1.4.7 Should

Indicates a recommendation.

1.5 CONSULTATION

When planning any process which involves changes to or relocation of existing machinery, or the provision of new machinery, every effort should be made at the design phase to consult with all personnel who will use or maintain it.

Designers, where it is practicable to do so, should visit the site where the machinery will be used, to consult with the personnel. The manufacturer should consult the designer when any faults are detected or changes made at any phase in the life of the machine.

In this way, foreseeable safety related issues can be addressed at the outset, which will lead to a safer and more productive workplace.

Guidance on evaluating, assessing and selecting the most appropriate design and operational methods is given in AS 4024.1.

SECTION 2 RISK ASSESSMENT

2.1 GENERAL

Risk assessment is the procedure by which the knowledge and experience of the design, use, incidents, accidents and harm related to machinery are brought together in order to assess risks during the life of the machinery.

This Standard is not intended to provide a detailed account of methods for analysing hazards and estimating risks as this is dealt with in greater depth in AS 4024.1 and elsewhere (e.g. AS/NZS 4360).

2.2 RISK ASSESSMENT

Risk assessment is a series of logical steps which enables the systematic examination of the hazards associated with machinery. Risk assessment is followed, whenever necessary, by risk reduction as described in AS 4024.1. When this process is repeated it provides the process for eliminating hazards as far as practicable and implementing safety measures according to the state of the art. A list of potential hazards is provided in Appendix A.

Risk assessment (see Figure 2.1) includes the following:

(a) *Risk analysis*

Risk analysis consists of—

- (i) determination of the limits of the machinery;
- (ii) hazard identification; and
- (iii) risk estimation.

(b) *Risk evaluation*

Risk analysis provides the information required for the risk evaluation, which in turn allows judgements to be made on the safety of machinery.

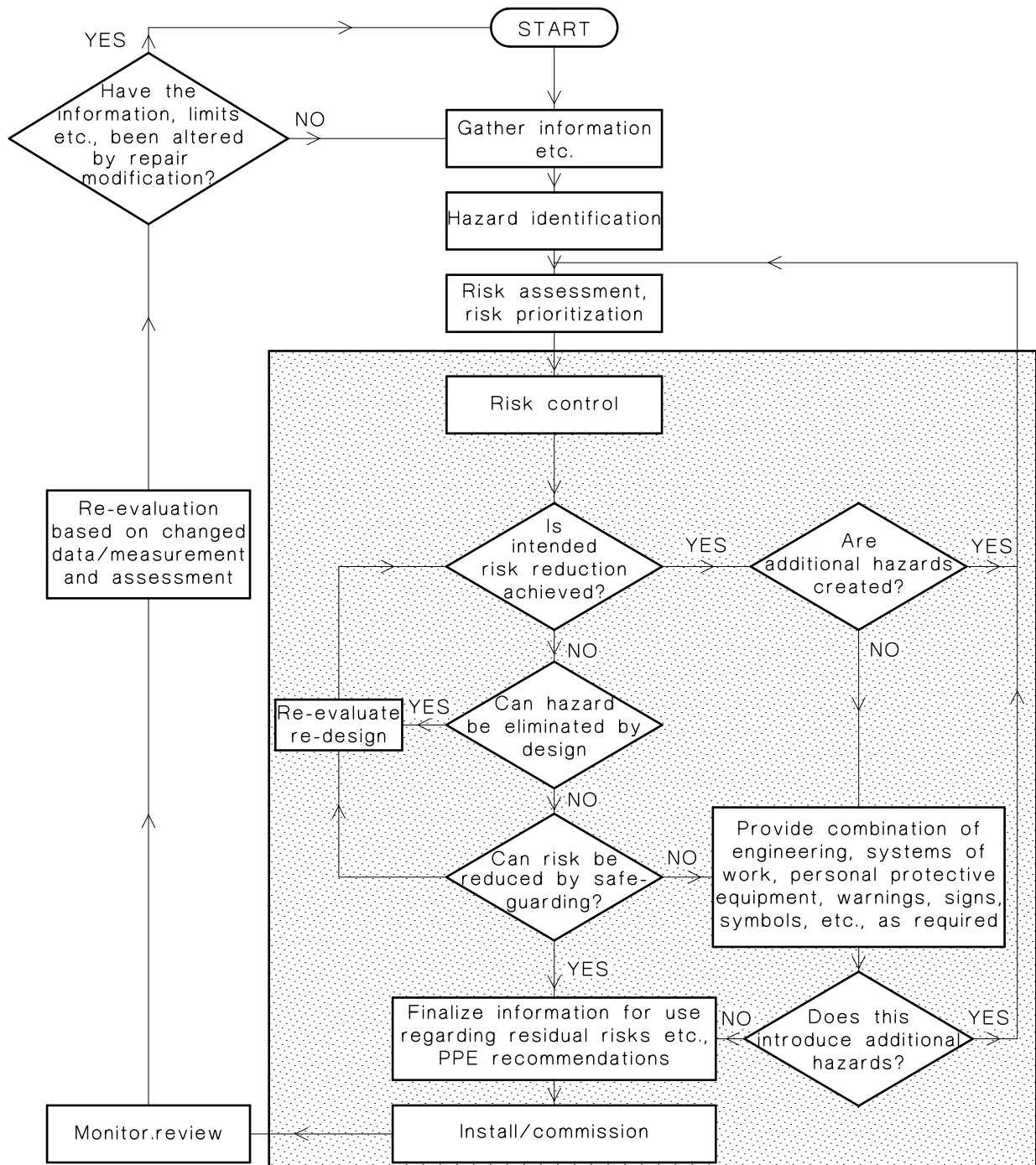
Risk assessment relies on judgemental decisions. These decisions should be supported by qualitative methods, complemented as far as possible by quantitative methods. Quantitative methods are particularly appropriate when the foreseeable severity and extent of harm are high.

Quantitative methods are useful to compare alternative safety measures.

NOTE: The application of quantitative methods is restricted by the amount of useful data which are available. Therefore, in many applications only qualitative risk assessment will be possible.

The risk assessment procedure shall be conducted in such a manner that it is possible to document—

- (i) the intended use of the machinery for which the assessment has been made, (e.g. specifications or limits);
- (ii) the hazards, hazardous situations and hazardous events identified;
- (iii) pertinent information used (e.g. accident histories and experience gained from risk reduction applied to similar machines);
- (iv) the objectives to be achieved by the risk control measures;
- (v) the safety measures implemented to eliminate identified hazards or reduce risks; and
- (vi) the residual risk to the individual hazards by specifying any relevant assumptions that have been made (loads and safety factors).



NOTE: Risk reduction and selection of appropriate risk control measures are not part of the risk assessment process.

FIGURE 2.1 THE ITERATIVE PROCESS TO ACHIEVE SAFETY

2.3 DOCUMENTATION

Documenting the risk assessment is a means of describing the hazards identified and the risk control measures implemented. The documentation should contain information on—

- (a) reference materials used for the risk assessment;
- (b) machinery for which the assessment has been made (specifications or limits);
- (c) any relevant assumptions which have been made, such as loads, strengths, or safety factors;
- (d) hazards identified;
- (e) hazardous situations identified;
- (f) hazardous events considered in the assessment;
- (g) data used and the sources;
- (h) any uncertainty associated with the data used and the impact on the risk assessment;
- (i) objectives to be achieved by the risk control method;
- (j) any requirements implemented (e.g. Standards or other specifications used);
- (k) residual risks; and
- (l) results of the final risk evaluation.

SECTION 3 PLANT LAYOUT AND MACHINE INSTALLATION

3.1 FOUNDATIONS

Machines should be fixed or located on a substantial foundation, floor or other support so that they are stable and secure.

3.2 WORK PLACES AND MEANS OF ACCESS

Work places and means of access should be in accordance with the principles expressed in AS 1470 and AS 1657.

3.3 MACHINE LAYOUT AND WORKING AREA

Sufficient space should be provided around machines to handle the material with the least possible interference from or to workers or other machines. Machines should be placed so that it will not be necessary for an operator to stand in or near an aisle, and the layout of machines should allow for easy maintenance and repair.

3.4 LIGHTING

Adequate illumination of the working area shall be provided by natural or artificial means or both. Artificial lighting shall be in accordance with the provisions of AS/NZS 1680.2.4.

3.5 ELECTRICAL

Electrical wiring and equipment shall be in accordance with AS/NZS 3000, AS 1543, AS/NZS 61241.3 and the requirements of the relevant regulatory authority.

3.6 NOISE

When a machine could create a noise hazard which has not been controlled at the design phase, and the noise levels are in excess of those permitted by the regulatory authority, or are such that they may affect the health of any person, all practicable steps shall be taken, during installation, to provide a means of reducing the transmission of noise.

SECTION 4 PLANT SAFETY, WORK SYSTEMS AND RISK CONTROL MEASURES

4.1 MACHINE GUARDING—GENERAL CONSIDERATIONS

4.1.1 Compliance

Employers should provide and maintain plant and systems of work that are safe and without risks to the health of employees. Requirements and recommendations on safe work practices are provided in Appendix B.

Where a risk assessment indicates that engineering controls are suitable, machine guarding in sawmills shall comply with the specific requirements of this Standard and AS 4024.1.

4.1.2 Guarding

All plant should be designed or protected to prevent the risk of injury by contact with moving parts or being struck by projectiles being ejected from the plant.

Such protection should be in-built wherever practicable.

4.1.3 Construction and application

Machinery guards shall be constructed in accordance with the requirements of AS 4024.1. They may be fixed guards, adjustable or controlled by mechanical or electrical interlocking systems. In certain circumstances, photoelectric systems or combinations of various forms of guarding may be used. Heavy or frequently adjusted guards should incorporate a system to move or adjust the guard by pneumatic, electric or some other means in preference to manual operation.

Fixed guards should be securely fixed in place and should not be able to be removed without the use of engineering tools.

A system of colour coding the machinery guards will assist in identifying and maintaining guarding in position. No machinery should be operated unless all guarding is secured and correctly adjusted. All machinery guarding should be maintained in good working order and employees adequately instructed, trained and supervised to ensure proper usage.

4.2 RISK CONTROL MEASURES FOR BREAKDOWN SAWS

4.2.1 General

Breakdown saws may include—

- (a) single circular saw;
- (b) Canadian circular saw (two blades—upper and lower);
- (c) twin-edger circular saw;
- (d) single bandsaw;
- (e) twin bandsaw;
- (f) frame saw—power ripping saw;
- (g) swing saw—individual or tractor mounted; and
- (h) trolley-mounted circular saw.

4.2.2 Cutting action

Only downward cutting actions should be used (see Figure 4.1). This is because—

- (a) the downward force of the cut tends to assist the security of the log on the carriage;
- (b) sawdust and water spray is directed downwards; and
- (c) dislodged pieces of timber are directed to the rear of the cut.

In the event of the saw blade jamming, the machine should be stopped before appropriate remedial action is undertaken.

Where upward cutting actions are used, the workpiece shall be adequately secured to prevent the logs from being drawn into the saw teeth.

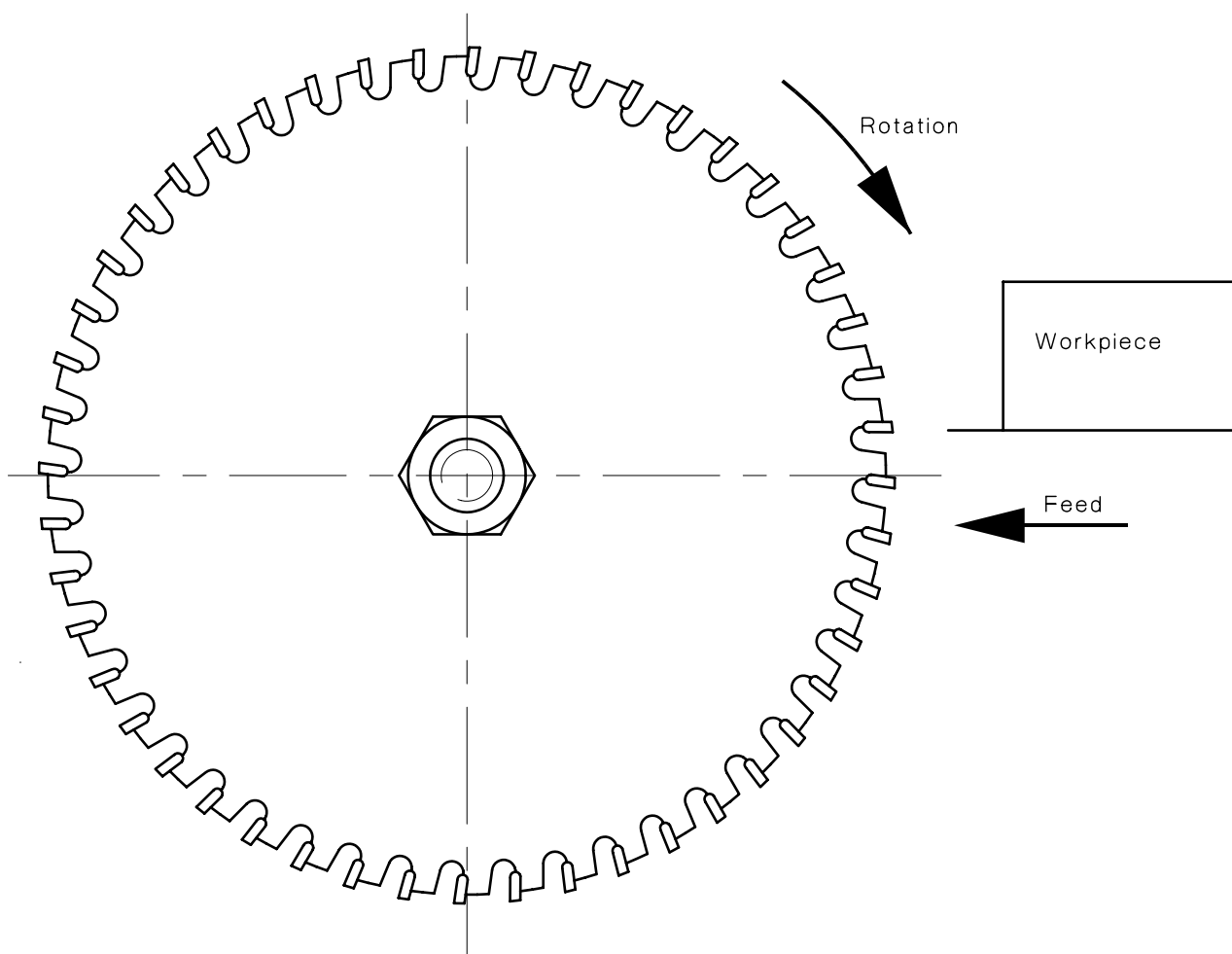


FIGURE 4.1 DOWNWARD CUTTING ACTION

4.2.3 Log carriage (cradle)

When mechanically driven, the majority of breakdown saw carriages are mounted on rails and powered by means of wire cable and winch drum.

The log carriage and associated fittings shall be maintained in a safe working condition at all times. Suitable brushguards shall be fitted to both front and rear of all wheels on the carriage to clear the rails of debris or sawdust.

Not less than two full turns of cable shall remain on the winch drum when the carriage is fully extended.

The traverse of a log carriage should always be achieved by mechanical means, e.g. winch or fluid power.

Rail-mounted carriages which are manually pulled or pushed past the revolving saw should not be used.

Both the winch drum and winch cable return pulley shall be fully guarded.

Where the carriage is designed to be ridden, it is permitted that operators ride the carriage.

Where it is necessary for the operator to ride the carriage, a risk assessment shall first be carried out. The risk assessment shall take into account at least the following:

- (a) Protection for the operator.
- (b) Means of access and egress.
- (c) Position of controls on the carriage is appropriate for ease of use.
- (d) Any trip or fall hazards on the carriage.
- (e) Electrical hazards.

4.2.4 Securing log to carriage (dogging)

All logs shall be secured to the carriage before the saw is passed through the log.

4.2.5 Operator's location

4.2.5.1 General

The location of the operator should be assessed and an enclosed workstation used where practicable.

4.2.5.2 Remote location

The operator should be located in an elevated enclosed workstation clear of the breakdown saw and saw log carriages positioned so as to maximize visibility of the area.

A remote enclosed workstation for the operator has the following advantages:

- (a) Reduced risk from—
 - (i) propelled particles and water spray;
 - (ii) noise; and
 - (iii) injury from projectiles.
- (b) Protection from the weather.
- (c) Less fatigue.

The operator located in a cabin should be able to see if any person enters the floor area around the saw and transfer decks. This can be achieved by the erection of suitably located mirrors or closed-circuit television monitors.

4.2.5.3 Adjacent to the saw

Where an operator is located adjacent to a breakdown saw or log carriage, a risk assessment (see Section 2) should be conducted and control measures implemented to minimize the risks arising from at least the following:

- (a) Exposure to sawdust and water spray.
- (b) Exposure to noise.
- (c) Risk of being struck by propelled slivers of timber.

- (d) Risk of being struck by flitches.
- (e) Increased fatigue.
- (f) Greater risk of soft tissue injury if required to physically handle each flitch, e.g. pull flitch off the vertical.
- (g) Contact with the saw blade.

4.2.6 Guarding

4.2.6.1 General

All areas of plant where a risk of injury exists shall be guarded. Guidance on the general principles for guarding can be found in AS 4024.1.

4.2.6.2 Work area

The working area traversed by a powered carriage shall be effectively fenced to prevent access while the saw and carriage are operating.

The area below an elevated breakdown saw, including infeed and outfeed decks or rollcases, should be effectively fenced to prevent access. Fence gates should be fitted with interlocks. (See also AS 4024.1.)

In addition, an activated interlock switch should alert the operator by a suitable visual or audible warning device located in the enclosed workstation.

4.2.6.3 Saw blade transmission drive

All power transmission shafting, vee and flat belts, chain-and-gear drives should be fully guarded. (See also AS 4024.1.)

4.2.6.4 Saw blade

Single circular saw blades should at least be fitted with a strong, adjustable top hood guard which should be adjusted to suit the log being sawn.

Where there is a risk to personnel, the upper saw blade of a Canadian saw should be fitted with a strong top hood guard.

4.2.6.5 Riving knife

To reduce the likelihood of the flitch coming into contact with the back of the sawblade, the use of a riving knife or other means such as a power-operated wedge, shall be used with circular breakdown saws.

4.2.7 Other safety considerations

4.2.7.1 Safe access to infeed and outfeed decks

Safe access should be provided to allow misaligned or caught logs/flitches to be released or manoeuvred by appropriate means. Where manual or mechanical handling methods are used, the risk to the health and safety of persons accessing the infeed or outfeed decks from energy stored within the machine or from the action of gravity on the log or flitch shall be considered. Examples of stored energy include pressurized pneumatic or hydraulic systems, springs and counterweights.

4.2.7.2 Placing logs on infeed deck

Where practicable, logs should be placed on the infeed deck of a breakdown saw by mechanical means.

4.2.7.3 Handling saw blades

Saw blades should be handled in accordance with the following:

(a) *Circular saw blades*

Mechanical means should be used to transfer circular saw blades.

When not in use, all circular saws should be stored in suitable storage racks located away from passageways or walkways.

(b) *Bandsaw blades*

Bandsaw blades not in use should be stored away from walkways and a guard placed over the cutting teeth.

Floor trolley and mechanical devices should be used to transfer bandsaw blades.

The cutting teeth guard should not be removed until the bandsaw blade has been fitted to the bandmill wheels.

4.3 CONTROL MEASURES FOR BENCH SAWS

4.3.1 Non-powered infeed

Where indicated by a risk assessment, benches should be either converted to power infeed benches or safeguarded in accordance with AS 4024.1.

Four critical factors to be considered in the risk assessment are as follows:

- (a) The severity of potential injury.
- (b) The frequency of access or entry to the danger zone.
- (c) The time of exposure to the hazard.
- (d) The type of operational, maintenance or casual access to the hazard.

4.3.2 Saw blade top hood guard

All saw benches should be fitted with a top hood guard of strong and appropriate construction (see AS 4024.1), the height fully adjustable and the adjustment easily accessible. The guard shall be capable of covering the whole of the saw blade and the riving knife protruding above the bench.

A top hood guard is designed to assist in preventing objects being propelled forwards towards the sawyer and should be adjusted as low as practicable to suit the individual workpiece being cut.

4.3.3 Riving knife

The purpose of a riving knife is to reduce the risk of ejection of material from the saw at high velocity into the hazard zone by—

- (a) preventing the cut workpiece (flitch) from closing on the uprunning body of the saw blade; and
- (b) preventing the sawn flitch, loose timber or splinters from coming into contact with the up-running cutting edge of the saw blade.

The knife should be manufactured from steel, have a smooth surface, be approximately 10% or one gauge thicker than the body plate of the saw blade, and be thinner than the saw kerf.

The riving knife should be fixed below the level of the table and be set behind and in line with the saw blade. It shall be capable of adjustment so as to bring it as close as practicable to the saw blade so that the clearance complies with the requirement of Figure C1 when measured from the centre of the saw blade, at table level.

The edge of the riving knife nearest to the saw blade teeth shall have a curve forming an arc of a circle equal in diameter to the largest saw blade for which the machine is designed.

Requirements for the design and mounting characteristics are given in Appendix C.

4.3.4 Powered infeed bench

Safety aspects of a powered infeed bench are the same as those of a breast bench (see also Clauses 4.3.6 and 4.3.7).

4.3.5 Infeed drive hob

The infeed drive hob should be fitted with a suitable guard which shields the operator from the friction drive area on the opposite side to the timber infeed area, i.e. through 180 degrees opposite the timber infeed.

4.3.6 Power infeed emergency stop bar

Where it is not practicable for the operator to work more than 2 m from the bench, guards shall be fitted. An infeed stop bar is one solution to guarding the area.

4.3.7 Sizing gauge controls

The sizing gauge controls and operation position of a powered infeed bench shall be located remote from the bench and be outside the defined hazard zone.

4.3.8 Saw packing adjustment

Where manual adjustment is necessary, a remote packing adjustment system should be used. In this system, the manual adjustment (packing adjustment nut) of the packing adjustment mechanism should be relocated away from the top surface of the bench and replaced by either of the following:

(a) *Screw adjustment*

Increase the length of the adjusting screws (both sides) so that they extend past the sides of the bench. Alternatively, by the use of steel rods and swivel joints, hand adjustments can be relocated to the front of the bench. Some minor redesign of the bench may be necessary. There should be a suitable system of preventing unwanted or inadvertent movement of the saw packing setting.

(b) *Hydraulic adjustment*

Existing screw adjustment mechanisms may be removed and replaced by a hydraulic system. Adjustment controls can be located on the front skirt of the bench.

4.4 CONTROL MEASURES FOR DOCKING SAWS

4.4.1 General

Docking saws may include—

- (a) saw pivoted from overhead;
- (b) saw pivoted from below;
- (c) saw or saws mounted on horizontal bars;
- (d) saw mounted in a fixed position; and
- (e) automatic docking saw.