

# Pallet racking operation and maintenance

This information sheet provides advice on the safe operation and maintenance of pallet racking in warehouses and storage areas.

September 2012

## Background

There have been reports of damaged or overloaded racking at many workplaces that store pallets in racking. This includes an incident where racking collapsed onto a worker who was stacking goods.

This advice is for employers and will also be useful for persons in charge of racking and those who work around racking, including warehouse managers, operations managers, general managers, maintenance managers, forklift operators, store persons and health and safety representatives.

As an employer, you must ensure, so far as is reasonably practicable, that racking equipment and the way it is used and operated is safe for workers and others.

Note: This information sheet is for standard 'selective' pallet racking. Additional safety measures may be required for cantilever, drive-in, double-deep, pallet-live, push-back or other specialised types of racking.

## Operation and maintenance

### Racking design

Racking should be set up, operated and maintained according to the instructions of the racking manufacturer and be in accordance with AS 4084:2012 - *Steel storage racking*. It should be designed specifically for the size, shape and weight of the products being stored.

Racking should also be compatible with the pallets and the material handling equipment used in the workplace. For example, aisle width should be matched to the turning circle of the forklift used for picking and replenishment.

Any modifications should be checked by the original supplier/manufacturer/designer.

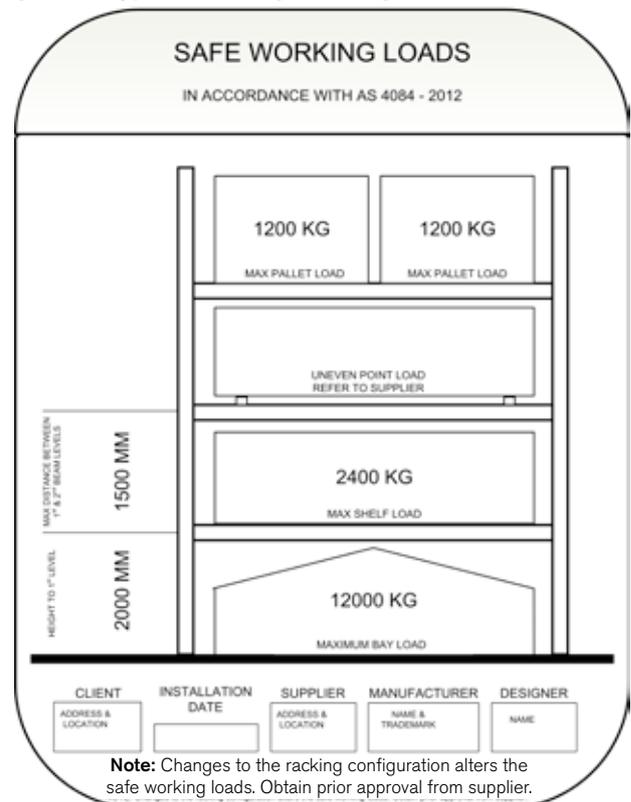
If in doubt, seek advice from the racking manufacturer or installer, or a competent person with experience in racking design and construction.

### Working load limits

Working load limits should never be exceeded for the unit load (pallets of goods to be stored), pallet beam or bay.

Provide information for workers about the safe working loads (SWL) for pallet racking. For example, place signs in visible areas that include:

Figure 1: Typical racking SWL sign



Note: SWL in this case is based to a unit load of 1200kg on a standard pallet. For uneven loads where a large load is only supported at two or three points, refer to the supplier to determine whether the racking is capable of supporting that load.

- racking manufacturer's name, supplier's name and trademark, and the installation date
- designer's name
- working unit load limit
- total working unit load limit for each pallet beam level
- total working unit load limit for each bay
- maximum distance from the base plate level to the first beam level and maximum distance between first and second beam levels.

See **Figure 1** for an example of SWL. There should be some means of determining the weight of each unit load being placed into racking.

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## Modifications to racking design or components

Any modifications to the racking should take into account the affect on load limits and should also be approved by the manufacturer, supplier or a qualified engineer. Operating procedures, signs and drawings must be amended accordingly.

Never make physical alterations to uprights, bracings, beams or components, such as welding on additional cleats or bearers.

Replacement of uprights, bracings, beams, clips or other components should be with parts from the equipment manufacturer. If alternative parts must be used, an engineering report should confirm the integrity and load limits of the racking.

## Single bay racking

In situations where single rows are installed, and there is pedestrian access along the rear of the racking, rear protection should be installed to prevent loads falling out of the back of the racking.

## Operating instructions

Put procedures in place to ensure operations are done safely with regard to the racking design, the load and capability of lifting equipment (see **Figure 2**).

As a minimum, operating instructions should include the:

- correct application and use of the equipment
- SWLs
- prohibitions on unauthorised alterations
- requirement to report any damage incurred due to impact so that it can be assessed.

**Figure 2: Example of supplier's operating instruction sign**

Operation and Maintenance of racking
<ul style="list-style-type: none"><li>▪ Refer to supplier's drawings and/or technical data for maximum safe load.</li><li>▪ Don't alter structure without either:<ul style="list-style-type: none"><li>a) checking effects against supplier's technical data</li><li>b) obtaining necessary approval from supplier</li></ul></li><li>▪ Instruct operators in correct use of equipment (note - damage due to impact can seriously affect safety)</li></ul> 
<ul style="list-style-type: none"><li>▪ Conduct regular inspections to check for:<ul style="list-style-type: none"><li>a) correct application and use</li><li>b) loads within allowable safe limits</li><li>c) accidental damage to or dislodgment of structure components.</li></ul></li><li>▪ If in doubt always contact suppliers.</li></ul>

## Goods on pallets to be stored in racking

Pallet racking should take into account the nature of the goods in the unit load.

A change in the design should not be permitted unless it has been agreed to by the racking supplier or on the advice of a competent person and the:

- racking design is suitable to support the weight of the unit load
- pallet design 'keys' into the racking to prevent the unit load from being dislodged unless mesh decks or other form of support structure has been designed and fitted.

An assessment of any change to the pallet design should be done by a competent person to prevent problems. For example:

- changing from timber pallets to post pallets will apply concentrated loads on racking beams and the pallets may not key into the beams
- using pallets larger than in racking design can overlap pallets behind or push them off their supports
- using pallets smaller than allowed for in the racking can allow them to drop through
- using skid pallets in racking without timber decks can allow them to drop through.

**Note:** Overseas pallets often differ in size and may not fit Australian racking (see *Further information*).

Potential problems that may require changes to racking design include:

- boxes, cartons and other such items stored on pallets overhanging the pallet (unless the racking structure has the correct clearance)
- unit loads on upper levels containing boxes, cartons and other loose loads falling (unless this is prevented by wrapping, strapping or by some other means, such as end frame extensions and pallet safety backstop.)

## Collision protection

Bottom portions of frames exposed to possible collisions by forklifts or other moving equipment should be fitted with upright protectors and end-of-rack protectors.

## Reporting unsafe situations

All safety risks related to operation or maintenance of the racking should be reported immediately to management. In some circumstances (eg collapse of racking), WorkSafe must be notified immediately.

## Damage report

Workers should report any damage to the supervisor immediately so it can be inspected and assessed. There should be a method of recording damage to components such as coloured stick-on tags to show the location and level of damage (see **Figure 3**).

## Inspections

Racking should be inspected frequently for damage and overloading, and at least annually to check its integrity. Consider the following questions when doing inspections:

### Beams

#### Are beams overloaded?

A large amount of deflection indicates overloading of the racking. Where two beams connect at an upright, the beam connectors should be parallel. If racking is or has been overloaded, the beam connectors may be deformed (form a 'V'). There will also be evidence of 'permanent set' in unloaded beams. In this situation, the racking should be inspected by a competent person or engineer.

#### Are beams or welds damaged?

Check for obvious signs of beams being hit by a pallet or forklift. Damaged beams should be replaced. If a beam has been hit and is only showing minor damage, ensure welds are checked by a competent person for cracking.

#### Are beam connectors or safety clips missing?

Examine beams for damage and replace missing clips. Replacements must be of a design approved by the equipment manufacturer. If clips are regularly being dislodged, contact the manufacturer or installer to determine why and implement corrective action.

#### Has a beam popped out of its upright?

If a beam has popped out this will mean it is only suspended on one end connector and could collapse.

### Working load limits

#### Are rack load signs posted?

Ensure bays display the SWL signs provided by the designer / installer and the rack configurations have not been altered.

### Uprights and footplates

#### Are uprights damaged?

If an upright shows significant damage (see **Figure 4**), is twisted or contains splits or cracks, replace it or splice in a new section. Splices should be approved by the equipment manufacturer. If the upright is damaged, replace it and the footplate.

#### Are splices in good condition?

Check the condition of all splices. They should be above the first beam level, not below 1.5m, and no more than one splice should be between any two adjacent beam levels.

### Out of plumb

#### Is the racking vertical?

Out of plumb racking is usually caused by incorrect installation but also as a result of impact, overloading, or settling of the floor slab. Contact the manufacturer or installer.

### Braces

#### Are racking braces damaged?

Replace bent, horizontal or diagonal braces. For bracing, the member deviation from a 1 m long straight edge in either plane should not exceed 10mm.

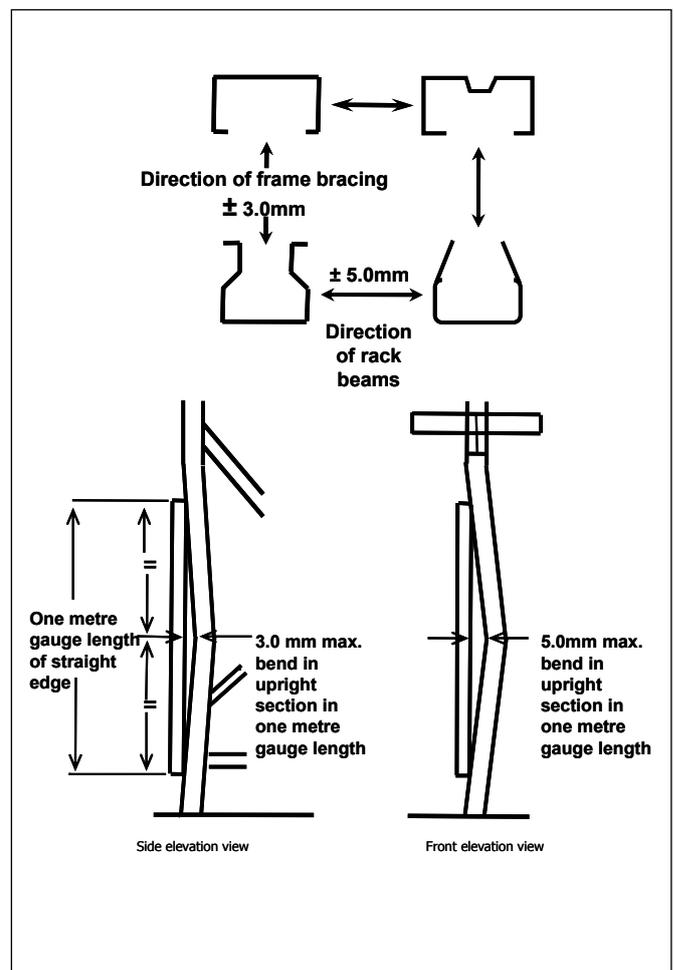
### Floor fixings

#### Are floor fixings installed?

Check floor fixings are installed and undamaged. If damaged, replace it and the footplate. At least two anchors are required in each footplate.

**Note:** To reduce the damage caused by pallets hitting the uprights, footplates and bracing while being lifted by forklifts, some workplaces install racking with beams, at knee height, in the bottom bay. This can also assist with manual picking activities as it raises the height of the items to be picked.

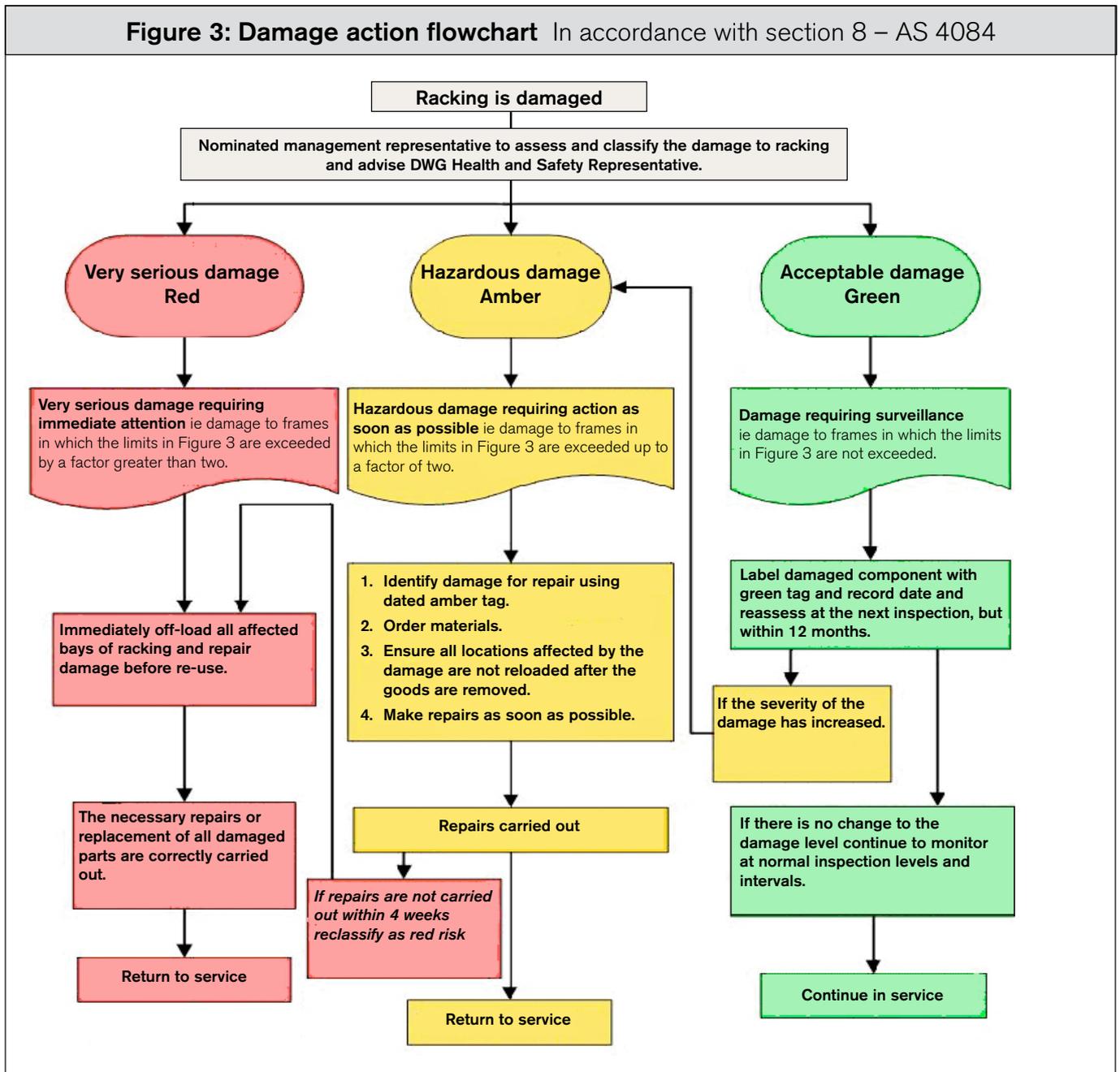
**Figure 4: Typical upright sections and method of measurement**



*Note: With permission from Standards Australia this diagram has been reproduced from AS 4084:1993 – Steel storage racking.*

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**Figure 3: Damage action flowchart** In accordance with section 8 – AS 4084



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## Further information

Call us on: 1800 136 089

Email us at: [info@worksafe.vic.gov.au](mailto:info@worksafe.vic.gov.au)

For more information on occupational health and safety, go to WorkSafe's website: [worksafe.vic.gov.au](http://worksafe.vic.gov.au)

### Compliance Codes

AS 4068:1993 - Flat pallets for material handling

AS 4084: 2012 - Steel Storage Racking

AS 4762: 2000 - General purpose flat pallets: Principal dimensions and tolerances