



Where Service is the Difference!

## Terms & Conditions

### Inspection criteria

All racks were inspected in accordance with the following criteria:

Ref: AS 4084-2012 Page 60, Section 6.3.2

*"BASE PLATES". The bottom of all uprights shall be furnished with base (bearing) plates to transfer upright loads and moments into the floor. These forces and moments shall be consistent in magnitude and direction with the racking analysis". In every upright frame, the base plates shall be fixed squarely to the uprights and secured to the floor through using packing material or grouting necessary to ensure that the uprights are solidly supported under the whole area of the base plate. The packing material shall be steel and prevented from shifting relative to the base plate.*

Ref: AS 4084-2012 Page 63, Section 6.4.1 Base plate anchorage

*On racking serviced by mechanical equipment, a minimum of two anchors per base plate shall be used. Each upright to floor connection shall be able to transfer design ultimate actions of 5kn in tensions and 8kn in shear*

*Note" This does not cover sections 6.4.2.1, 6.4.2.2, 6.4.2.3 and 6.4.2.4 and associated Notes regarding the concrete floor to which the anchor is fixed in particular:*

*For anchorages in concrete the following parameters need to be identified*

- a) The thickness of the structural concrete floor (an added screed will not contribute to the strength of the anchorage)*
- b) The actual embedment length of the anchor in the solid concrete floor*
- c) The actual hole diameter in the concrete*
- d) The quality of the concrete*
- e) The percentage of reinforcement in the top of the slab*
- f) Whether the anchorage is in the tension or compression zone of the concrete*
- g) The spacing of anchors within an anchor group*
- h) The distance between the anchor and the edge of the concrete slab*
- i) The difference between the size of the hole in the base plate and the diameter of the anchorage*

Ref: AS 4084-2012 Page 64, Section 6.5 Frame Spacers

In double entry racking, at least two frame spacers (refer Fig 1.3.1 (a) and 1.3.2 (a) are required between each adjacent pair of upright frames. The frame spacers shall be located near the node points of the upright frames and spaced as widely apart as practicable. The lowest spacer shall be positioned at the level of the first bracing node above the floor.

Each frame spacer shall have a capacity greater than or equal to the horizontal placement action and the horizontal accidental action

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Ref: AS 4084-2012 Page 64, Section 6.6 Upright Splices

*"UPRIGHT SPLICES" – In general splices in an upright frame shall be avoided. A splice should not be allowed below the lowest beam level or below 1.5m, and no more than one splice should be located between any two adjacent beam levels*

Ref: AS 4084-2012 Page 99, Section 8.1.3

*"The racking installation shall not be altered to deviate from the load application configuration furnished for the racking installation*

*Physical alterations to uprights, bracings, beams or components, such as welding on additional cleats or bearers shall not be made.*

*In addition change of use such as from timber pallets to post pallets shall not be permitted.*

Ref: AS 4084-2012 Page 100, Section 8.2

*"INSPECTIONS – Inspections shall be carried out on a regular basis, and at least once every twelve months to –*

- (a) ensure correct application and use of equipment*
- (b) ensure that the working load limits are adhered to*
- (c) ensure that the racking installation has not been altered. A copy of the load application and configuration drawings shall be retained for this purpose.*
- (d) Examine the extent of damage due to impact in the racking installation*
- (e) Examine the out of plumb of the racking*
- (f) examine for any dislocation and deformation of sections and connections for uprights and beams,"*
- (g) Examine connectors for deformations or signs of cracking of the welds*
- (h) Examine base plates and floor anchors*

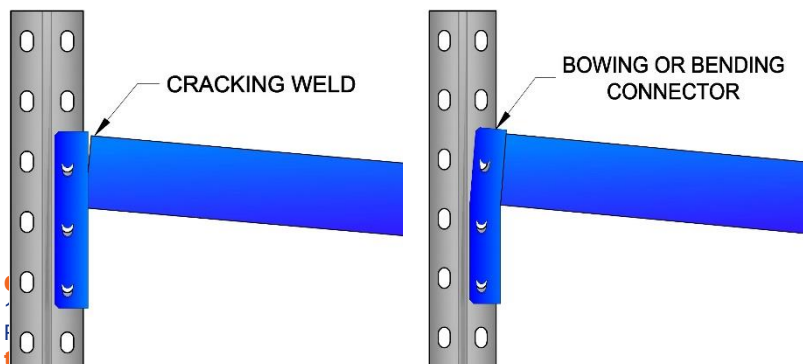
Ref: AS 4084-2012 Page 100, Section 8.3.1 and 8.3.2

*The extent of damage due to impact in the racking installation, determined from regular inspections and reports of damage incurred, shall be assessed in accordance with clauses 8.3.2 to 8.3.6. Damage levels shall be specified and appropriate actions shall be taken in accordance with clause 8.8*

*For uprights, the visible damage shall not exceed that shown in Figure 8.3.2*

Ref: AS 4084-2012 Page 101 and 102, Section 8.3.5 and 8.3.6

*"Connectors and Connector Safety Lock – Connectors shall not show visible permanent deformation or signs of cracking of welds". Damage of this type shall require the beam to be unloaded and advice shall be sought from the racking supplier. The presence of the necessary locking devices shall always be checked during maintenance and repair. Any missing locking devices shall be replaced immediately to prevent accidental dislodging of beams. A supply of beam locking devices shall be stocked on site*



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Ref: AS 4084-2012 Page 102, Section 8.4

The out of plumb of unloaded racking caused by impact shall not exceed the finished tolerance given in table 1.7.1 (Height of upright frame / 1000)

### ***Exclusions / Disclaimer***

***We are not engineers and cannot confirm the design criteria apart from genuine Rack n Stack Warehouse ® products that have been certified to AS4084-2012 and purchased and installed according to our requirements and in accordance with our directions.***

***The racking inspection is completed and valid for the date of inspection only. It is recommended that appropriate regular internal checks are completed to ensure any damage that occurs to the pallet racking system is immediately recorded and reported to the Rack n Stack Warehouse.***

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## Damage classification and Risk management for Pallet Rack

### Risk management for pallet racking structures

- The assessment applies only to damage that produces an overall bend in a member in accordance with clause 8.3.2 to 8.3.4. These limits do not apply to highly localized damage such as dents, buckles, tears and splits. Members subjected to tears and splits shall be replaced.

#### Risk identification

##### Acceptable Damage (Green)

**When the level of damage does not exceed the permissible limits specified in clauses 8.3.2 to 8.3.4, the racking shall be considered serviceable and does not require either unit load reduction or immediate unloading. This constitutes green level damage.**

**There shall be a method of recording damage to components. There shall also be a method such as the use of stick on tags on the components, to show that these components have been inspected and that the racking is suitable for further service until the inspection, when the components have been re-inspected and re-assessed (section 8.2). For example use could be made of coloured dated adhesive labels, which indicate that racking or components are suitable for service and need to be reinspected at future inspections.**

**Exceeding the green level shall be considered hazardous or very serious damage and causes risk to the racking system.**

##### Hazardous damage (Amber risk)

**When the level of damage exceeds the permissible limits specified in clauses 8.3.2 to 8.3.4 by up to a factor of 2, the damage section shall be clearly marked and isolated until remedial work has been carried out before the racking can be reloaded. If remedial work cannot be carried out within 4 weeks, the level of damage shall be redesignated as "very serious damage" (red risk)**

**There shall be a method of isolating such racking to ensure that it will not come back into use until the necessary repairs have been carried out and equipment certified as safe. For example, dated coloured adhesive labels could be used to indicate that the racking is not to be reloaded until rectified.**

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## Very serious damage (red risk)

When the level of damage is in excess of the permissible limits specified in clauses 8.3.2 to 8.3.4 by more than a factor of 2, the damage section and appropriate adjacent sections(s) shall be immediately unloaded and isolated from further use until remedial work has been carried out and certified as safe

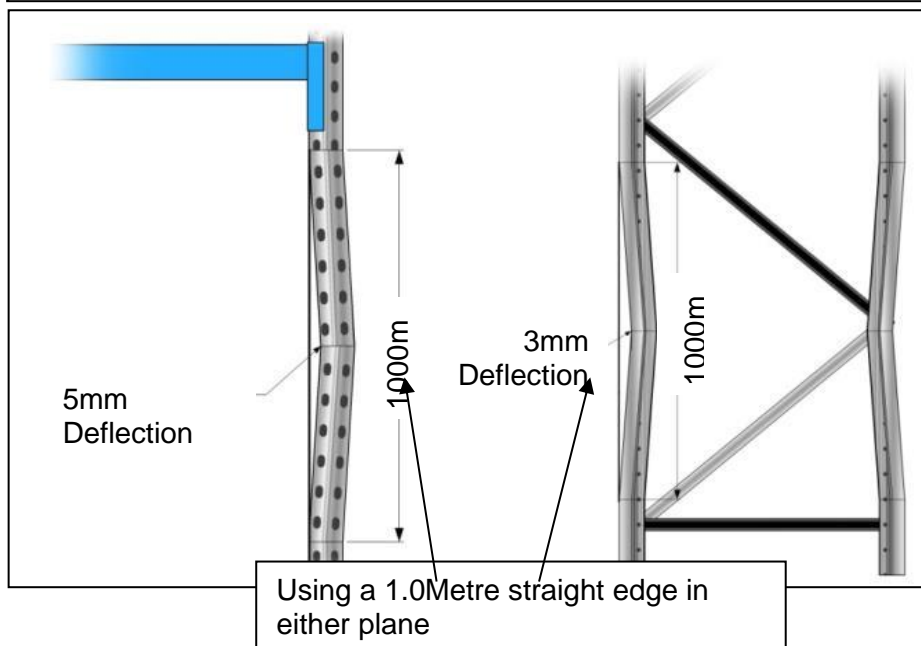
There shall be a method of isolating areas of racking to ensure that they do not come back into use prior to repair work being carried out. For example, a particular bay could be immediately un-loaded and roped off to prevent further use.

Any repair work shall be in consultation with the racking supplier or a qualified structural engineer.

**Note:** Remedial work usually involves replacement

## Method of Measurement for Visible Upright Damage

Fig. 8.3.2 – AS4084 Method of Measurement for Visible Upright Damage



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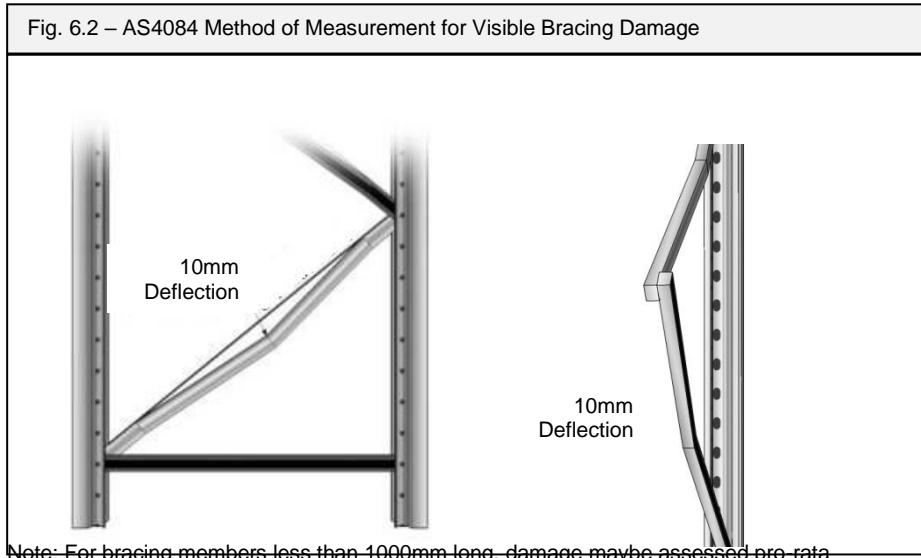
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## Damaged Bracing

Bracing can either be damaged by direct impact from unit loads, or indirectly by forces transferred to them as a result of impact on the uprights. For bracing damage, the member deviation from a 1 meter straight edge in either plane must not exceed 10mm.



## Damaged Beams

Beams deflect vertically when under load and this is quite acceptable if the deflection is within the limits of the standards – AS4084 =  $L/180$ . In the serviceability limit state, pallet beam deflections shall not exceed 1/180 of the span measured relative to the ends of the beam (when loaded).

The residual vertical deformation when unloaded shall not exceed 20% of the allowed vertical deflection under serviceability action specified above (1/180 of the beam span)

The residual horizontal deformation measured at the top of bottom edge of the beam shall not exceed 50% of the allowed vertical deflection under serviceability action specified above (1/180 of the beam span)

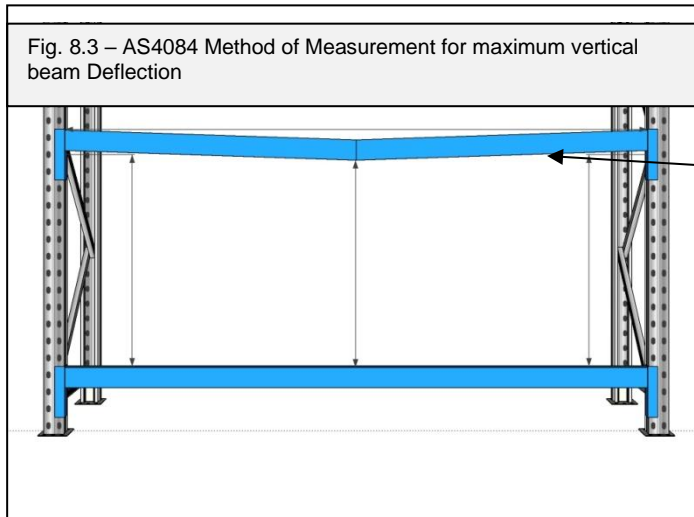
When these limits are exceeded, the beam shall be unloaded and advice sought from the racking supplier

Beam Deflection Allowance			
Beam Span	Maximum loaded beam vertical Deflection	Maximum horizontal deformation	Maximum unloaded vertical Deformation
1372	7.62mm	11.43mm	9.14mm
1520	8.4mm	12.60mm	10.08mm
2591	14.39mm	21.58mm	17.26mm
2750	15.23mm	25.39mm	18.27mm
3048	16.93mm	25.39mm	20.31mm
3350	18.61mm	27.91mm	22.33mm
3658	20.32mm	30.48mm	24.38mm
4300	23.88mm	35.82mm	28.65mm

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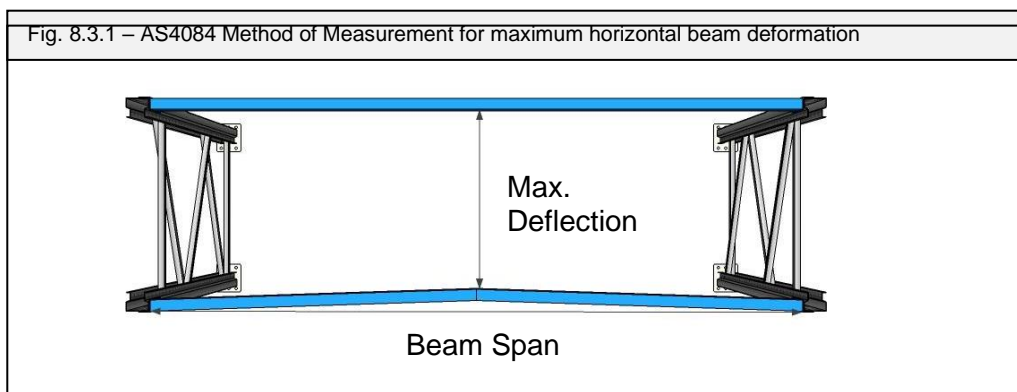
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Vertical  
Beam Span

The Maximum permanent horizontal beam deformation in an unloaded condition not to exceed 50% of maximum loaded beam deflection



The full loaded racking with the actions arising from the imperfections specified in clauses 3.3.2.1 and 3.3.2.2, but not placement or accidental actions, shall be considered. It shall be verified that under these actions, the sway of the racking shall be less than  $h/200$  where  $h$  is the total height of the racking.

NOTE: Sway is the horizontal movement in addition to any initial out-of-plumb

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## **Load Signs**

### **AS4084 - 1.6 General**

To comply with this Standard, a racking shall comply with all of the following:

(a) The racking installations shall have, in one or more conspicuous locations, a permanent corrosion-resistant plaque not less than 125 mm long and 250 mm high with maximum load action figures, written in a large font of at least 25 mm high, mechanically secured to the racking structure at 2m above floor level, which shall display the following:

- (i) Permissible working unit load limit
- (ii) Permissible total working unit load limit for each pallet beam level
- (iii) Permissible total working unit load limit for each bay
- (iv) Designers name
- (v) Racking manufacturers name, suppliers name and trademark and the installation date
- (vi) The maximum distance from base plate level to the first beam level, and the maximum distance between first and second beam levels

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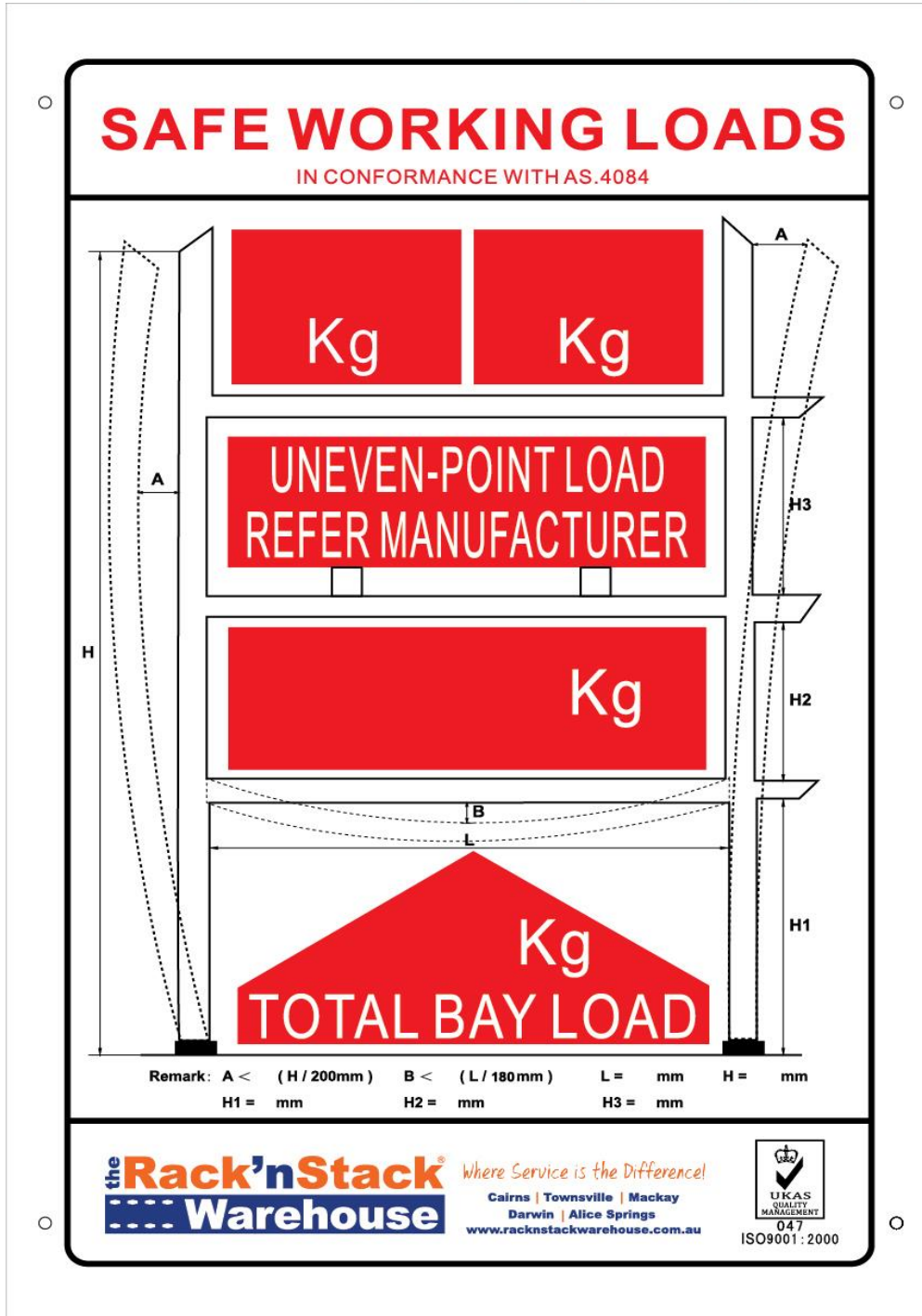
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## MAINTENANCE OF Steel Racking Structures

DESIGNED & MANUFACTURED IN CONFORMANCE WITH  
AUSTRALIAN STANDARD AS4084 : STEEL STORAGE RACKING

1. Refer to manufacturer's drawings and supporting technical data for maximum safe working loads.
2. **DO NOT** alter structure without:
  - a) Checking any potential effects against the manufacturer's technical and design data.
  - b) Undertaking a detailed risk assessment in accordance with AS4084/ FEM.
  - c) Ensuring that any change is certified by racking manufacturer / installer or a qualified structural engineer.
3. Instruct all personnel the correct use of equipments.
4. Immediately remove from service damaged or non-compliant racking and perform a detailed incident investigation.

**NOTE:** Damage due to impact can seriously impair safety.

5. Conduct regular inspections at least every 12 months;
  - a) ensure the correct application and use of equipment;
  - b) ensure that the working load limits are adhered to;
  - c) ensure that the racking installation has not been altered. A copy of the load application and configuration drawings shall be retained for this purpose;
  - d) examine the extent of damage due to the impact in the racking installation;
  - e) examine the out-of-plumb of the racking;
  - f) examine for any dislocation and deformation of sections and connections for uprights and beams;
  - g) examine connections for deformation or signs of cracking of the welds; and
  - h) examine base plates and floor anchors

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### How to complete a SWL sign

**A:** Frame Height / 200mm.

**B:** Span of the beam /180mm

**C:** Total Bay Load.

**D:** Capacity per pair of beams / 2 pallets

**D1:** Capacity per pair of beams / 2 pallets

**L:** Beam length

**H:** Frame Height

**H1:** Height to first beam level

**H2:** Height between 1<sup>st</sup> and 2<sup>nd</sup> beam level

**H3:** Height between 2<sup>nd</sup> and 3<sup>rd</sup> beam level

**G:** Manufacturer's Details.

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