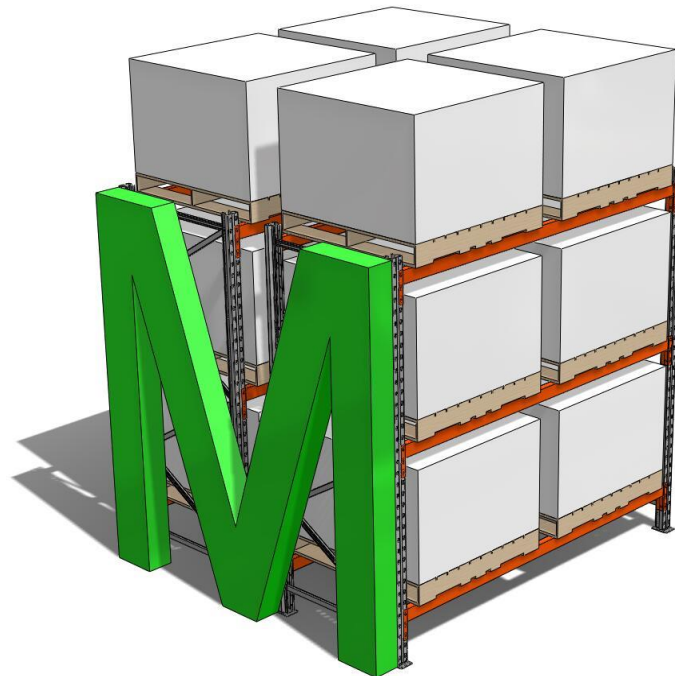


MACRACK

SELECTIVE RACK MAINTENANCE GUIDE



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AMENDMENTS TO SELECTIVE RACK USER AND MAINTENANCE GUIDE

Issue / Amendment	Date Issued	Description	Inserted By

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PURPOSE

This guide provides advice on the safe operation and maintenance of selective pallet racking, and gives practical guidance on detecting and classifying unsafe racking.

This guide is intended to be read by persons working with and responsible for selective racking. Generally the owner of the racking has a duty of care to ensure that the racking is safe and well maintained for the safety of employees and others.

BACKGROUND

This guide is based the requirements of AS4084 – 2012 (Steel Storage Racking) for the current standard racking inspection and maintenance procedures.

APPLICATION

This guidance applies to static selective pallet racking. Additional safety requirements may be required for cantilever, drive-in, double-deep, pallet-live, push-back or other specialised racking. All advice is of a general nature and applicable in conjunction with of the requirements of relevant Australian Standards. It is not designed to replace Australian Standards on racking. If in doubt Macrack (Australia) Pty Ltd should be contacted for specific operational and maintenance requirements.

RACKING DESIGN AND MATERIALS HANDLING EQUIPMENT

Storage racking for products on pallets should be designed specifically for the size, shape and weight of the products being stored. The racking design should be compatible with the pallets and the materials handling equipment in use within the workplace. Aisle width should be matched to the turning circle of the forklift or other materials handling equipment used to put-away, replenish or pick. Steel storage racking should be designed and installed in accordance with Australian Standard 4084 –2012 as a minimum.

SAFE WORKING LOAD AND MAINTENANCE SIGNAGE

Particular attention should be paid to racking being overloaded.

Do not exceed the Safe Working Limit (SWL) per unit load (pallet), per level or the total safe working load per bay of the racking.

Information for users should be displayed in one or more conspicuous locations making users aware of its SWL. Often these are displayed at the end of each run of racking. Where a site has racks with multiple differing multiple SWL then sufficient signs must be displayed to make it clear which SWL applies to which rack. Each sign must be 2M from the ground to allow clear visibility. Additionally there should be some means for users to determine the weight of each unit load being placed into racking.

Maintenance signs are also required. These may be combined with the load sign or separate.

Each SWL sign contains the following information:

- a) Macrack's name and trademark and contact information.
- b) Safe working unit load.
- c) Safe working unit load for each beam level.
- d) Safe working total unit load for each bay.
- e) The height to the first beam level.

In the case of modifications, design criteria should be provided to allow updating of the SWL (Safe Working Load) and relevant signage on the rack updated accordingly.



Each maintenance sign contains the following notes:

- a) Reference to drawings and technical data (usually the SWL sign).
- b) Warnings about making alterations to the structure.
- c) Users must be instructed in correct usage of rack and a note that damage can seriously impair safety.
- d) Regular inspections to be made for
 - a. Correct application and use
 - b. Correct loading
 - c. Damage
- e) Refer to AS4084 Steel Storage Racking for more detailed info.
- f) If in doubt contact Macrack
- g) Macrack's name and trademark and contact information.

ALTERATION, ADDITION OR REPLACEMENT OF RACK COMPONENTS

If rack is modified in any way it can compromise its integrity and capacity. Any modifications to the rack should be authorised or checked by a competent person. Effects of modifications on the Safe Working Load should also be considered. Documentation, signs, and drawings should be changed to reflect any changes and users of rack advised.

Do not modify components by drilling or welding. Any replacement parts must be genuine Macrack manufactured items to ensure the rack is not compromised or warranty voided.

COLLISION PROTECTION

The lowest part of uprights is most prone to damage. Macrack has a variety of protective devices to minimise the risk and severity of damage.

ROUTINE INSPECTION AND MAINTENANCE

Users of racking should refer to Section 9, "Operation and Maintenance of Adjustable Pallet Racking", of AS4084 – 2012(Steel Storage Racking) for the current standard racking inspection and maintenance procedures. The following recommendations are a brief summary both of this standard.

In general racking systems require no maintenance other than to replace components damaged by misuse. Regular inspections are essential.

Rack Safety Officer

Each site should have a designated 'Rack Safety Officer'. This officer should put in place a regular inspection and reporting procedure so that any damage or incorrect usage can be reported and then acted upon. The Rack Safety Officer routinely inspect and keep records of racking damage, incorrect usage, maintenance and safety.

Risk Colour Coding

FEM 'Guidelines for the Safe Use of Static Racking' classifies damage into Green, Orange, and Red classifications of risk.

Green Risk: Risk requiring surveillance.

Orange Risk: Hazardous risk requiring action as soon as possible.

Red Risk: Very serious risk requiring immediate action.

Green Risk definition:

Risk requiring continued observation.

For example - where damage does not exceed the maximum allowable. This shows where damage exists but is not in need of repair or replacement at the time of assessment. This damage should be re-assessed at the next rack safety audit.

Orange Risk definition:

This is serious risk requiring action but not immediate action.

For example - damage is severe but not to the point where the immediate removal from service is required. As a guide - if the damage is double or less than that indicated in the RISK ASSESSMENT section then ORANGE risk applies.

If this rack is unloaded or becomes unloaded it should remain unloaded until repairs are made. If this rack is still loaded 7 days after a risk is identified it should then be unloaded and removed from service. A method of removing rack identified from service should exist ensure that they do not come back into use before repairs are complete.

Repairs to ORANGE category risks should take place within 4 weeks of being identified. If not repaired within 4 weeks the risk should be reclassified as RED risk.

Red Risk definition:

RED risk is very serious risk where immediate action is required.

As a guide if the damage more than double that which is indicated in RISK ASSESSMENT section RED risk applies.

Where such risk is identified rack should be immediately unloaded and removed from service.

A method of removing rack identified from service should exist ensure that they do not come back into use before repairs are complete.

Note that users and safety auditors will also assess correct use and application of the rack with the GREEN, ORANGE and RED risk categories and not confine themselves to damage.

RISK ASSESSMENT

Are rack load signs posted?

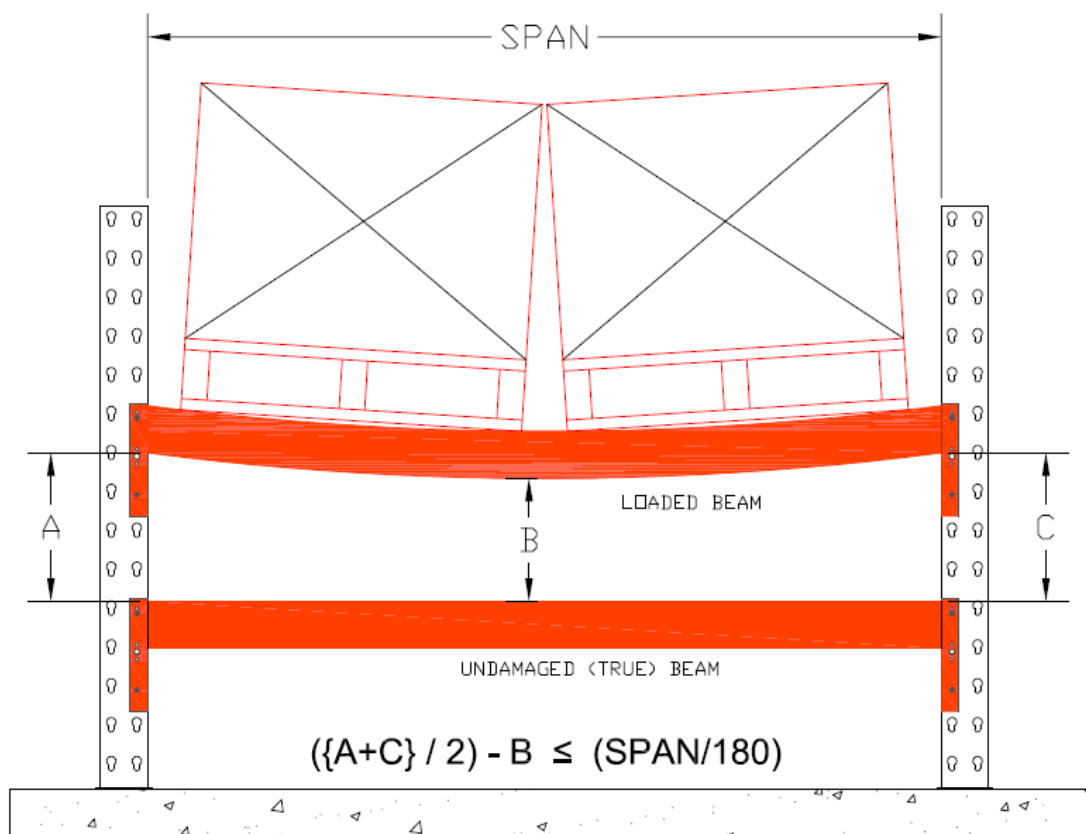
Check that the bays conform to the SWL signs provided Macrack, and that the racks have not been modified in configuration or componentry. Non-conformance with these criteria is always a RED category risk.

Are beams overloaded?

Beams will bend under load. An overly large amount of bending indicates that the beams is overloaded. The usual maximum allowable bend (deflection) in a loaded beam is $SPAN/180$.

For example - this means that for a standard 2743mm beam the allowable deflection is

$2743mm / 180 = 15.2mm$.



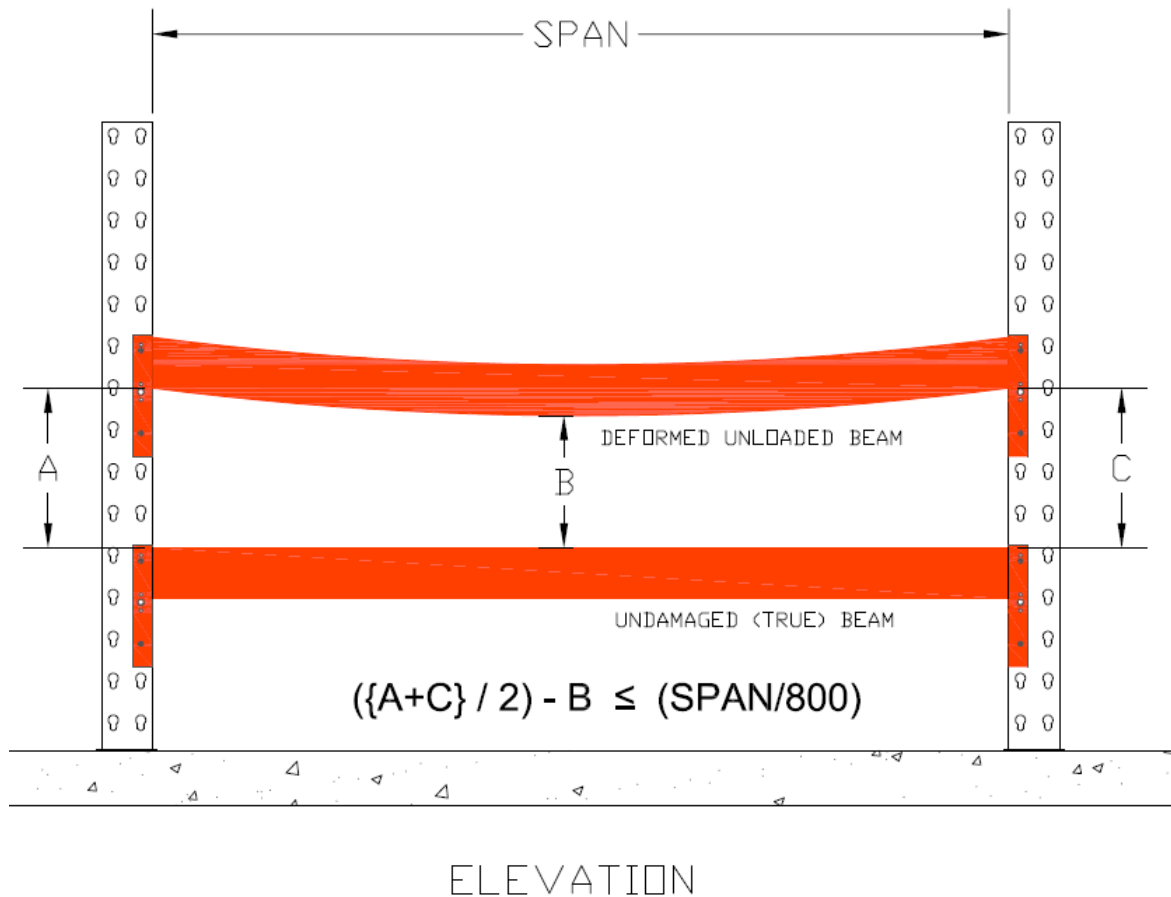
ELEVATION

Have the beams been permanently damaged by overloading?

When a beam is unloaded it should be almost straight and very little deflection. If an unloaded beam shows permanent deflection it is likely to have been overloaded at some stage. The allowable deflection for an unloaded beam is $SPAN/800$.

For example - a standard 2743mm beam the allowable deflection is

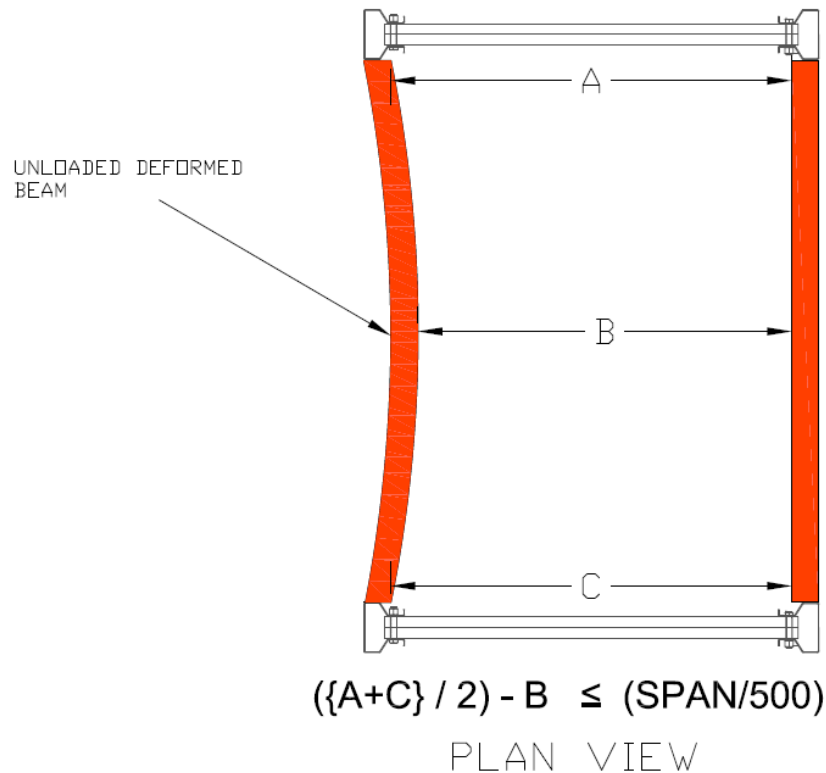
$$2743\text{mm} / 800 = 3.5\text{mm}.$$



Are beams damaged?

Check for impact damage on beams. Beams with only minor apparent damage may have damage to the welds. Such beams should be removed and checked by a Macrack approved assessor prior to returning to service.

If a beam is permanently deformed in the horizontal direction it is likely that it has suffered impact damage and should also be removed from service (see diagram below). The maximum allowable permanent deflection in an unloaded beam is $\text{SPAN}/500$.



Are safety pins missing?

Safety pins are essential for safety as they prevent a beam being unintentionally lifted out of position. This may occur if the pallet below is lifted too high. If pins are regularly being dislodged, contact the Macrack. Non-conformance with this criterion is RED category risk but may be assessed by a Macrack approved assessor as ORANGE or GREEN risk especially where the rack is partially or fully used as shelving.

Are beam connectors properly engaged?

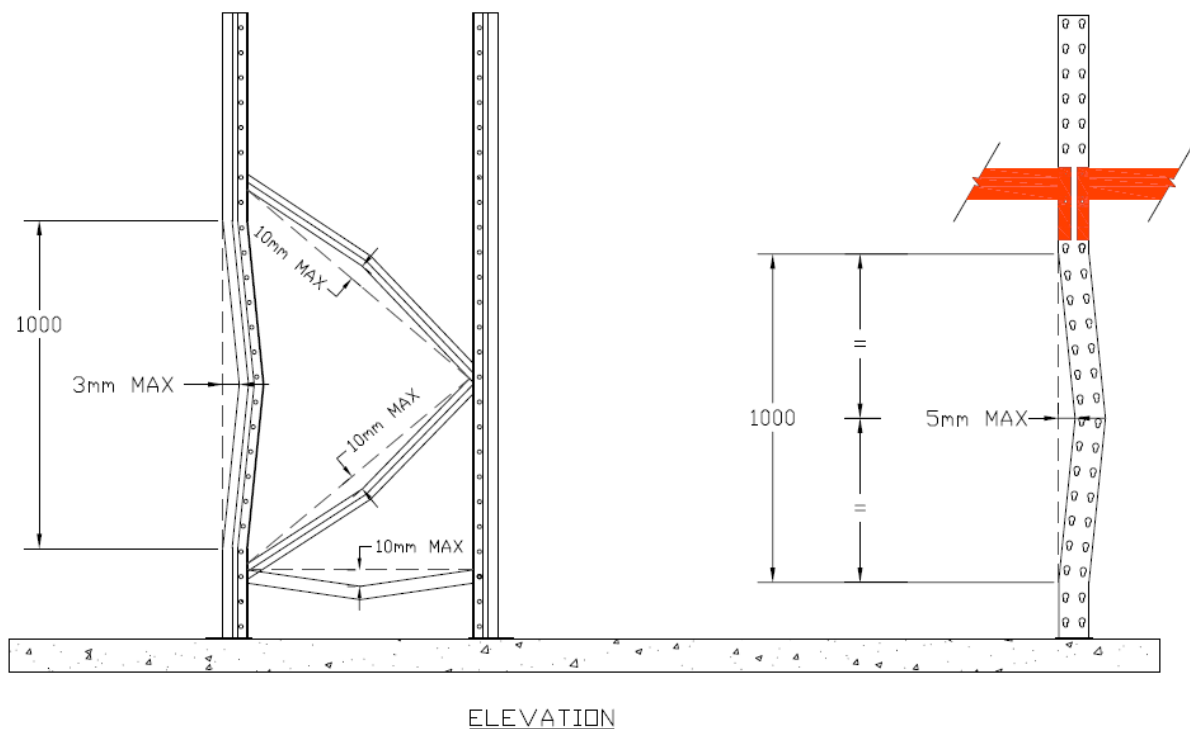
Beams can fully or partially pop out of the upright (especially when safety pins are missing) and be suspended by one end only. Non-conformance with this criterion is RED category risk.

Are uprights damaged, twisted or out of alignment?

The stresses of large loads are transmitted through uprights to the floor. The various forces must flow directly through the upright as intended and very small deviations from true will greatly affect the load that a rack is capable of. Unlike beams, uprights will often show no visible sign of stress until actual failure. For this reason it is critical that particular attention is paid to them. The diagram below is a guide to maximum allowable bending of uprights. Use a 1M rule to assess the damage as per the diagram. Bends over shorter distances should be assessed pro-rata. That is a bend in the face of the rack nominally 3mm in a metre is 1.5mm in half a metre.

Where an upright has a visually noticeable twist this must be corrected. Most often this occurs at the baseplate. A twist to an upright may be assessed as GREEN, ORANGE or RED damage by a Macrack approved assessor. Users should always consider twist that is easily noticed visually as minimum ORANGE risk.

Note that this guide only applies to even bending in uprights. Highly localised damage such as dents, kinks or tears in upright is always RED category damage.



Are racking braces damaged?

For bracing, the member deviation from a 1 m long straight edge in either plane should not exceed 10 mm.

Are footplates damaged?

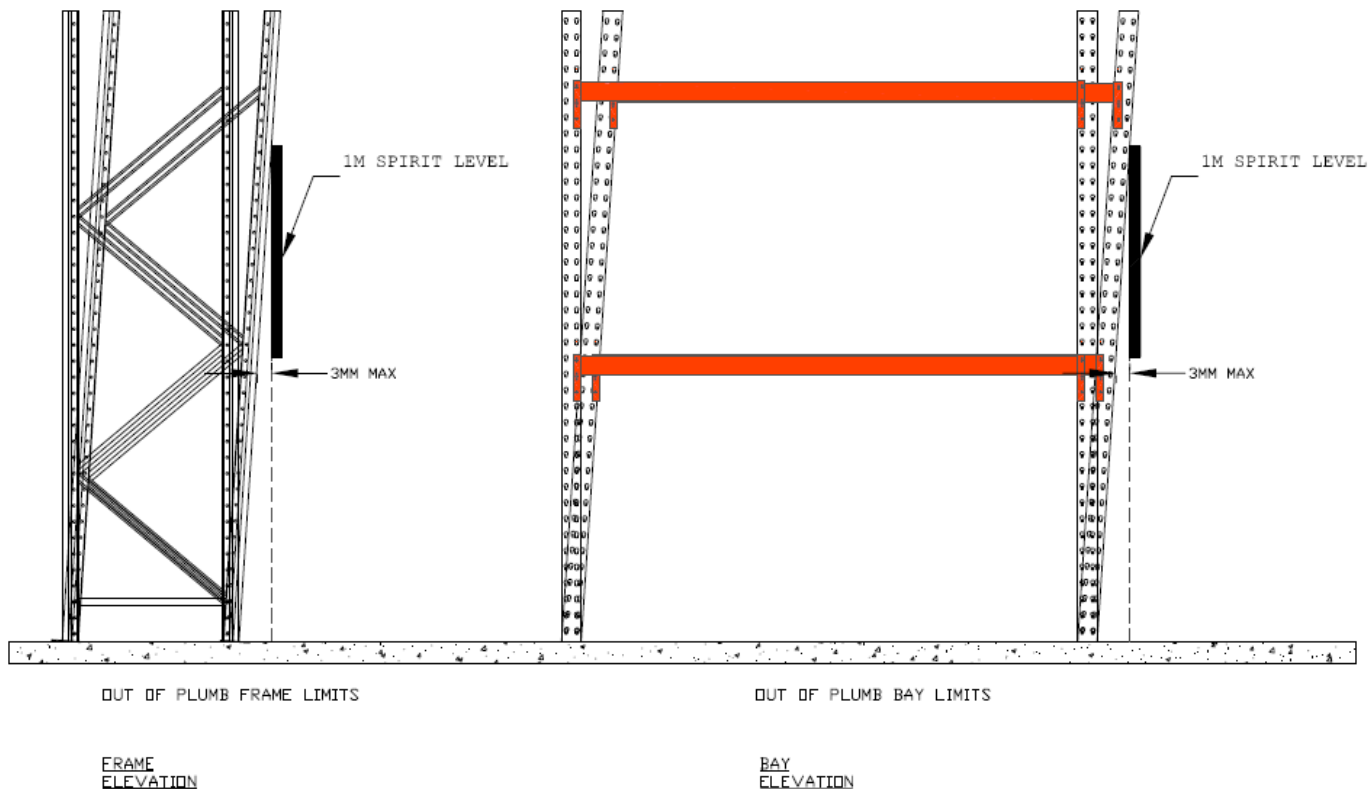
If the upright is damaged and is to be replaced, the footplate should also be carefully checked as it is almost certain to have sustained damage.

Are splices in good condition and located correctly?

Check that splices have no damage and bolts remain tight. Upright should NEVER be spliced below the first beam level.

Is the racking plumb (vertical)?

Out of plumb racking creates uneven and disproportionate loads on the uprights. The maximum an upright can be out of plumb is 3mm per metre.



Floor fixings

Floor fixings should be installed and should be replaced if missing or damaged. If the floor fixing has been damaged, it is likely that the footplate will also be damaged.

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REGULAR INSPECTIONS

Everyday reporting

Operators should ensure correct use of racking. They should also report any damage or usage issues to the Rack Safety Officer who will then assess and classify risk. It is possible that a hazard may be not damage but usage – ie personnel overloading beams. In this case the risk could be managed by training.

Weekly Inspection

The Rack Safety Officer should perform a visual inspection from ground level of all racking. All occurrences of Red or Orange Risk should be recorded and instances of RED Risk removed from service.

Monthly Inspection

The Rack Safety Officer should perform a visual inspection from ground level of all racking and also empty random bays to carry out a more detailed inspection.

Items already identified as Red Risk should be checked to remain out of service and action taken to rectify the risk.

Orange Risk items should be checked to ensure action is planned to rectify the risk.

Check that all signage is in place, visible and legible.

6 to 12 Month Inspection

This is a major inspection by a technically competent person experienced in the identification and classification of rack damage. It is likely that this person will be externally sourced and can independently assess racking, maintenance and reporting.

The most current drawings of the plan and elevation will be kept by the Rack Safety Officer for this purpose together with load information. The minimum inspection period is once every 12 months.

DAMAGE ACTION PROCEDURE

