

REFERENCE TOOL

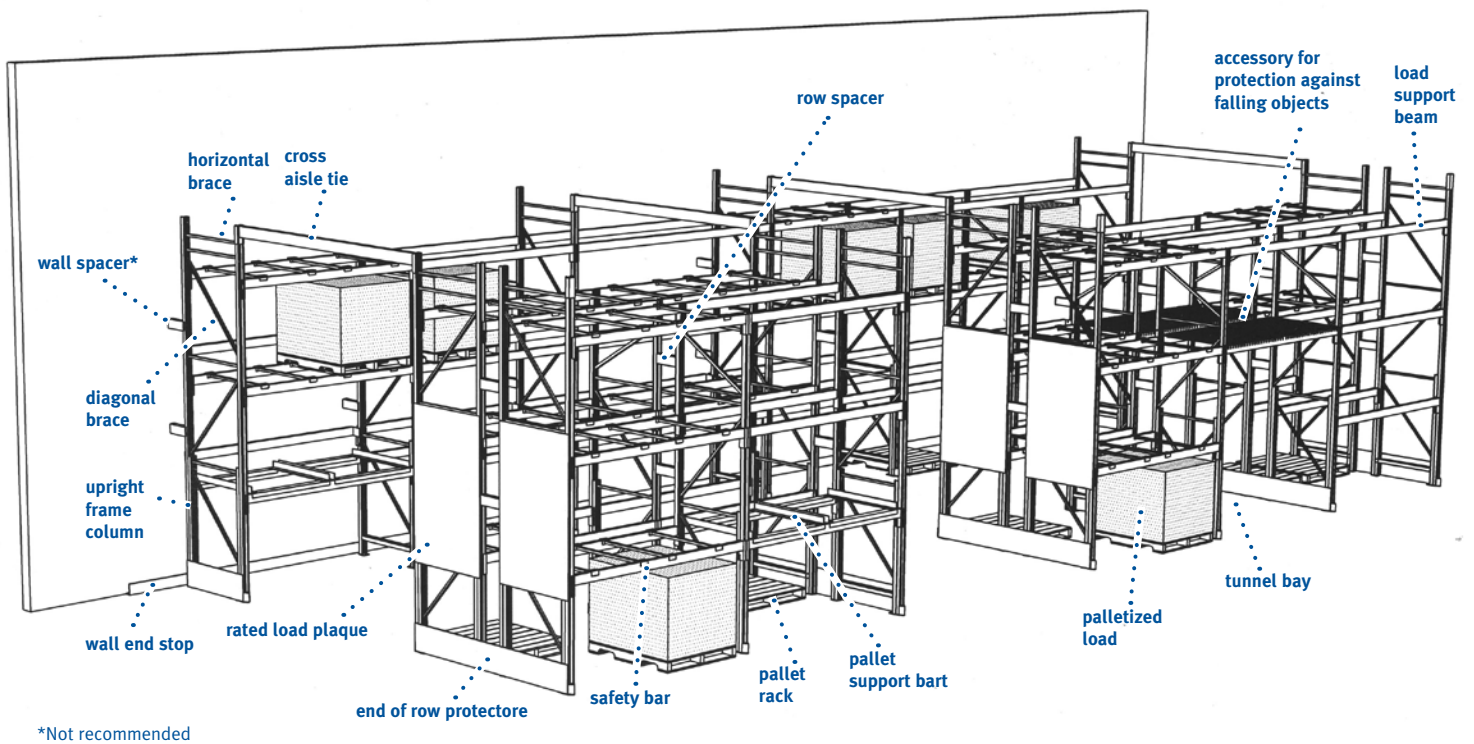
Pallet Racks

**MOST FREQUENTLY
ASKED QUESTIONS**



WHAT IS A PALLET RACK?

A pallet rack is a structure mainly composed of braces and beams and designed to carry loads, which are usually palletized, in the course of storage operations.



Rack components and accessories
(Illustration: Technirack)

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A - Can the pallet rack be attached to the structure of the building?

No.

The pallet rack must be stand-alone. Any fastening to building structures is generally forbidden, unless the building was specially designed for that purpose.

If it is absolutely necessary to attach a pallet rack to a structural component, one must make sure that any forces thereby transferred to the building do not exceed the specifications of the *National Building Code* (NBC).

B - Are wall spacers recommended?

No.

For the same reasons as why the pallet rack cannot be attached to the building structure.

A wall spacer is used to connect a pallet rack upright frame to an adjacent wall in order to keep them evenly spaced.

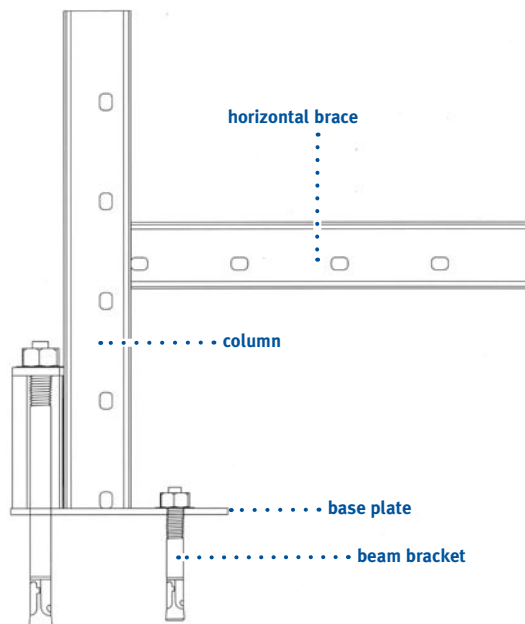
C - Does the pallet rack need to be anchored to the floor?

Yes.

Pallet racks are not designed to withstand an impact from a forklift truck. When pallet racks are used with forklifts, ground anchoring is always recommended for increased stability.

Expansion bolts can be used to anchor pallet racks because they are resistant to shearing and pulling.

In some situations, particularly when the floor concrete does not afford enough of a purchase for standard anchor bolts, chemical anchoring can be used. Chemical anchoring consists in filling the anchor hole with a compound — epoxy resin, for example.



Base plate and anchor bolts
(Illustration: Technirack)

Anchoring the base plate

- 1- All base plates are anchored with **at least one anchor bolt**. Using two anchors instead of one helps prevent the base plate from pivoting in the event of an impact. However, the anchor bolts must be spaced far apart to prevent the floor concrete from chipping or cracking.
- 2- Anchor bolts must be **installed and tightened as per the bolt manufacturer's specifications**.
- 3- The **concrete floor** around base plates **must be free of cracks and fissures**. The ground and foundations must be strong enough to hold up the loads applied. When pallet racks are installed, the thickness and flatness of the floor slab must be considered.

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A - Can we adapt or repair the pallet rack ourselves?

No.

Any changes must be previously approved by the pallet rack manufacturer or by an engineer.

The configuration of beams and braces must be specified by the manufacturer in the installation plans and specifications. For example, any modification of the height of a brace will alter the load capacity and stability of a pallet rack. The racks must be installed by the manufacturer itself, by one of its representatives or by contractors specialized in this field.

The company using the pallet rack must keep the plans and specifications on file — available and up to date.

Any modification to the pallet racks not envisaged in the original specifications, particularly in reference to their configuration, must be submitted to the pallet rack manufacturer or to an engineer before work can proceed. A new rated load capacity for the installation as well as its specifications and tolerances must be re-computed by the manufacturer or an engineer.

B - Should we be replacing damaged components?

Yes.

Any damaged components must always be replaced with new, identical components or parts equivalent to the original components, as per the manufacturer's or engineer's directives. Cracked or split members must be replaced. Any parts with evidence of damage caused by corrosion must be repaired or replaced.

The configuration of any diagonal braces on the pallet racks may not be changed in the course of a repair job.

Repairs must always be done as per manufacturer specifications, unless a repair method is approved by an engineer, such as to guarantee strength at least equal to that of the original component.

Any repairs such as straightening of bent components, welding sections of components together, or sleeving or splicing damaged sections carried out without prior consultation with the manufacturer, one of its representatives or an engineer is strictly forbidden.

Should there be a rated load identification plate on the pallet rack?

Yes.

There must be a visible and readable rated load identification plate affixed to the rack.

The pallet rack's rated load must be observed. Localized overloading in a pallet rack can permanently deform beams or their connectors.

This ID plate **must be corrosion-resistant**.

The ID plate must contain the following information:

- Manufacturer's name
- Maximum permissible load per alveole
- Permissible load for an entire bay

The alveole is the name given each space on a pallet rack, generally designed to accept palletized loads.

A bay is a vertical stack of alveoles between two pallet rack upright frames.

It is also **recommended to add the following mention** of the rated load ID plate:

"No changes may be made to the pallet rack's rated load or configuration, unless previously approved by the manufacturer or an engineer."

ABC PALLET RACKS INC.

Rated load of the pallet rack

- Maximum permissible load per alveole: _____ Kg
- Total permissible load per bay: _____ Kg

Caution: No changes may be made to the pallet rack's rated load or configuration, unless previously approved by the manufacturer or an engineer.

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Are safety pins compulsory?

Yes.

Safety pins are components inserted into a beam connector to prevent the beam from accidentally separating from the upright frame.

These pins can be simple cotter pins, a bolt with a nut, etc.

There must be safety pins at either end of every beam.

They must be designed to prevent intentional or accidental removal. In the case of bolts, the nuts must be tightened.

At the top of the pin, a small end stop prevents it from being intentionally or unintentionally removed from the column.



Recommended as a lock pin design

The pin is inserted in the column with a hammer, and thus cannot be intentionally or unintentionally removed from it. However, particular attention should be given to the wear and tear on each side of the stem.



Recommended as a lock pin design

The pin is not securely attached, since it can be intentionally or unintentionally removed.



Not recommended as a lock pin design

5

Are safety bars compulsory?

Yes.

Safety bars are components usually installed in pairs, perpendicular to the rack beam, to prevent the beam from accidentally separating from the upright frame column, and there are different systems for inserting them.

Safety bars are installed on the beams to help support the palletized loads. They are not designed to support loads by themselves; this is what the beams are for.

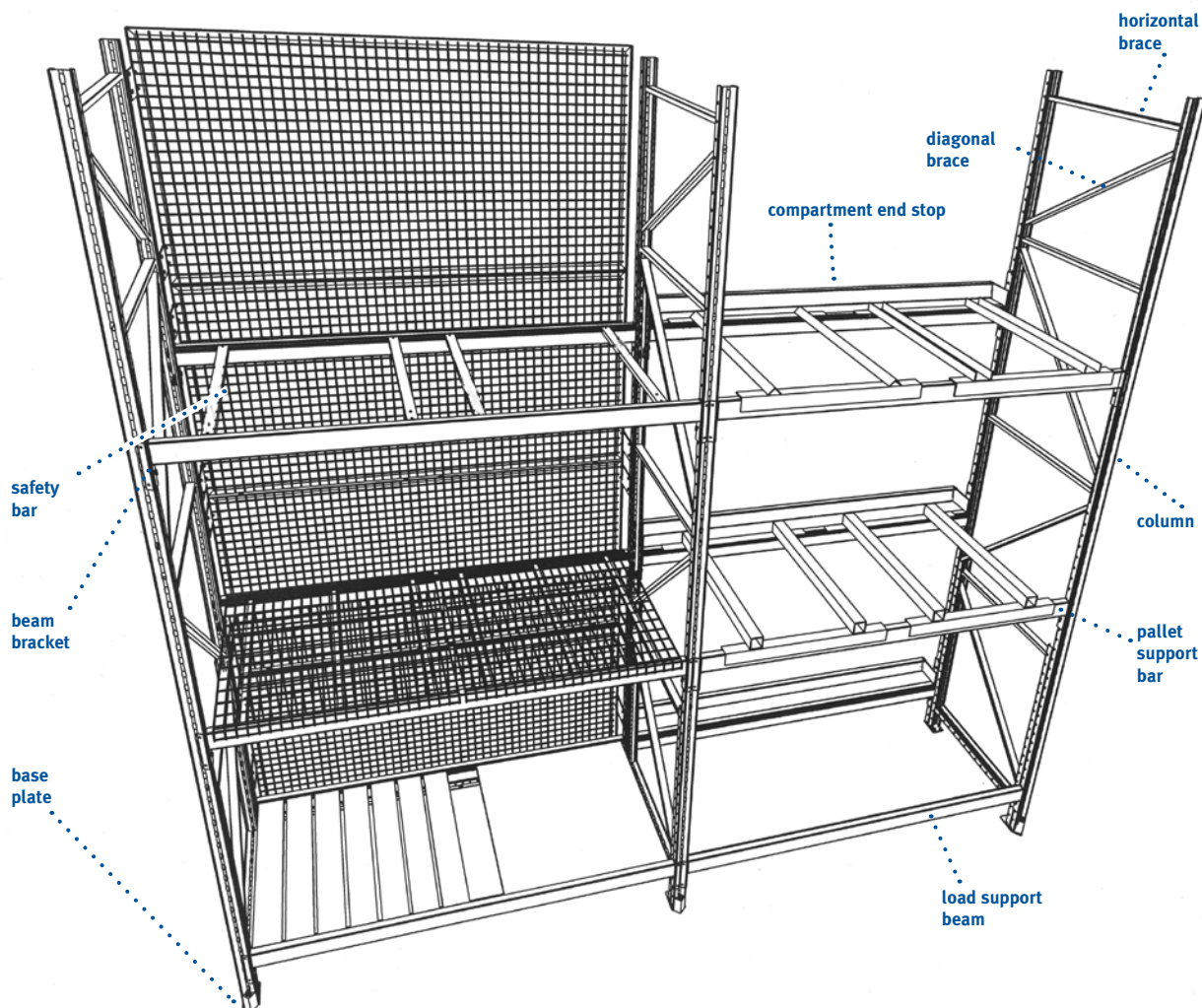
The safety bars must be connected to the beams.

Are support bars recommended if the load is too big to rest directly on the beams?

Yes.

As opposed to safety bars, support bars are designed to carry a load by themselves when the dimensions, awkwardness or type of load prevent placement directly on the beams.

These support bars provide enough clearance for truck forks to be inserted under loads that are not on a pallet (wooden beams, for example).



Rack components and accessories
(Illustration: Technirack)

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Should there be some clearance left over for the placement of loads in the pallet rack?

Yes.

Built-in clearance is an important component of pallet rack design. If there is not enough clearance, there is an increased risk of damage to loads or racks. The forklift manufacturer should be consulted to make sure enough clearance is built into the pallet rack design to allow forklift operators to handle loads safely.

To find out how much clearance is required, consult tables 5 and 6 of the safety guide titled “*Safety of Pallet Racks*”.

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Should devices be added to prevent falling objects?

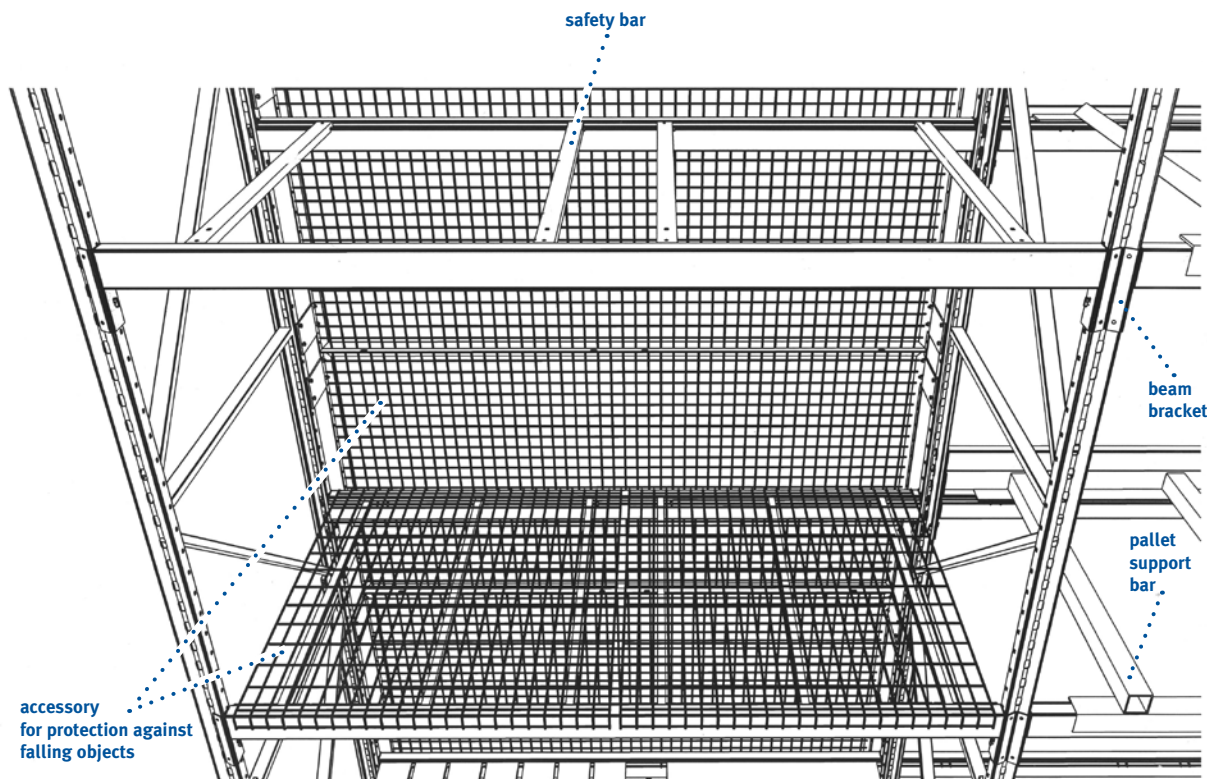
Yes, if there is a risk of anything falling from a pallet rack.

Accessories for protection against falling objects are installed on the beams or across the back face of an alveole to prevent things from falling, particularly if there are alveoles located above the pallet rack tunnels or of the rear side of some alveoles face walkways, warehouse aisles, throughways, work stations or other areas where people are likely to be found.

It should be forbidden to set up a work station in a main or warehouse aisle.

The pallet rack tunnel is a throughway left open in a row of pallet racks for an aisle to go through.

Accessories for protection against falling objects usually consist of *latticed panels or metal gratings*. These screens are used from a height of 1 m (40") to a height above the warehoused loads. The loads should not butt against these screens.



Rack accessories: safety bars, pallet support bars
and accessories for protection against falling objects
(Illustration: Technirack)

Can single-use pallets (disposable or limited-use pallets) be used in a pallet rack?

No.

Pallets are loading platforms used to support one large or many small packages all combined into a palletized load. It can also be considered part of a product's packaging.

There are stated standards for the design and manufacture of pallets and skids.

Single-use pallets are designed to be used only once and are therefore considered to be part of the packaging. These low-cost pallets are usually made of low-quality wood, particle board, cardboard or polystyrene foam.

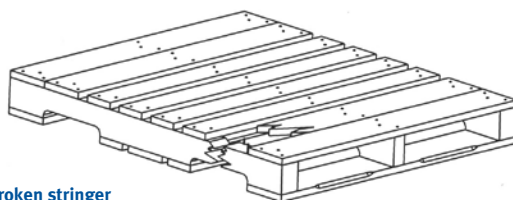
If a limited-use pallet is to be stored on the pallet rack, it is recommended to place a reusable pallet underneath.

The only pallets that can be used are those that are compatible with the pallet rack in terms of dimensions, weight, strength, and so on. Pallets must have sufficient capacity to support a load without breaking or deforming.

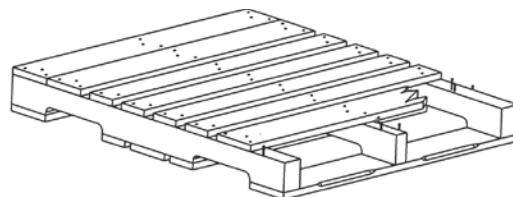
Pallets must be inspected regularly.

Pallets should be discarded if they are damaged or defective as in the cases below:

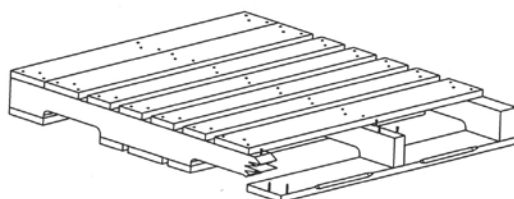
- Missing, incomplete, split or broken stringer
- Missing, incomplete, split or broken board
- Nails sticking out



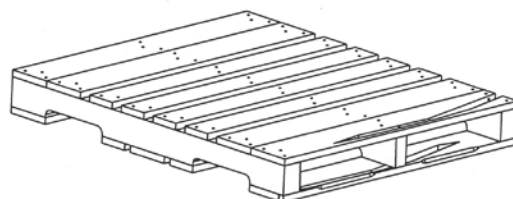
Broken stringer



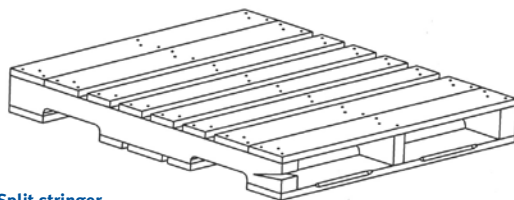
Missing and broken boards



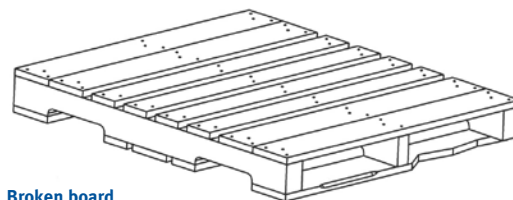
Deficient stringer



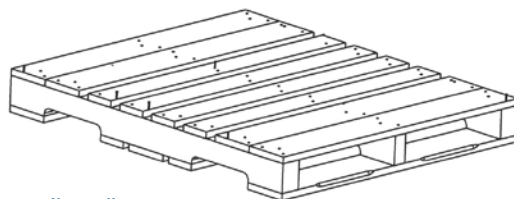
Split boards



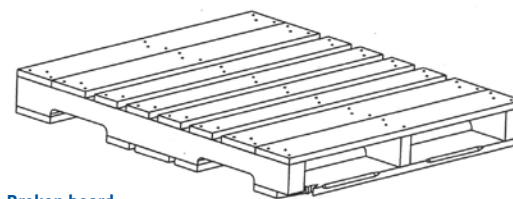
Split stringer



Broken board



Protruding nails



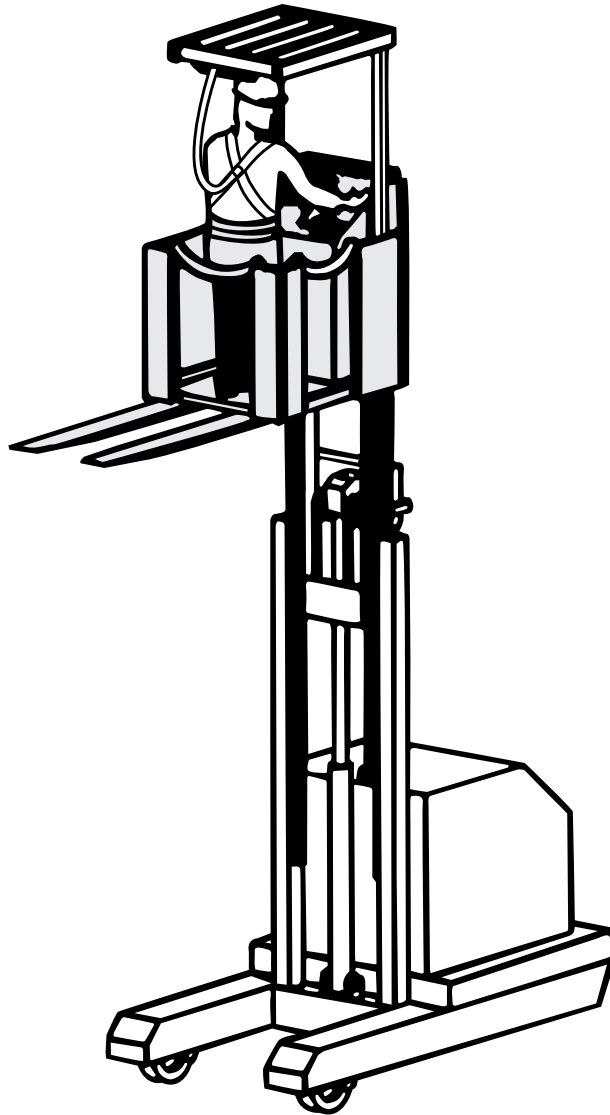
Broken board

Damaged pallets to be rejected
(Illustration: Technirack)

Yes.

Because the driving station on an order picker elevates, their operators must wear a harness, as stated in the *Act Respecting Occupational Health and Safety* (section 346).

Order pickers are designed for manual preparation of orders. The operators work in a standing position in a cab that can rise several metres, enabling them to custom-prepare orders and restock the racks.



Order picking truck
(Illustration: Technirack)

B - Are rear safety bars recommended for forklift operators working in a standing position?

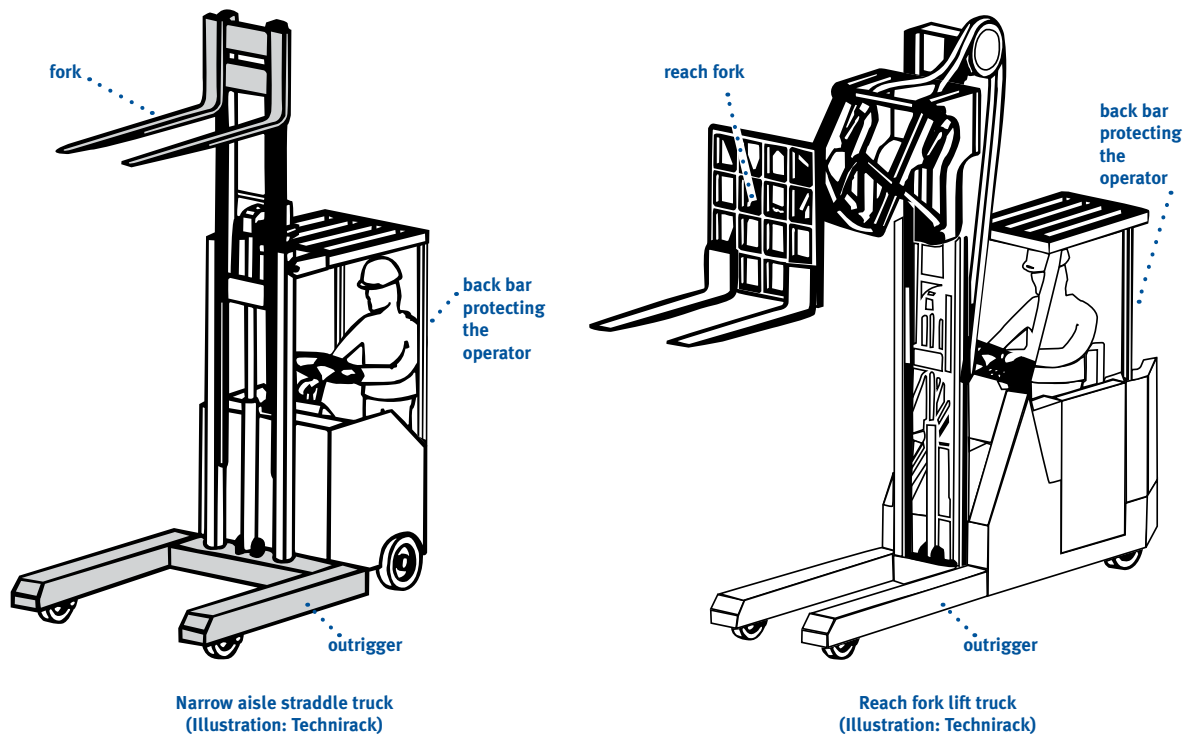
Yes.

The safety device consists of one or two bars installed behind the standing operator of a narrow-aisle straddle truck or a reaching carriage truck.

This safety device is designed to prevent objects transversal to the truck (e.g. beams) from entering the operator's driving cab when the forklift is reversing.

Any changes made to forklift trucks must be previously approved by the manufacturer or by an engineer.

This safety device must be in compliance with the specifications outlined in section 7.28 of the *Safety Standard for Low Lift and High Lift Trucks ASME B56.1* (1993-A.1995).



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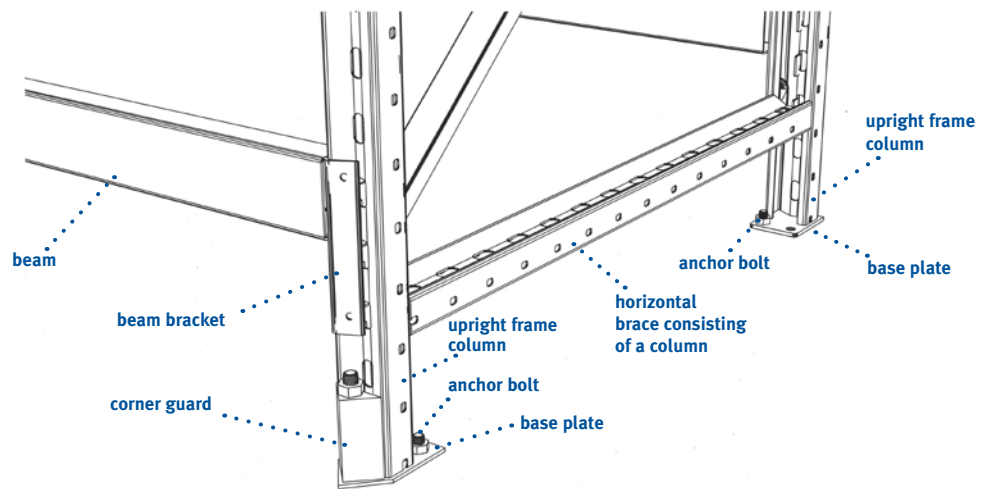
Are column guards recommended?

Yes.

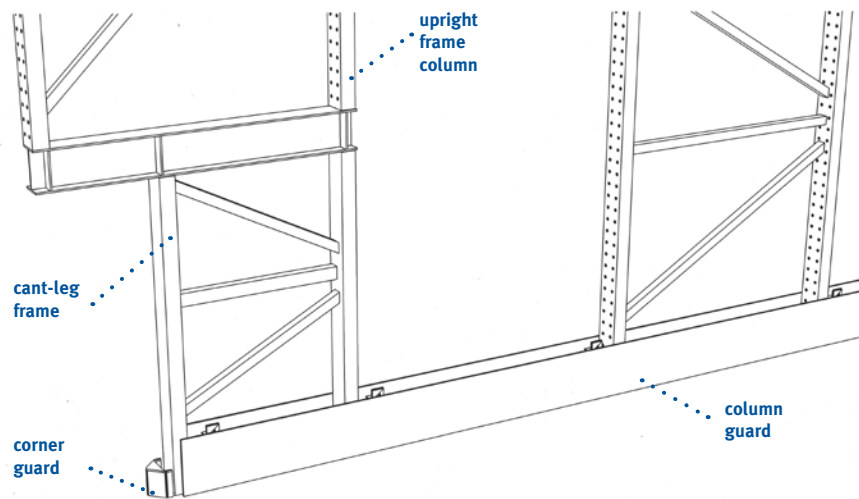
The purpose of protecting uprights and columns, whether or not they are attached to pallet rack braces, is to increase their resistance to impacts from forklifts. They are separated into two major groups:

- Column guards (bumper, stopper, angle deflector, etc.)
- Row end protector (guardrail, bumper post, etc.)

Incidentally, protection can be increased by doubling the upright columns.



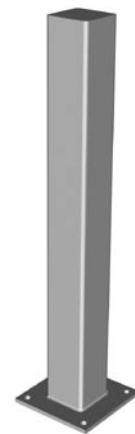
Built-in column protection
(Illustration: Technirack)



Cant-leg frame
(Illustration: Technirack)



Protective barrier separating the pedestrian
walkway and the main aisle
(Illustration: Technirack)



Row end protector
(Illustration: Technirack)

Should earthquake hazards be factored into pallet rack design?

Yes.

Pallet rack users who wish to have earthquake risks factored into their design should so inform the manufacturer. The manufacturer will then consult seismic data provided in the *National Building Code*, notably in Table C-2 of its Appendix C, *Design Data for Selected Locations in Canada*.

Pallet racks designed to withstand overloads attributable to earthquakes are safer because they comprise more bracing and stronger anchoring. They are more resistant to domino-type collapsing if one of the rows is hit by a forklift. This type of pallet rack is recommended in big-box stores open to the public and wherever hazardous materials are stored.

A - Do workers need to be trained in order to report any damage to the pallet rack?

Yes.

Workers must be trained to be in a position to detect and report easily visible irregularities in the storage system. In addition, the forklift operators need to be informed of the effect of machinery impacts with the pallet racks.

B - Is it necessary to have an inspection and preventive maintenance program for the pallet racks?

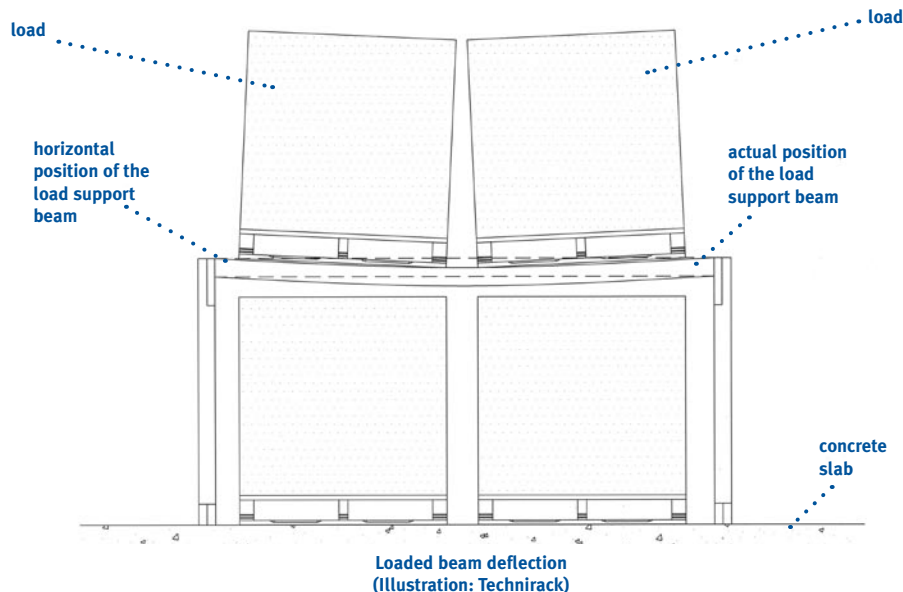
Yes.

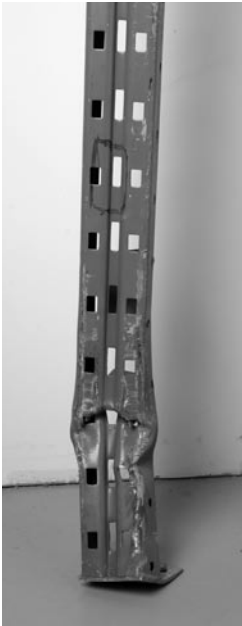
Pallet rack users must consistently apply the inspection and preventive maintenance program. This program includes daily monitoring as well as planned inspections (both visual and in-depth).

The purpose of daily monitoring is to report easily visible incongruities such as the following:

- Bent components
- Poorly positioned loads
- Missing safety pins
- Loose anchor bolts
- Cluttered warehouse aisles and main aisles

Planned inspections are conducted both visually and with specific measuring instruments (levels or precision metal rulers) to assess the verticality of the upright columns and any deformations in the beams or uprights. It may become necessary to unload entire sections of a pallet rack in order to measure the permanent deformation of certain components. The content and frequency of planned inspections can be determined in consultation with the pallet rack manufacturer.





Column damaged by repetitive impacts from the front and the side (Front view)
(Photo: Maurice Vézinnet)



Same damaged column (Side view)
(Photo: Maurice Vézinnet)



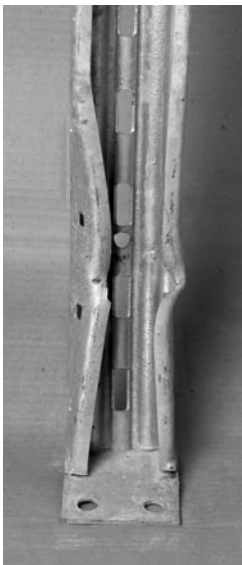
Damaged column: The weld near the base plate gave way
(Photo: Maurice Vézinnet)



Damaged double column: Substandard weld, worn and deformed column due to friction with the lift truck outriggers
(Photo: Maurice Vézinnet)



Corroded steel column worn by friction and rewelded
(Photo: Maurice Vézinnet)



Galvanized steel column damaged by impacts from the rear (Rear view)
Photo: Maurice Vézinnet



Same damaged column (Side view)
Photo: Maurice Vézinnet



Damaged column guard
(Photo: Maurice Vézinnet)



Damaged column repaired by electrode welding
(Photo: Maurice Vézinnet)

The information and illustrations contained herein are drawn from a document titled “*Safety of Pallet Racks*”, a joint publication of the *Commission de la santé et de la sécurité du travail au Québec* (CSST) and the *Association Sectorielle Transport Entreposage* (ASTE).

Please refer to the above-mentioned guide for further details.

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