



# Conventional Pallet Racking

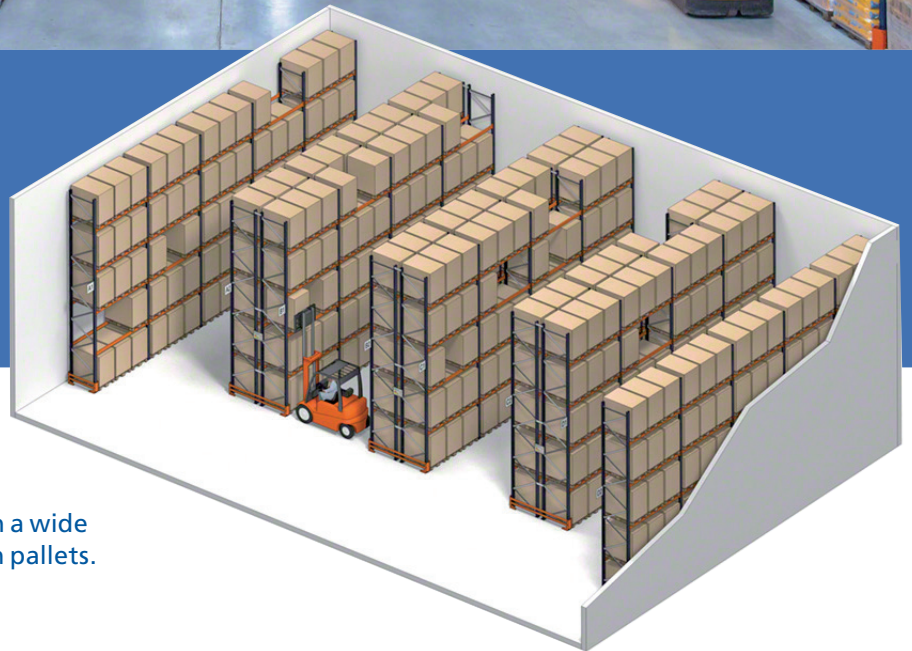
A universal system for direct access to each pallet







## General Features of Conventional Pallet Racking



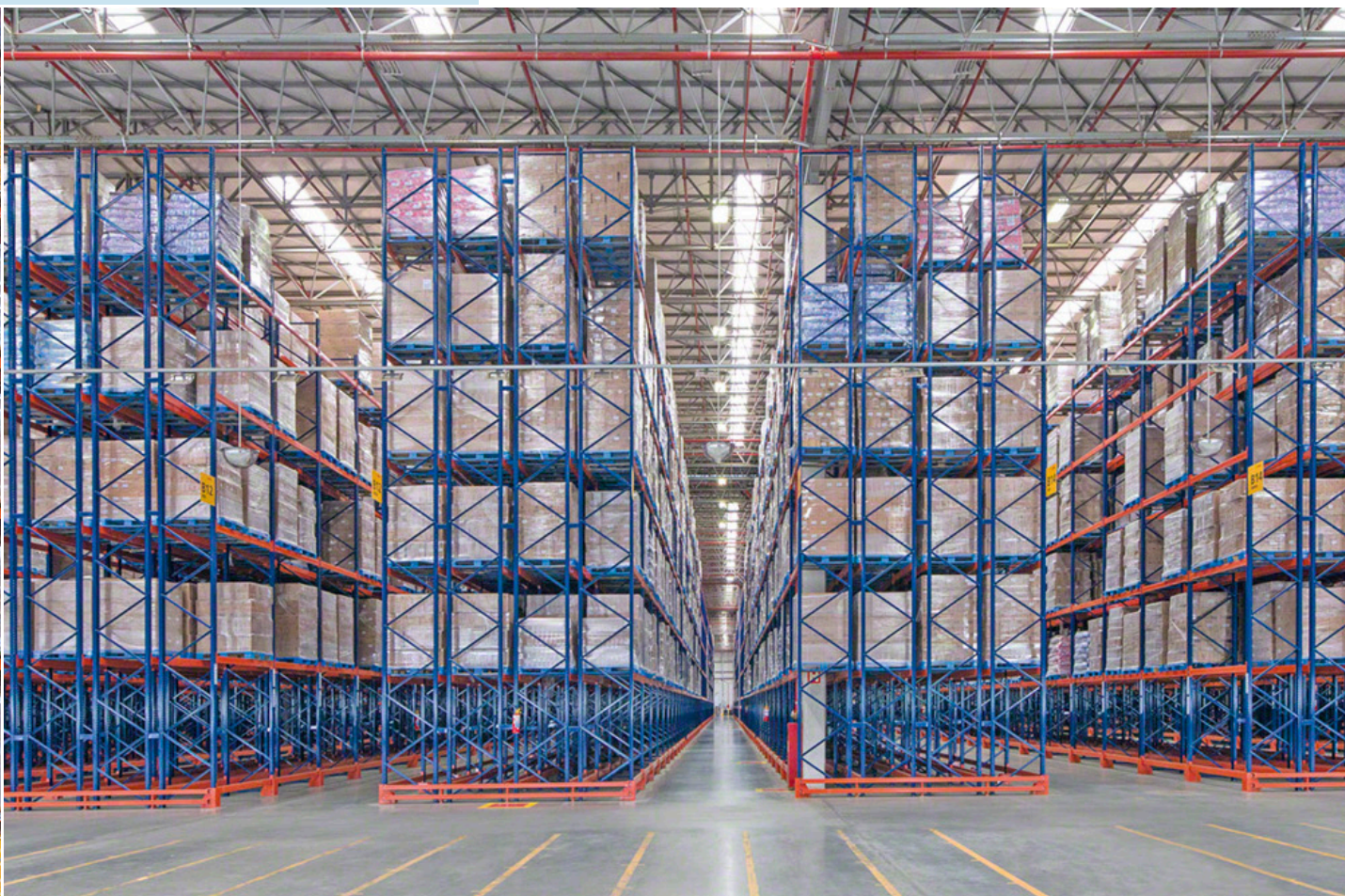
Mecalux's conventional pallet racking is the best solution for warehouses with a wide range of SKUs that need to be stored on pallets.

### Key advantages

- **Goods can be easily retrieved** as each pallet can be accessed without shifting other pallets.
- **Total stock control** since each storage location holds a single pallet.
- **Maximum adaptability** to any load type, both in weights and volumes.

A conventional pallet rack warehouse is generally arranged with single-entry racks on either side and double-entry racks down the middle. The type of forklifts or handling equipment used and the height of the warehouse determine the width of the working aisles and the height of the racks.





### Double-deep conventional pallet racking

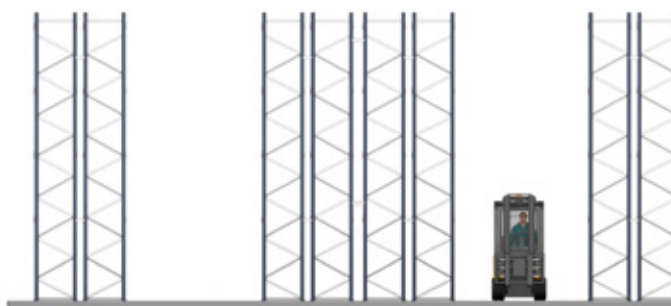
Double-deep racks can be installed to store more pallets (depending on their weight and the pallets per SKU), enabling one pallet to be stored behind the other on each side of the aisle.

Direct access is only available to the first pallet. So, this system is recommended for storing products with multiple pallets per SKU.

This system requires suitable lifting machinery fitted with double-depth telescopic forks.



The most common conventional system comprises a single-entry rack fitted to the wall and double-entry racks in the middle



Double-deep conventional system



## Measurements and clearances

### Aisle

The forklift type and model must be determined to define the minimum open aisle width between loads. This information can be found in the technical specifications of each forklift.

As a guideline, 1,200 x 800 mm pallets are handled sideways by their 800 mm edge using:

#### Minimum clearances:

**Stacker:** 2,200 to 2,300 mm

**Counter-balanced forklift:**  
3,200 to 3,500 mm

**Reach truck:** 2,600 to 2,900 mm

**Bilateral turret truck:**  
1,500 to 1,600 mm

**Trilateral turret truck:**  
1,700 to 1,900 mm

**Automatic trilateral stacker crane:**  
1,700 to 1,900 mm

**Stacker crane:** 1,500 to 1,650 mm



### Reach height and clearance

The clearance height between load levels is obtained by taking the total height of the pallet, plus the load and adding this figure to the required clearance. This should never be less than the figure listed in the technical rack clearances table on page 12.

Reach heights also differ for each type of forklift truck. This information can be found in the technical specifications of each forklift.

#### Maximum height:

**Stacker:** 5,200 mm

**Counter-balanced forklift:** 7,000 mm

**Reach truck:** 12,000 mm

**Bilateral turret truck:** 13,500 mm

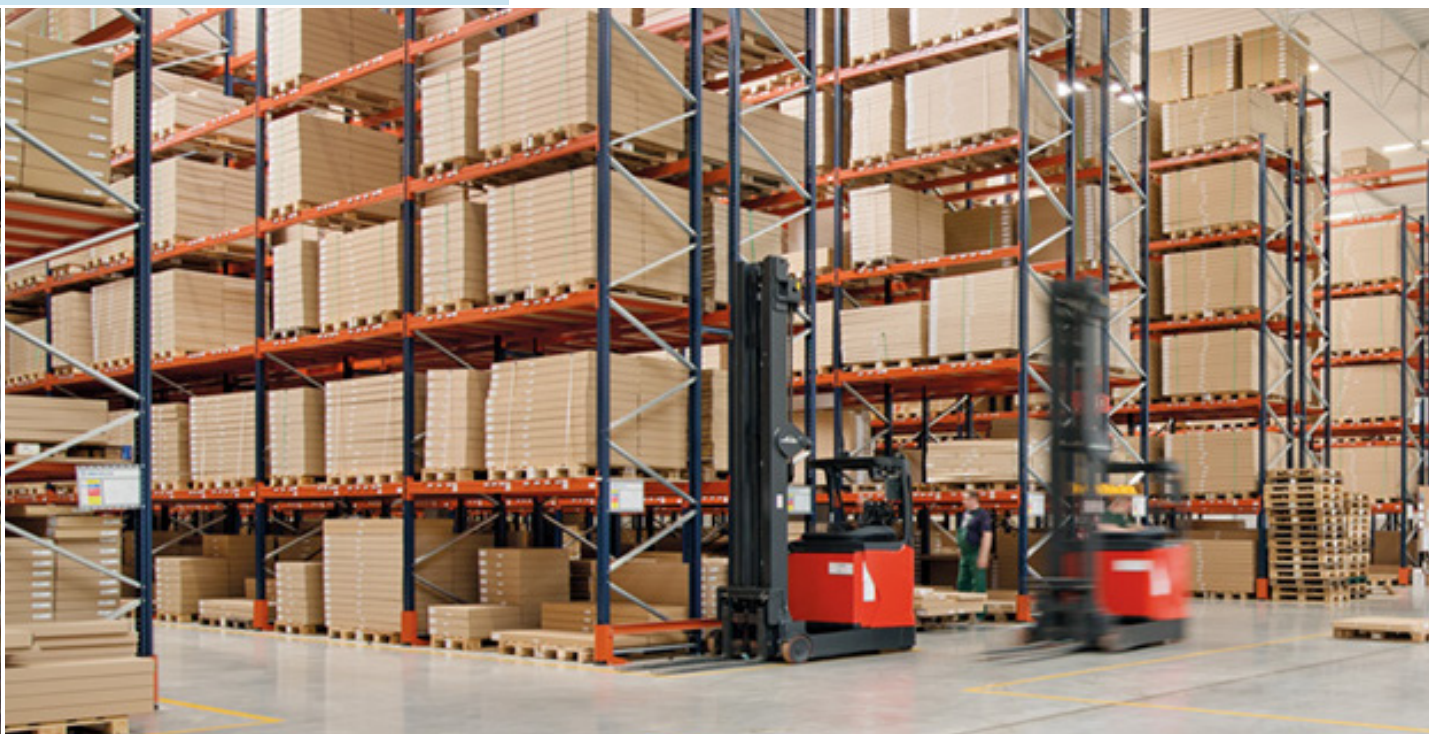
**Trilateral turret truck:** 14,500 mm

**Automatic trilateral stacker crane:**  
14,500 mm

**Stacker crane:** 45,000 mm







The most commonly used material handling equipment:



Stacker



Counter-balanced forklift



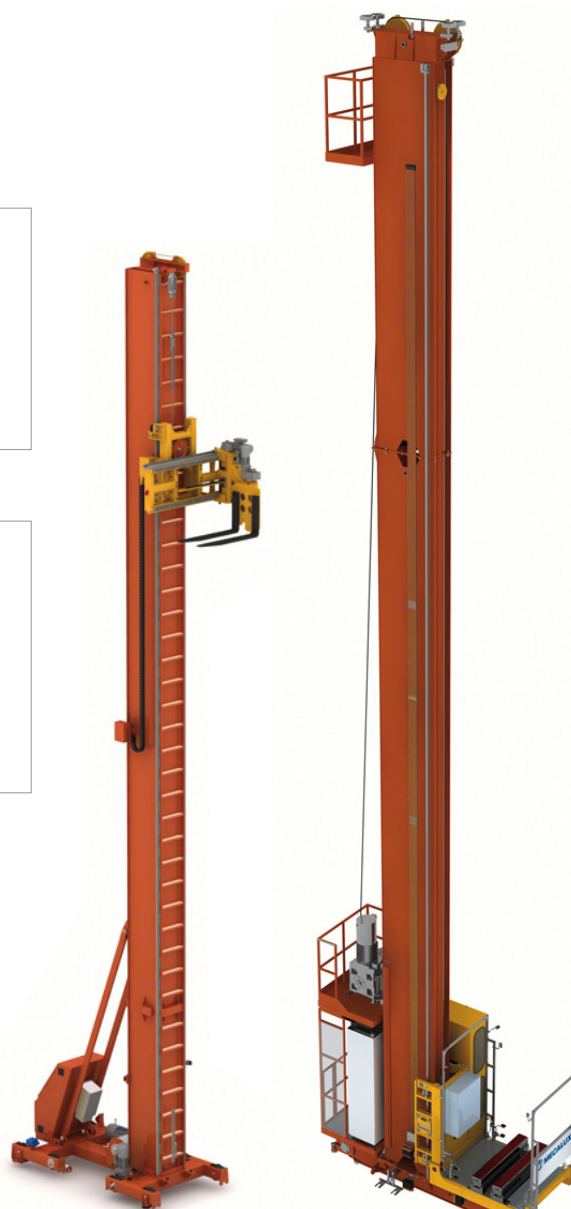
Reach truck



Bilateral turret truck



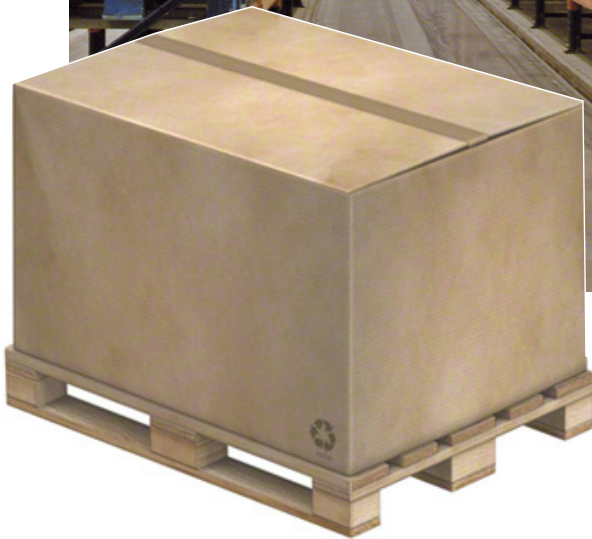
Trilateral turret truck



Automatic trilateral  
stacker crane

Stacker crane





The above image shows a pallet racking warehouse, with pallets handled by their 1,200 mm edge

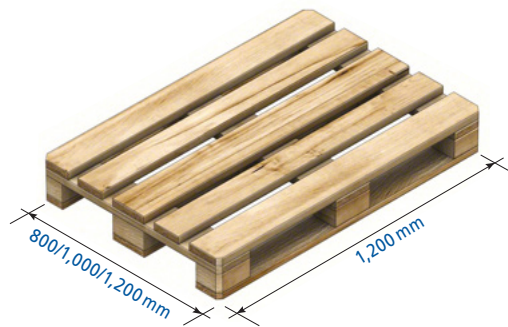


Conventional pallet racking warehouse. Pallets handled sideways along their 800 mm edge

### Load units: pallets and containers

Goods are placed on pallets and in containers when stored. The characteristics of the goods determine the way they should be stored.

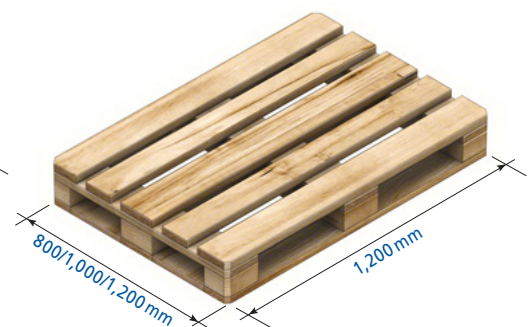
The most common types are:



#### Europallets

Europallets are 800 x 1,200 mm in size and handled sideways by their shorter edge. Pallets are also made with the same criteria in measurements of 1,000 x 1,200 mm and 1,200 x 1,200 mm.

They are built with nine blocks and three skids as a support base.



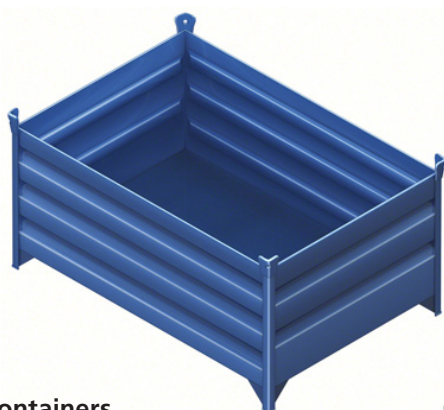
#### Perimeter base pallets

These pallets are built like the Europallets, except they have two additional skids on the base that are connected with the other three skids.





Conventional pallet rack warehouse  
with metal containers



### Containers

Storage containers are usually made of metal and are built with variable specifications and sizes. They may require additional components to be used for storage on conventional pallet racking.

### Other pallets and containers

In addition to the previously mentioned types, other pallets and containers are also available on the market. Their use must be studied on a case-by-case basis to determine the best way to store them.

Europallets (800 x 1,200 mm) are normally handled sideways by the short edge, since they have three skids running along the base parallel to the 1,200 mm lengthwise edge. When stored on the racks, these skids rest perpendicular to the support beams.

On occasion, especially to streamline picking work, they are handled by their wider edge (1,200 mm). In such cases, the racks should be fitted with components, so pallets are properly supported (pallet support bars).

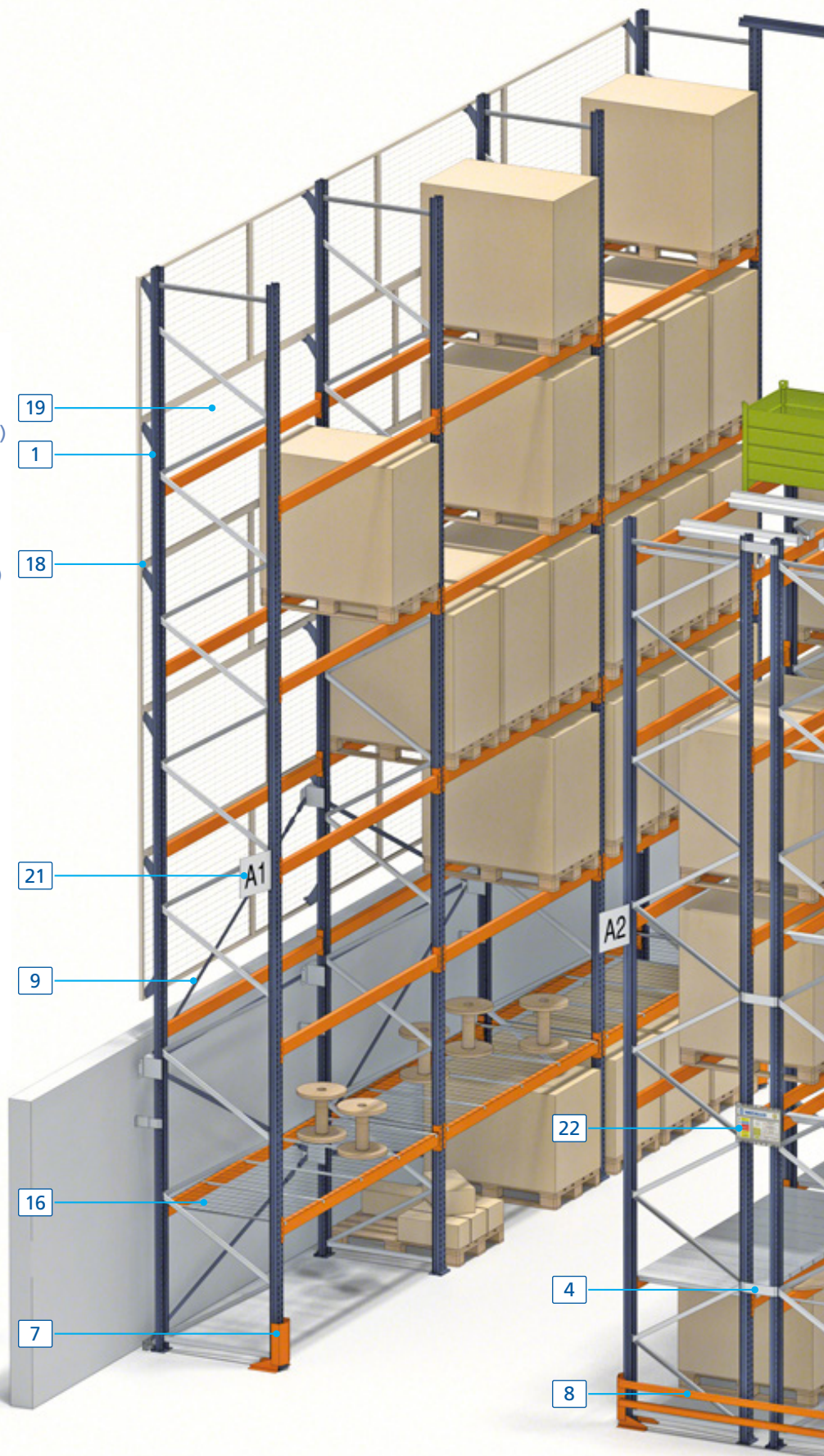
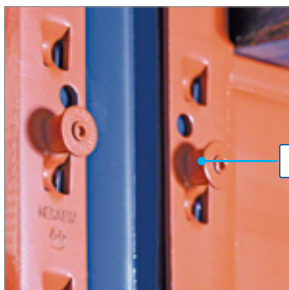


## Basic components

Mecalux has developed an extensive range of accessories to help store goods on pallets, no matter how demanding your storage needs may be.

### Components

1. Frame (page 10)
2. Beam (page 16)
3. Safety locking mechanism (page 18)
4. Row spacer (page 18)
5. Anchor bolts (page 11)
6. Levelling shims (page 11)
7. Upright protector (page 25)
8. Lateral protection barrier (page 24)
9. Cross bracing set (page 32)
10. Top portal tie (page 40)
11. Pallet support bar (page 26)
12. Container support bar (page 27)
13. Chipboard deck support (page 22)
14. Chipboard or melamine shelf (page 22)
15. Galvanised picking shelf panel (page 20)
16. Mesh shelf (page 21)
17. Drum support (page 28)
18. Back stop rails (page 30)
19. Fall protection mesh (page 31)
20. Raised pallet support bar (page 26)
21. Aisle sign (page 33)
22. Safe load warning sign (page 33)







**MECALUX**

**TECHNICAL INSPECTION**  
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 REPORT NO: 261.563

**Warnings and Inspections:**

- Check the system for any damage or deformation.
- Report all the damage to the person responsible for safety.
- Do not use the structure for any other purpose than the one for which it was designed.
- Do not exceed the load.
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- Do not exceed the load.

**System: Conventional Pultruded Steel (CPS)**

**Estimate:** 1000 x 1000, 1.5

**Material:** S235JR

**Dimensions:** 1000 x 1000 x 1000

**Configuration of Bays:**

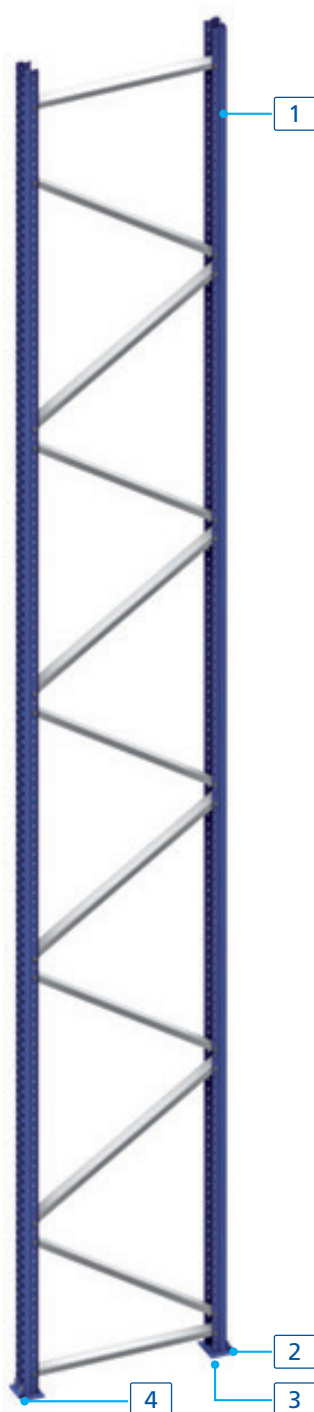
Bay	Width (mm)	Height (mm)	Depth (mm)
1	1000	1000	1000
2	1000	1000	1000
3	1000	1000	1000
4	1000	1000	1000
5	1000	1000	1000
6	1000	1000	1000
7	1000	1000	1000
8	1000	1000	1000
9	1000	1000	1000
10	1000	1000	1000
11	1000	1000	1000
12	1000	1000	1000
13	1000	1000	1000
14	1000	1000	1000
15	1000	1000	1000
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66	1000	1000	1000
67	1000	1000	1000
68	1000	1000	1000
69	1000	1000	1000
70	1000	1000	1000
71	1000	1000	1000
72	1000	1000	1000
73	1000	1000	1000
74	1000	1000	1000
75	1000	1000	1000
76	1000	1000	1000
77	1000	1000	1000
78	1000	1000	1000
79	1000	1000	1000
80	1000	1000	1000
81	1000		



## Frames

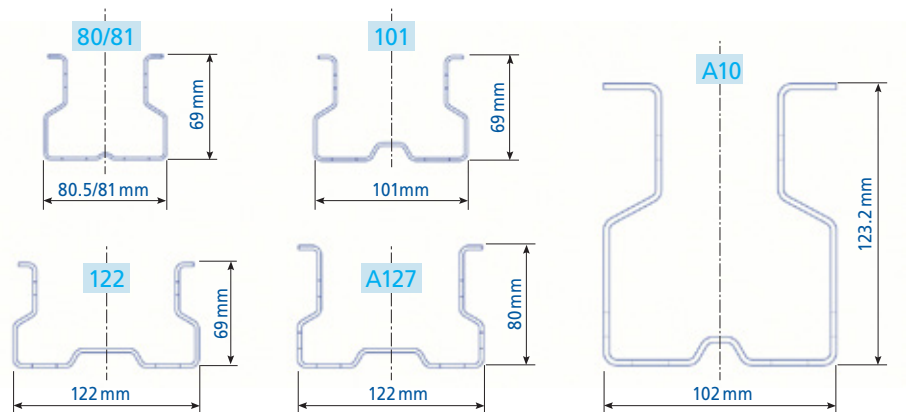
Frames are made up of two uprights with the corresponding horizontal and diagonal bracings, footplates and accessories. Uprights are slotted every 50 mm to fit beams to the frame.

The pallet's size determines a frame's depth. A 1,100 mm frame is normally used for a 1,200 mm deep Europallet.

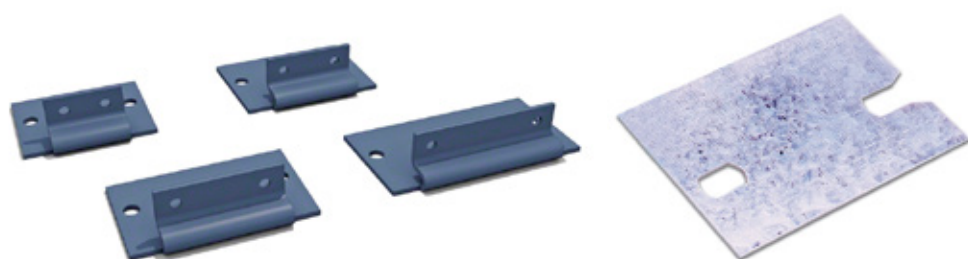


## Uprights (1)

The different models, lengths and thicknesses of uprights mean they can be adapted to a wide range of load requirements.







### Frame footplates (2)

Frames are erected on the floor using footplates, which are fitted to the base of the uprights. A wide range of different frame footplates are used depending on the load required and the upright model used. One or two anchor bolts fix them to the floor.

### Levelling shims (3)

Shims level out racks set up on uneven slabs. Each type of upright has its own type of shim, which comes in different thicknesses for more a precise levelling.

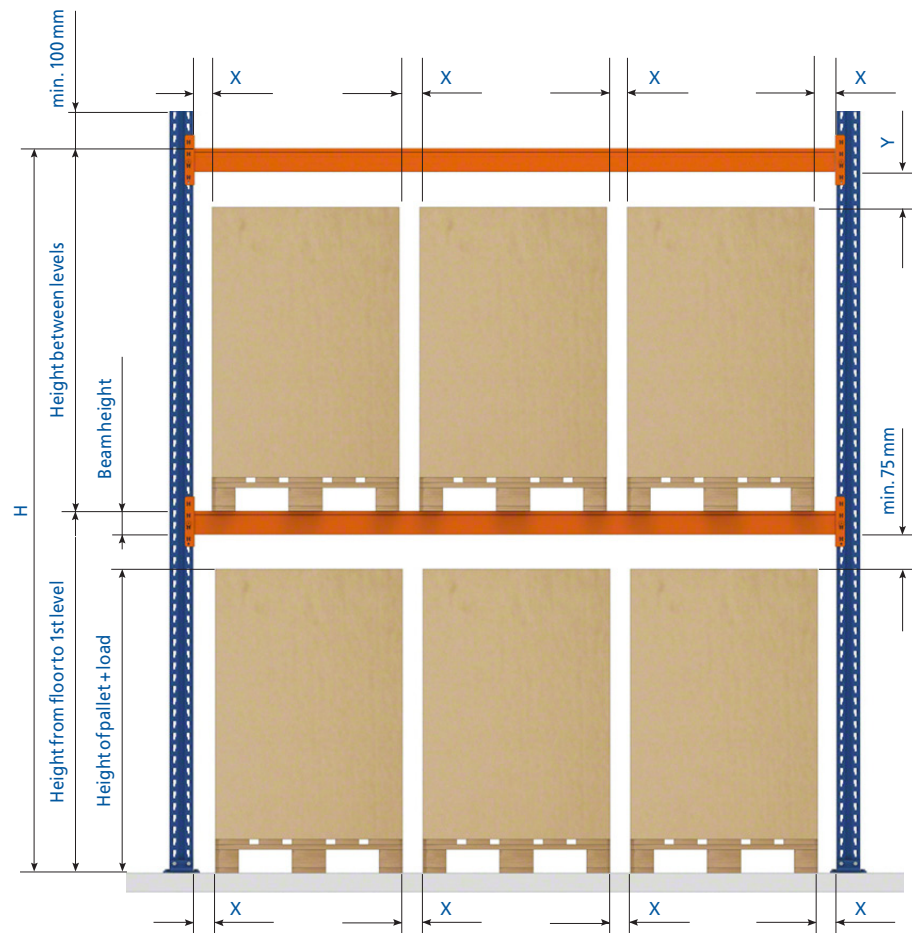
### Anchor bolts (4)

Racks are fixed to the slab using anchor bolts. They vary depending on the forces they must withstand and the characteristics of the slab.

#### Footplate and shim measurements

Upright	Width	Depth	cm <sup>2</sup>
<b>80/81</b>	135 mm	119 mm	160.6
<b>101</b>	155 mm	119 mm	184.4
<b>122</b>	175 mm	119 mm	208.2
<b>127</b>	175 mm	119 mm	208.2
<b>A10</b>	as per the load		





### Clearances

The height between levels is calculated by adding three variables together: the pallet height, including the load, the beam height and the clearance (Y). These values are rounded up to a multiple of 50 mm.

Levels of between (mm):	Class 400		Class 300A		Class 300B	
	X	Y	X	Y	X	Y
$0 \leq H \leq 3,000$	75	75	75	75	75	75
$3,000 < H \leq 6,000$	75	100	75	75	75	100
$6,000 < H \leq 9,000$	75	125	75	75	75	125
$9,000 < H \leq 12,000$	100	150	75	75	100	150
$12,000 < H \leq 13,000$	100	150	75	75	100	175
$13,000 < H \leq 15,000$	–	–	75	75	100	175

### Bay tolerances and clearances:

Y: height between the pallet and the bottom of the beam, other than the ground level.

X: minimum clearance between pallets or loads.

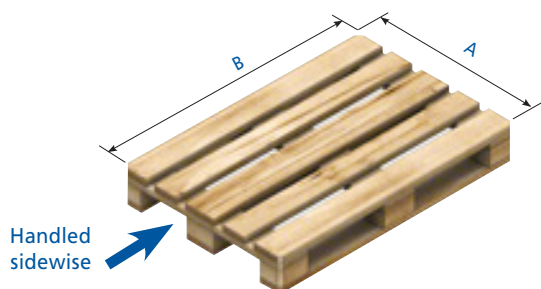
Bay or space clearance table according to UNE 15620, in force since January 2009, where:

**Class 400:** Counter-balanced forklifts or reach trucks.

**Class 300 A:** Man-up VNA trucks (the operator moves with the load).

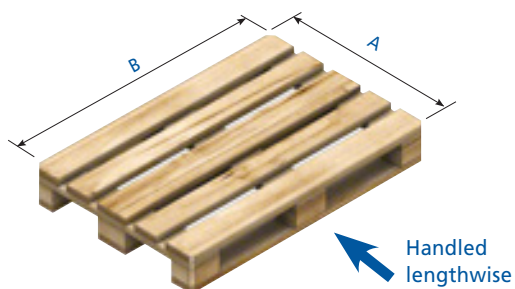
**Class 300 B:** Man-down VNA trucks (the operator remains at ground level).





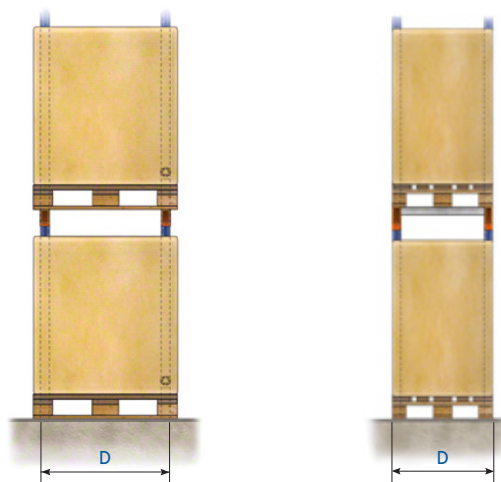
Beams measured in mm (up to 9,000 mm high)

Pallet		Beam	
A	B		
800	1,200	1,825	
1,000	1,200	2,225	
1,200	1,200	2,625	
800	1,200	2,700	
1,000	1,200	3,300	
1,200	1,200	3,900	



Beams measured in mm (up to 9,000 mm high)

Pallet		Beam	
A	B		
800	1,200	2,625	
1,000	1,200		
1,200	1,200		
800	1,200	3,900	
1,000	1,200		
1,200	1,200		



Frame depths (mm)

Pallets handled sidewise	Pallet sizes	Pallets handled lengthwise
D = 1,100	800 x 1,200	D = 800
D = 1,100	1,000 x 1,200	D = 1,000
D = 1,100	1,200 x 1,200	D = 1,200



## Structural calculations

A structural calculation must be done once the racking tolerances, buckling and clearances have been determined.

Pallet racks are metallic structures, usually made of cold-rolled sheet metal and able to withstand heavy loads.

Pallet rack installations must be versatile, adapting to different load types. So, it is essential that the fittings between the main structural components are adjustable, as well as fast and easy to assemble.

These uprights of the structure are often slotted or perforated, while the beams have built-in couplings that hook into these slots.

Based on the Eurocodes, the EN 15512 standard (Steel static storage systems. Adjustable pallet racking systems. Principles for structural design.), is the reference point for the structural design of conventional pallet racking in Europe. Likewise, engineers who design these racks must also take the EN 15620, EN 15629 and EN 15635 standards into account, in conjunction with the EN 15512 standard, as a guide for specifying storage systems, the precision required for assembly and safe warehouse operations.

## Standards and recommendations

**Mecalux calculates conventional pallet racking according to the main criteria from:**

- **EN 15512.** Adjustable pallet racking. Principles for structural design.
- **EN 15620.** Adjustable pallet racking. Tolerances, deformations and clearances.
- **EN 15629.** Steel static storage systems. Specification of storage equipment.
- **EN 15635.** Steel static storage systems. Application and maintenance of storage equipment.
- **EN 16681.** Adjustable pallet racking. Principles for seismic design.
- **FEM 10.2.16.** Design and use of rack protection for adjustable pallet racking.

The EN 15512 standard stipulates which requirements must be considered when calculating conventional pallet rack structures. It standardises calculation processes, tolerances and rack assembly, as well as installation maintenance.

A structural calculation is a two-phase process:

### 1. Global analysis of the structure.

The installation's overall stability is verified, as well as post-checking of the components. It also includes modelling of the true connection performance between the upright-beam and the upright-floor.

### 2. Analysis of individual components.

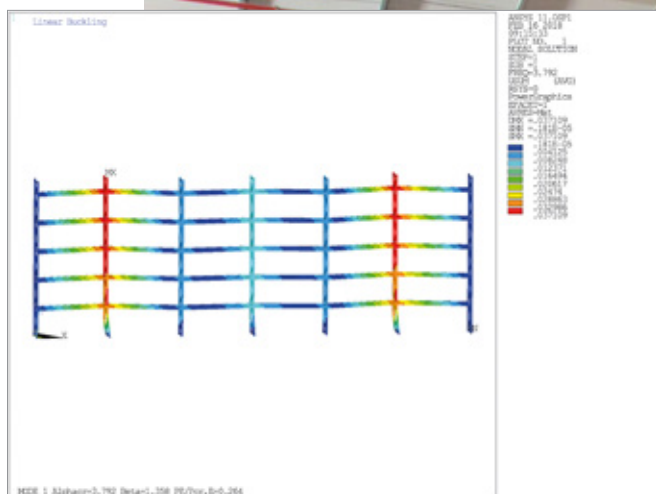
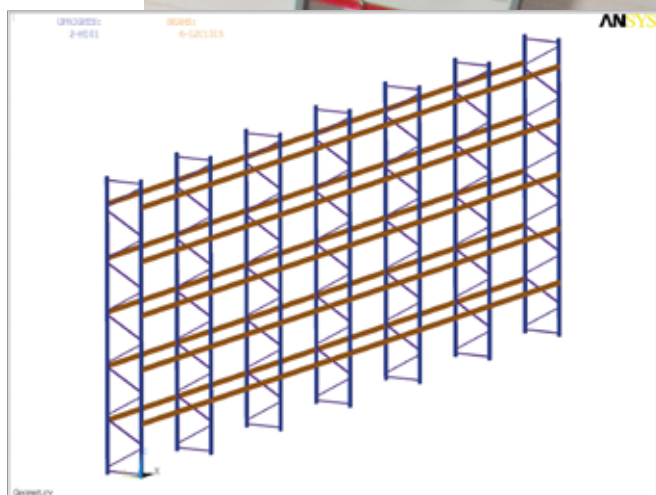
All components that comprise the structure are inspected (uprights, frames, anchor plates, beams and connectors).

Additionally, the calculation also includes the prevention of actions that could affect racking strength and stability, such as the weight of the racks and the loads, or actions pertaining to national regulations.

Predicting the structural performance of the racks is complicated due to their components' characteristics. For this reason, EN 15512 also takes into account testing of all rack components and the materials they are manufactured from.

The aim is to determine their resilience and elasticity. In terms of materials, their tensile and ductile strength are also tested, i.e., their capacity to be bent.







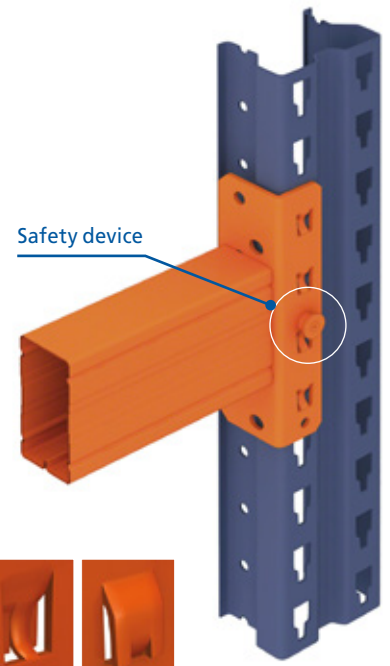


## Beams

Beams are the horizontal, robust racking components where loads are deposited. They are joined to the uprights via connectors or endplates, which fit into the slots on the upright. The hooks on these endplates, in the connecting system designed and patented by Mecalux, are joined to the main rack structure at both ends. This feature considerably increases load capacity and prevents deformations that typically occur when the connection between the main structure and the hooks or endplate is not sturdy enough.

As such, our connector system prevents the beam from falling, which could occur if it began to open due to fatigue. Each beam has two built-in safety devices, to prevent accidental dislodging.

Mecalux manufactures a wide range of beams for different storage needs in terms of size, as well as load type and capacity. The measurements of the load levels are determined by the number and size of the pallets stored, following the indications in the rack clearances table.

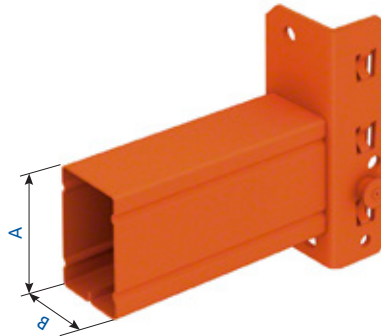


## Tubular beams

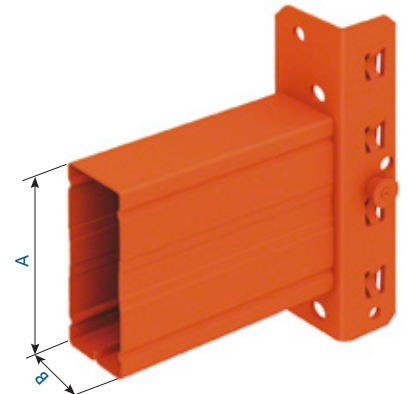
These are made of a single rolled tube, welded to two hooks or endplates.

Model TB	Height (A)	Width (B)
TB 80	80	50
TB 100	100	50
TB 120	120	50
TB 130	130	50

Dimensions in mm



TB Beam (80)



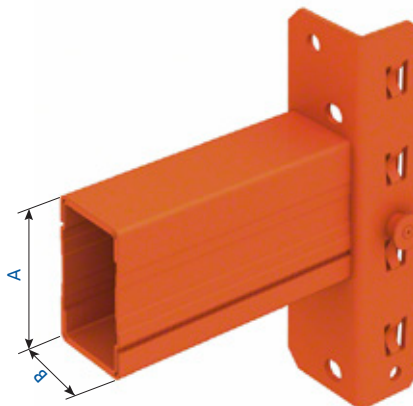
TB Beam (100, 120, 130)

## 2C-S beams

There are five standard models classified into two families. Each family has their own sized connectors or endplates.

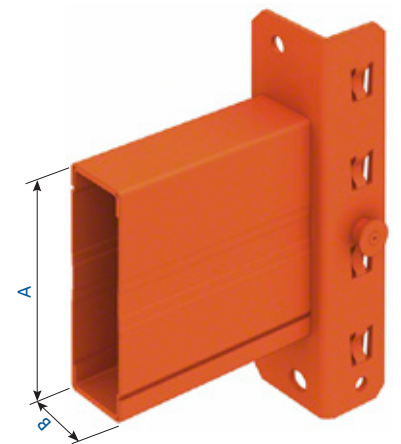
Model 2C-S	Height (A)	Width (B)
1115	110	50
1315	130	50
1515	150	50
1615	160	50
1718	170	50

Dimensions in mm



2C-S Beam (1115)

Made out of two C-shaped profiles fit into each other and welded to the endplate.



2C-S Beam (1315, 1515, 1615, 1718)

These beams are used for heavy loads and longer products due to their heavy-duty strength.





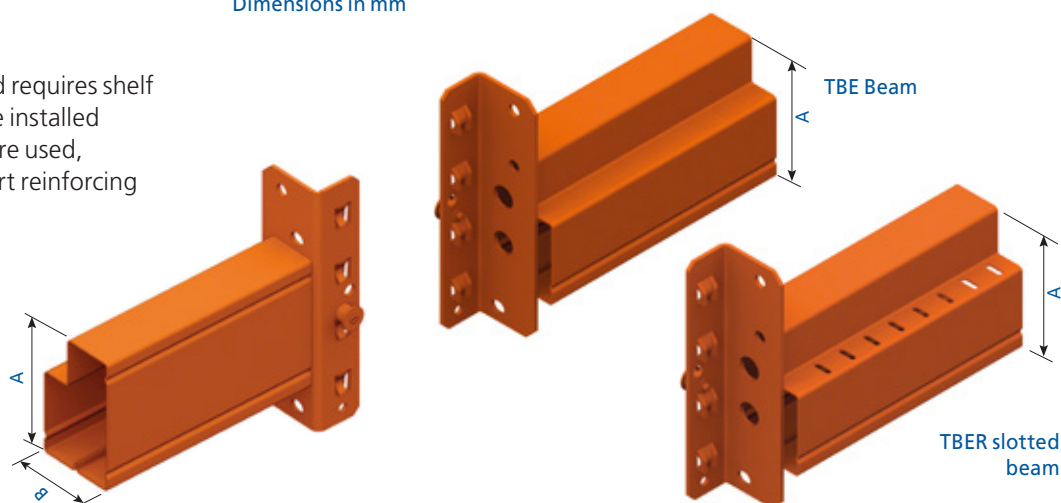
### Mixed beams for pallets and picking

These beams are made of a single rolled tube and welded to two hooks or endplates. A mix of pallets and items for picking can be stored on the same levels with these beams or different sizes and qualities of pallets.

Model TB	Height (A)	Width (B)
TBE-S 32	82	70
TBE-S 45	114	70
TBER-S 32	82	70
TBER-S 45	114	70

Dimensions in mm

Mixed storage of this kind requires shelf panels. Slotted beams are installed when chipboard panels are used, making it possible to insert reinforcing crossies into these slots.



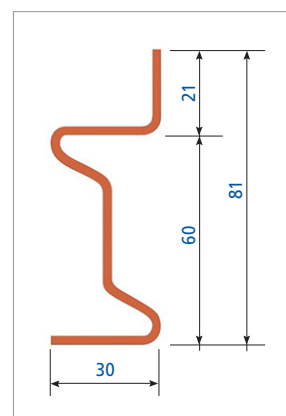
### Picking beams

Shelves can be fitted into these beams, and then used to store loose goods or pick items from them.



#### ZS-60P Beam

This profile, made of a Z-profile welded to a four-hook connector at each end, is folded to create a raised edge into which shelves can be placed. This beam is used to create picking levels in pallet rack installations.

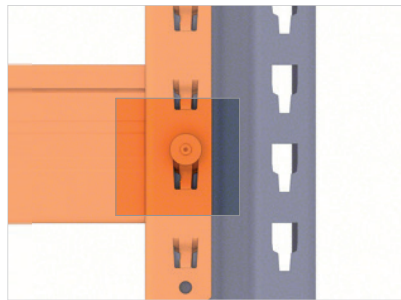
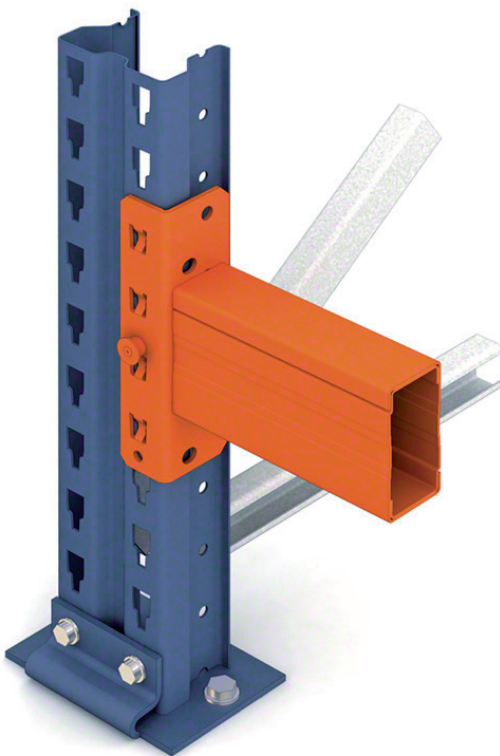


Dimensions in mm





### Joints and locking mechanisms

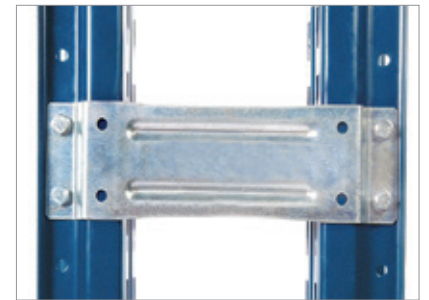


#### Safety locking mechanism

The endplate that joins the beam and upright includes a built-in safety locking mechanism, which is designed to make the structure even safer.

Since it forms part of the endplate itself, the mechanism is always activated. Once in place, it cannot be extracted without completely dismantling the beam. This feature stops the device from being moved either accidentally or deliberately, ensuring the strength and stability of the racking.

This innovative system is exclusive to Mecalux, which decided to introduce it into European installations after it proved successful in projects completed in the United States.



#### Row spacer

Row spacers are steel pieces shaped to fit the upright profile and are secured by four bolts.

They are used to join double-entry racks together, thus giving them greater structural stability.



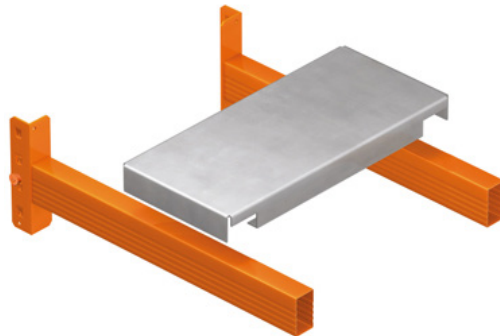






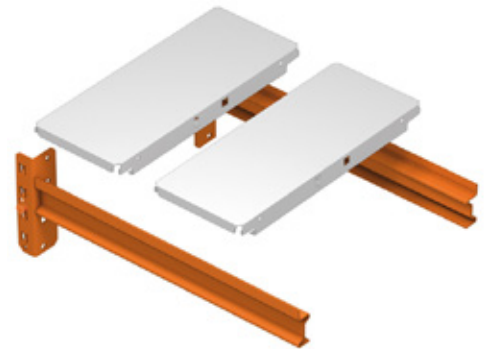
## Shelves

Various shelf types are available and will suit any storage requirement. The most commonly used are:



### L-2C galvanised shelves

Metal shelves that, depending on the storage need, can be placed on tubular or 2C beams. They fit directly on the beams and do not require further fixing.



### Galvanised picking shelves

These metal shelves are only used with ZS-60 beams. The shelf panels fit into each other via flanges and moulded edges.



Solid metallic panel

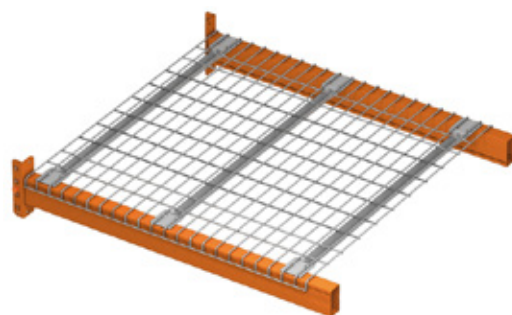
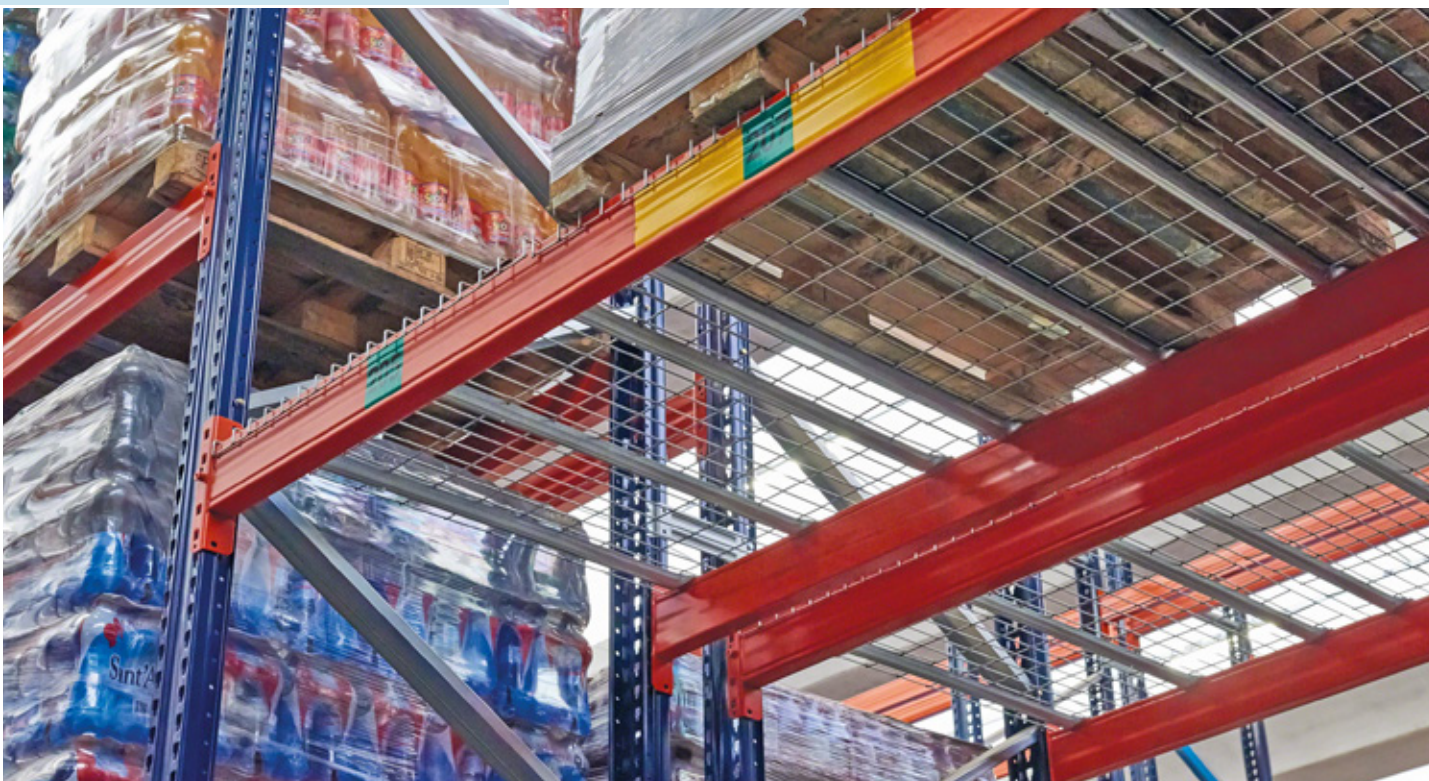


Slotted metallic panel



Perforated PKM panel





### **Mesh shelves**

Mesh shelves are made of rectangular electro-welded mesh panels that rest on cross tie supports, which strengthen the structure. They are always fitted on beams and do not require further fixing.

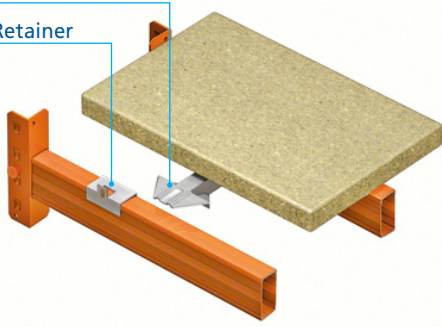




### Chipboard shelves

Chipboard deck supports

Retainer

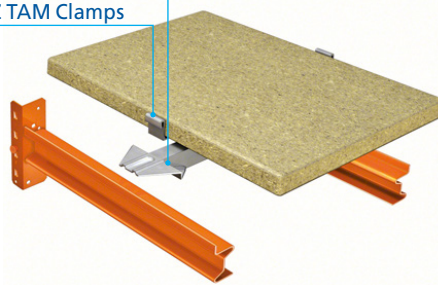


#### 2C Beams

Chipboard shelves can be fitted on tubular or 2C beams, and secured using four retainers. Chipboard deck supports can also be used.

Chipboard deck supports

Z TAM Clamps

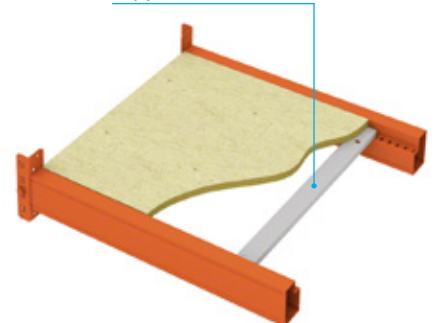


#### Z Beams

Chipboard shelves do not require brackets to be fitted on J or Z beams, as the edge of the shelf is hidden and supported on the beam profile.

Chipboard deck supports may be required, depending on the load they need to support. In addition, a single **Z TAM Clamp** is required per beam to ensure a correct fit for lengths  $\geq 1,900$  mm.

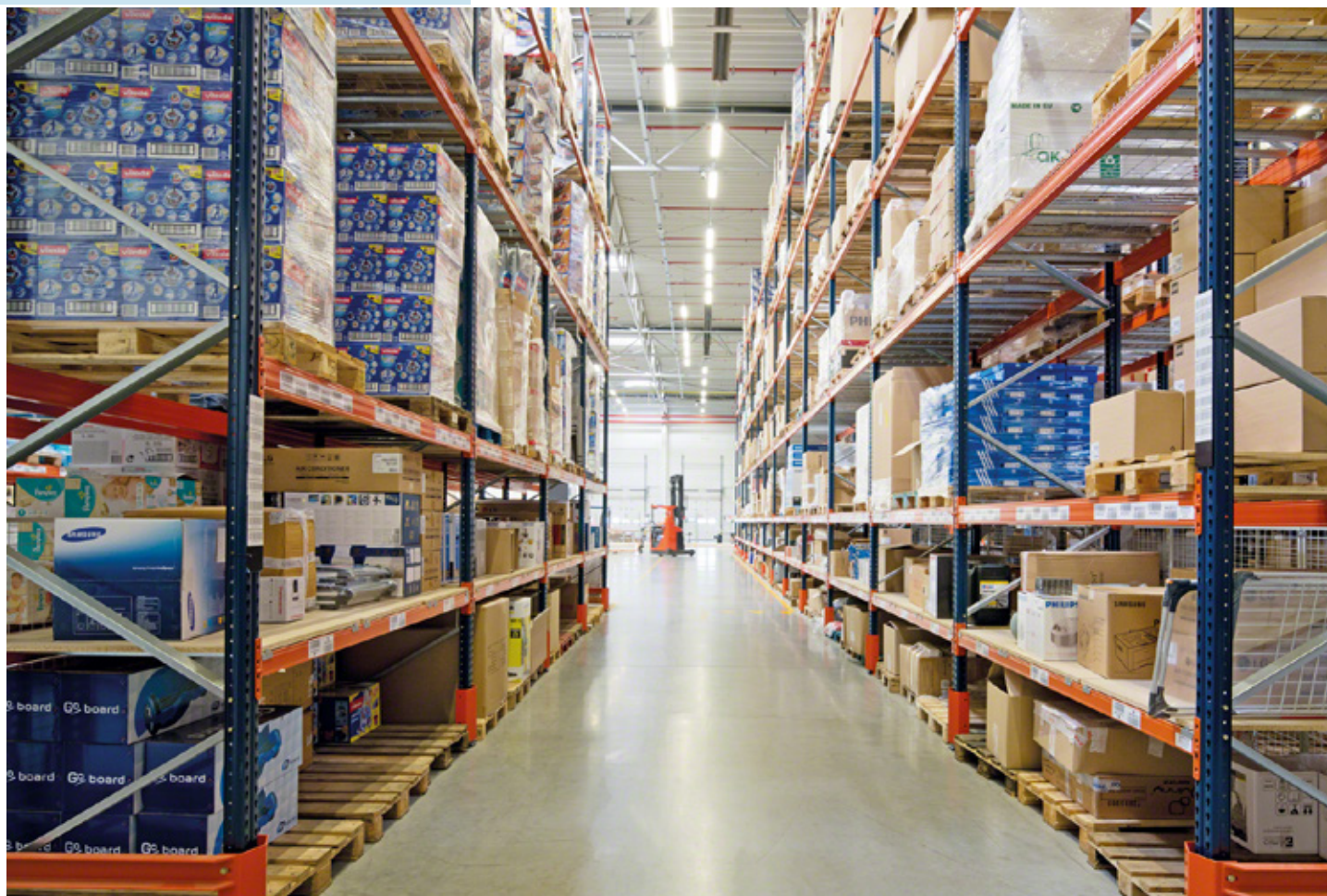
Chipboard deck supports



#### TBER beams

Chipboard shelf panels are fixed into place on the TBE slotted beams by crossties, although the panel's edge is concealed and rests the beam's profile. Depending on the load, different amounts of wooden crossties can be added.









Double-profile side protectors

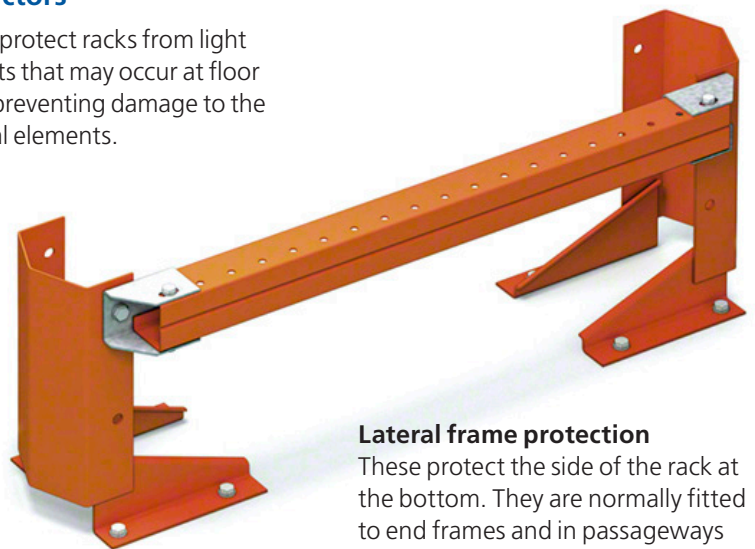


Single-profile side protector



### Protectors

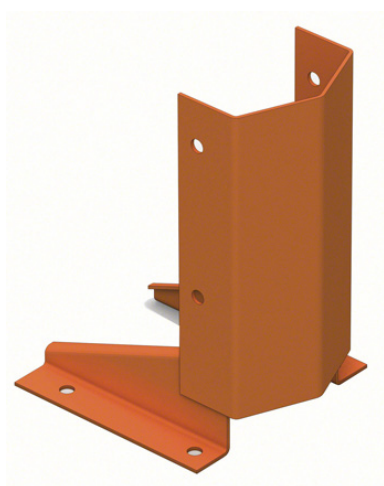
These protect racks from light impacts that may occur at floor level, preventing damage to the vertical elements.



### Lateral frame protection

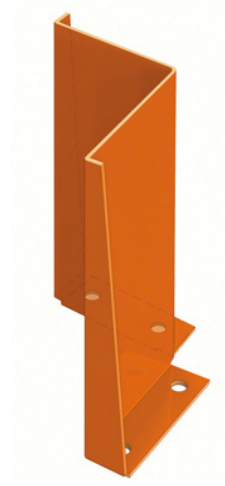
These protect the side of the rack at the bottom. They are normally fitted to end frames and in passageways between frames where impacts are most likely. Each upright type has its own protector. Two upright protectors and one C profile are used to protect the entire side of a frame. Two C profiles can also be fitted, if requested.





### Upright-frame protector

Each type of upright has its own type of protector. Protectors are 400 mm high and come with 4 anchor bolts to fix them to the floor. They are used to protect uprights from blows and possible damage in facilities operated by forklifts.



### Corner protectors

These protect the outer uprights when it is not possible to fit upright protectors. These protectors are made from 400 mm high folded metal sheets. They have four holes in their base for bolting the component to the floor.



### Upright reinforcer

If the uprights of an installation need to be protected at a certain height, and it is not possible to fit an upright protector, a reinforcer is used and fixed directly to the upright instead of the floor. Upright reinforcers are made from wedge-shaped folded sheets and have holes along their sides so they can be fixed to the upright. Upright reinforcers are available in different heights for each type of upright.





Close-up of a galvanised pallet support

### Pallet and container supports

Depending on how the pallet or container is placed on the rack, extra supports might need adding to the beams, such as the following pallet or container supports.



#### Galvanised pallet supports

These are fitted perpendicular to the beams and provide support to pallets when they are placed on the rack with their lower skids parallel to the beams or when the pallet is of poor quality. Either one, two or three crossties are required per pallet, depending on the pallet's quality and weight.

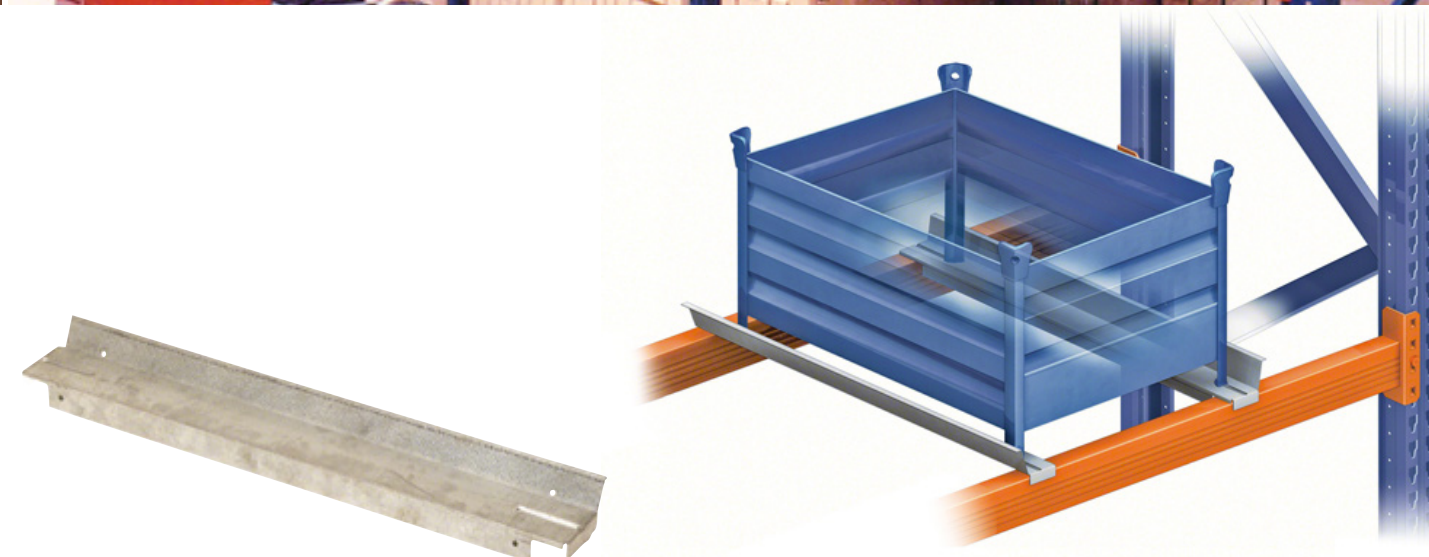


#### Raised pallet supports

These are necessary when storing pallets without skids.



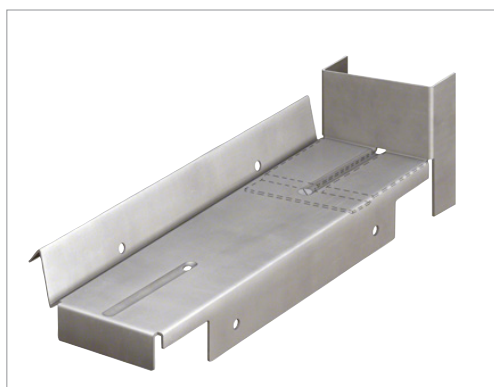




### Container support

This component is fitted when racks must store containers with legs instead of skids. Two supports are used per container, one on the right and one on the left.

The container supports can be fitted with end-stops, which are bolted to the back of each support.

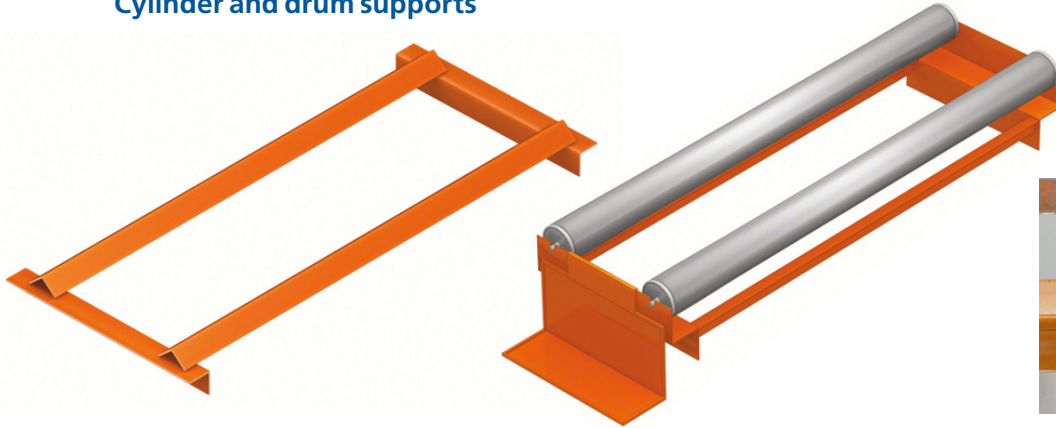


End-stops for container support





### Cylinder and drum supports

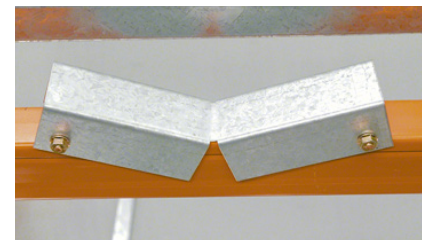


#### 2L Cylinder support

This set is made of two L-shaped profiles joined by two front profiles. Together it forms a cradle, allowing the secure placement of the cylinder. They are fitted across the beams.

#### Roller drum support

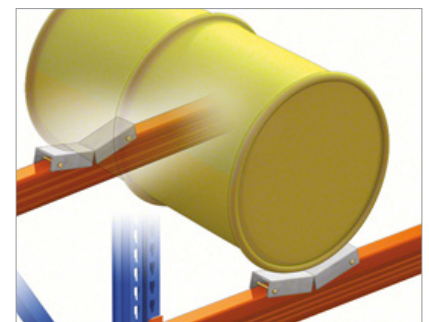
Made up of two rollers on which the drums turn, enabling liquid to be extracted from them. A tray placed below prevents liquid from spilling on the floor.



#### Front drum support

These 50 mm metal parts couple to the beams and adapt the load levels to store drums.

A drum support is placed horizontally on each beam. The V-shape provides the support needed to hold drums and reels in place.



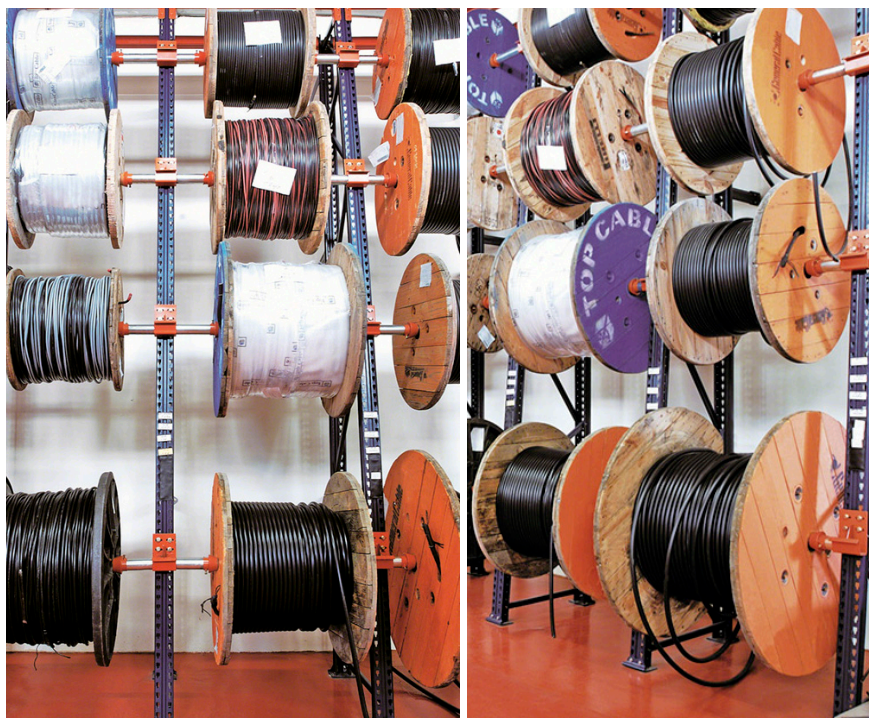


## Reel supports

Reel supports enable cylinder-shaped articles to be stored on a metal axle (cable reels and paper reels, etc.).

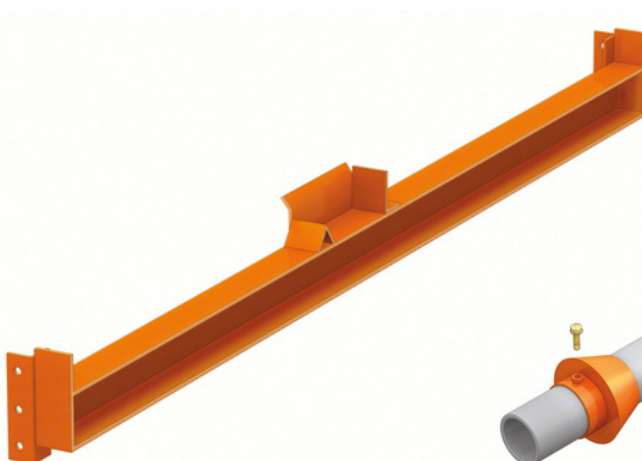
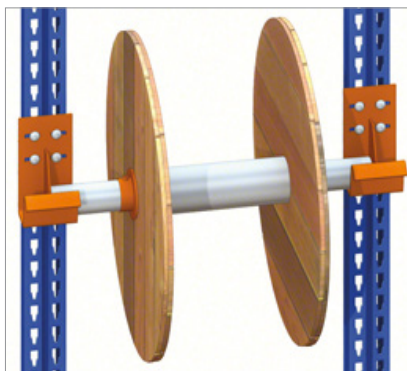
Two systems are available: front storage and side storage, depending on the characteristics of the goods, their sizes and use.

Support axles and collars are available as accessories. They prevent the reels from slipping sideways.



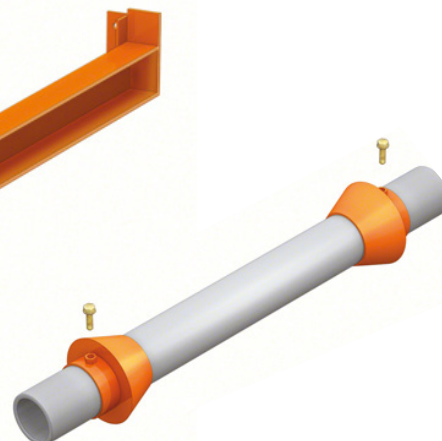
### Front reel support

The front reel support is fitted to the front uprights of the frame, where it is simply slotted into the upright.



### Side reel support

The side reel support fits laterally onto the frame using bolts and positions the reel at the centre of the frame.



### Support axle and collars

The axle is tubular with a diameter of 60 mm and is available in different thicknesses. It functions as an axle on which the reels can rotate, and rests directly on the supports.

Conical-shaped adjustable collars can be used as end-stops to prevent products from slipping along the axle.



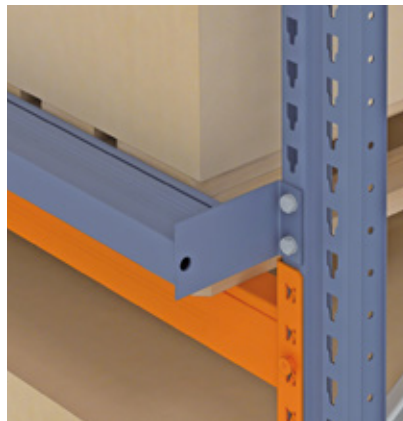


### Safety features

Additional components make installations safer and prevent goods or pallets from falling.

The following add-ons are available:

- Positioning profiles
- Safety profiles
- Fall protection mesh



### Positioning profiles

The pallet (not the load) stays in continuous contact with this profile when it is placed at the back of the racking.

This profile must withstand the forces produced during pallet positioning. Therefore, the rack must be designed for this purpose.



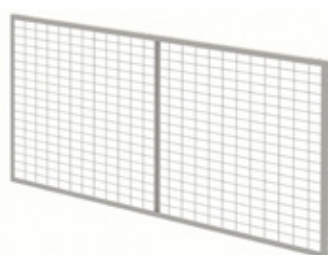
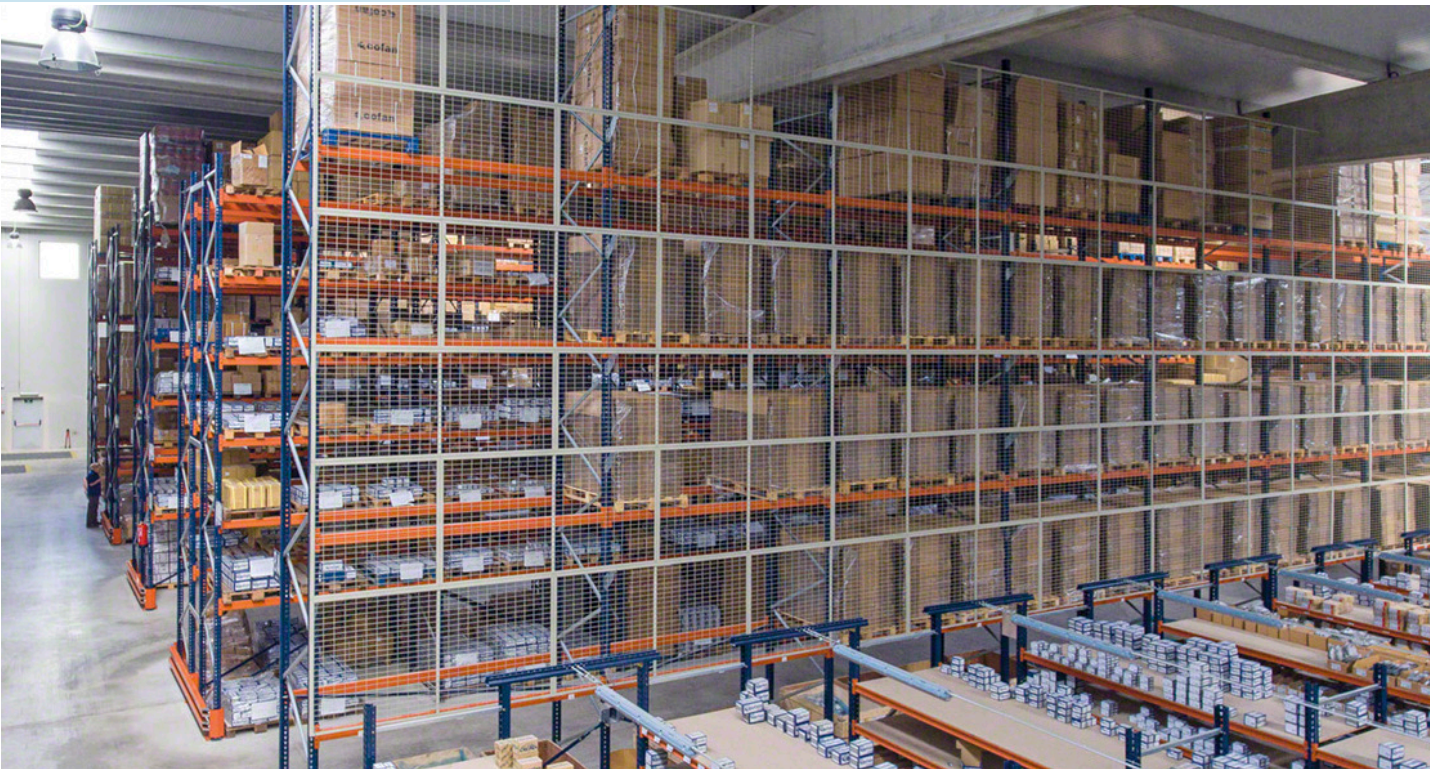
### Safety profiles

This profile acts as a warning system that stops a pallet from falling. It is not meant to withstand pallet movements or serve as a braking system for manoeuvres being carried out.

In this system, the load (not the pallet) is what butts up against the safety profile.

This accessory serves as a safety mechanism to prevent potential falls or collisions with load units, resulting from improper manoeuvring of the handling equipment.

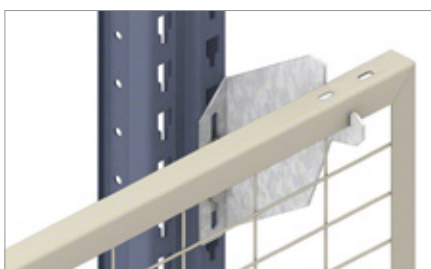




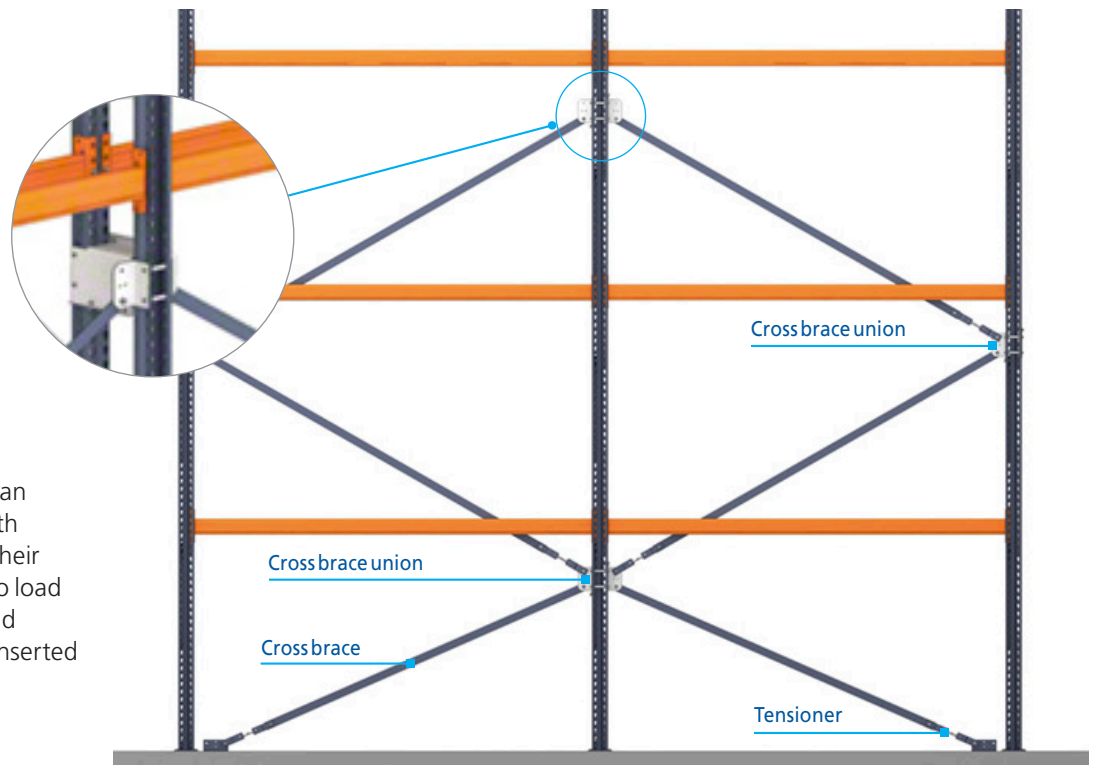
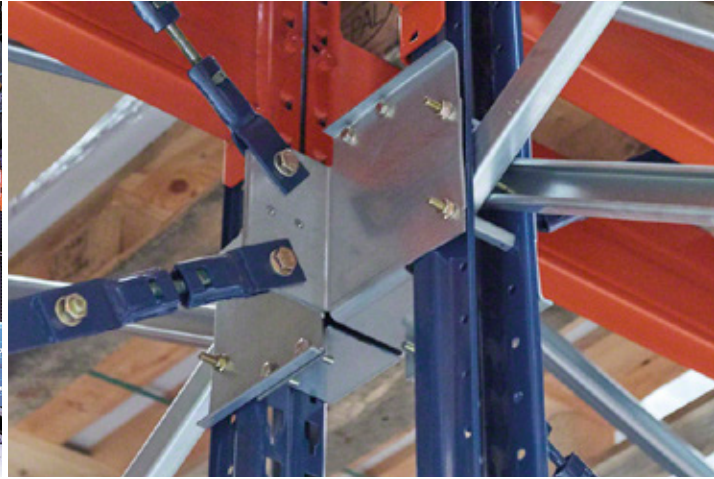
### Fall protection mesh

Fall protection mesh can be installed when the load is not shrink-wrapped or when the safety profile might not be enough to prevent the goods from falling. It is an optional safety measure, which is fitted at the rear of racks when there is a danger of loads falling. They can cover all or part of the rack's height.

If a single rack borders on a work or traffic area, it must be protected with mesh to prevent materials from accidentally falling, becoming trapped, etc.







### Cross bracing

The lengthwise stability of an installation is enhanced with this profile system. When their placement is needed due to load or height issues, vertical and horizontal braces are also inserted at the same time.

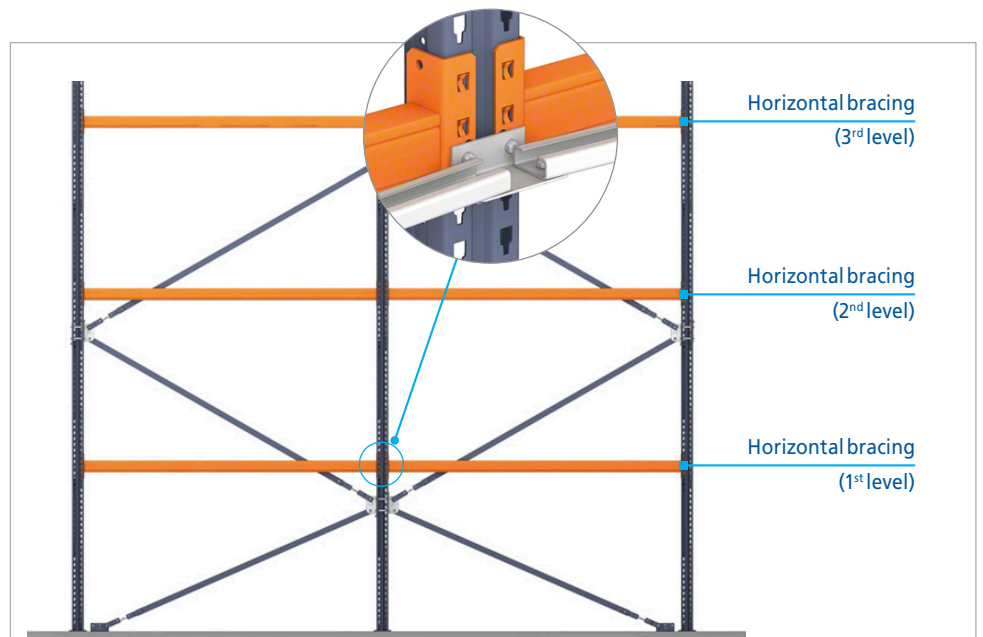
#### Vertical cross bracing

Cross braces are flat profiles fitted to supports, which in turn are fixed to the frames. Each profile has a tensioner, which gives it the necessary rigidity.

#### Horizontal cross bracing

These C-shaped profiles are bolted to the inner upright of the racks, at the same height as the beam.

Horizontal bracing is placed as high as the vertical cross bracing.





## Frame splice

Installations that require very tall frames do so by slicing two symmetrical frames together, which are bolted to the inner facet of the uprights being joined.



## Accessories for identifying racks



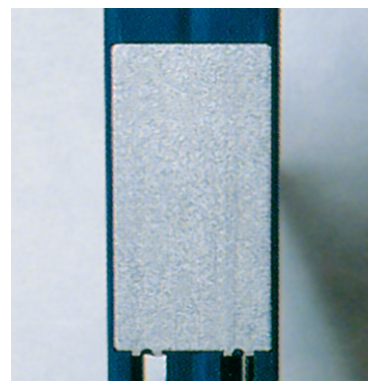
### Aisle signs

Rectangular metal sheets place at the ends of racks to identify aisles or racks by letters or numbers. Fit them in three different positions depending on the angle at which they should be visible.



### Upright cardholders

Designed to house identification cards that might need to be changed from time to time.



### Flat cardholders

These allow the attachment of fixed identification cards.

## Safe load warning sign

These plates are used to list the technical specifications of the installation. They are visibly displayed at the end of the racks.

### Technical inspection label

A yearly inspection must be carried out to keep the installation in perfect condition and guarantee long-term safety. The rack manufacturer should be the one to carry out this inspection. Mecalux's Technical Inspection Service provides a report that certifies the condition of the installation and a sticker to put on the safe load warning notice, which shows the deadline for the next inspection.

Technical inspection label

**MECALUX**

**TECHNICAL INSPECTION**  
Tel: 0121 333 6662  
VALU: 1470  
2023  
REPORT No: 253.063

**System: Conventional Pallet Racks (APR)**

Item	Maximum Loading	Load per bay
EUROPALET	1100	3/2

**Minimum dimensions (mm)**  
800 x 1200 x 1200

**CONFIGURATION OF BAYS**  
(Length in (mm))

SP	2200	2700	3200	3700	4200	4700
Cross-bracing Total Installation	Length max: 1	Length max: 1	Length max: 1	Length max: 1	Length max: 1	Length max: 1
MAX. LOAD PER PAIR OF BEAMS (per bay)	19-5120	45	2700	2700	1820	1400
MAX. LOAD PER BAY (if not included)	19-5120	45	2700	2700	1820	1400

**Safe Load**  
If in doubt, always contact the supplier.

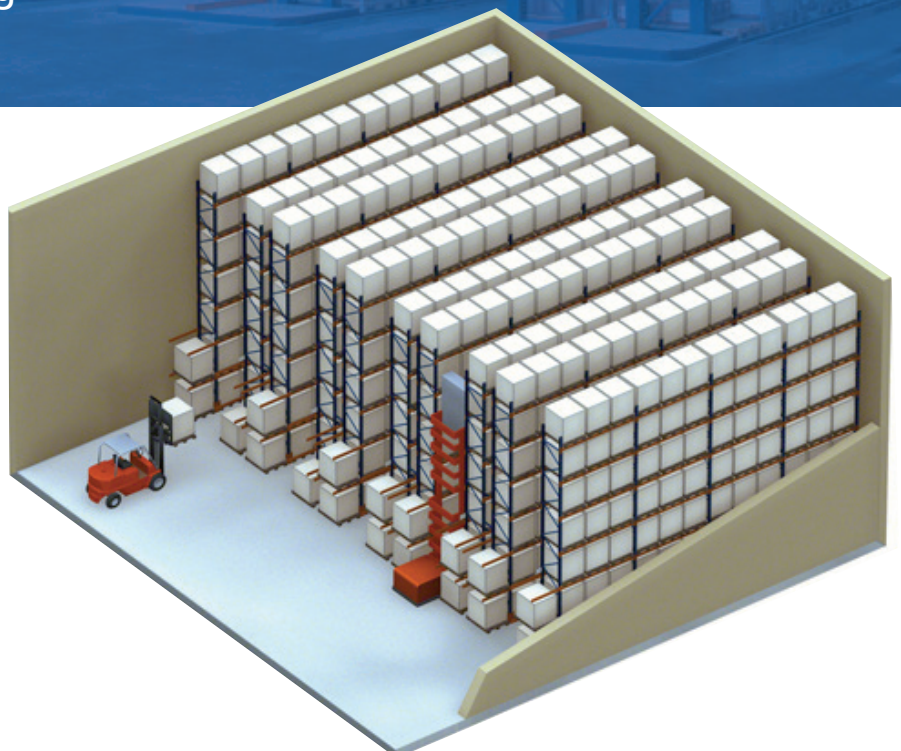




## High bay pallet racking with narrow aisles

Warehouses of this kind have very tall racks separated by narrow storage aisles. The main advantages of this system are the rack's excellent use of space and the direct access it provides to any stored pallet.

Turret trucks or stacker cranes are used to handle the unit loads.





## Turret trucks

Turret trucks are designed to work in narrow aisles, generally with high bay racking. These machines must be guided when operating inside load lanes.

These vehicles run too slowly to be used outside the load aisles. So, most of their work is done within the aisles. They are often supported by more conventional handling devices, which deposit and pick up pallets at the ends of the racking aisles.

Turret trucks can be classified into two different systems:



### Man-up system (Class 300 A)

In this system, the operator sits inside the onboard cabin, which moves up and down with the goods. This enables greater manoeuvrability and allows the operator to pick directly from the pallets.

It is also known as a 'combi' system, since both pallet storage and picking can be combined.



### Man-down system (Class 300B)

This system features a truck with an immobile operator's cabin that does not move up and down with the goods.

A viewing camera and a height selector facilitate the operator's manoeuvres.



Trilateral forks

## Types of forks

Goods can be extracted with two types of forks: trilateral and bilateral.

### Trilateral forks

Trilateral forks enable pallets to be picked up from and deposited on the floor in three positions: from the front, and from either side of the truck via a rotating swivel carriage head.

### Bilateral fork

Bilateral forks can only pick up and leave pallets in a raised position. So, they cannot pick pallets directly off the floor. Installations using these forks will be taller and have narrower aisles.



Bilateral forks



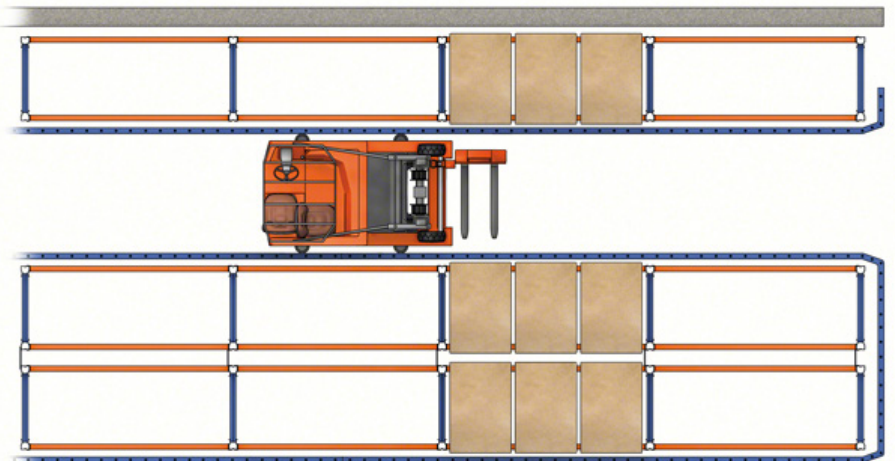


### Guidance systems for turret trucks

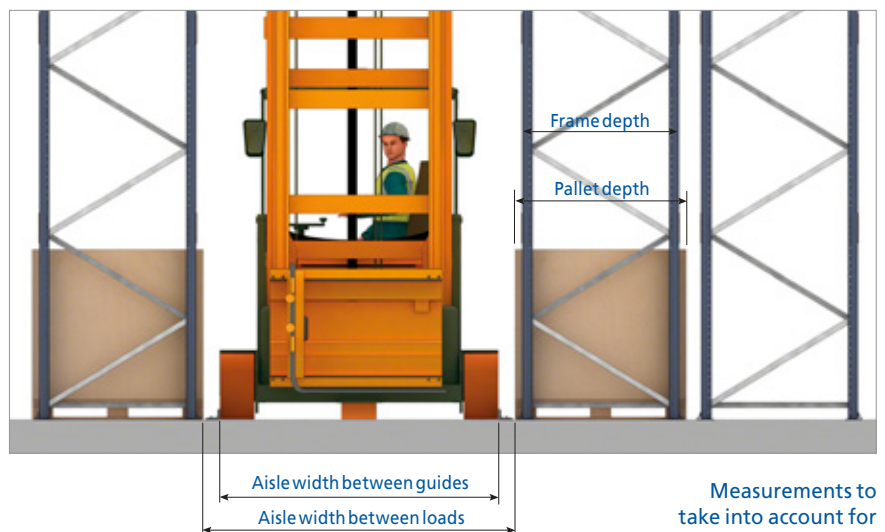
Turret trucks must be guided along the inside of storage aisles.

These vehicles can be wire-guided, in which case a wire is embedded into the floor and gives off a magnetic field to guide the truck's movement. Otherwise, the system is mechanically guided, using profiles fitted to both sides of the aisle and anchored to the floor.

Each vehicle model functions with a different type of guide rail and aisle width. The distance between guide rails and the distance between load pallets must be defined as per the aisle width.



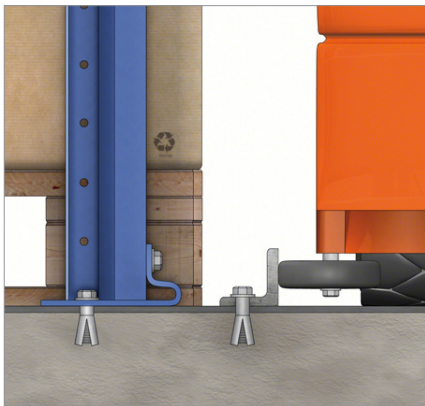
Mechanical guidance general layout



Measurements to take into account for mechanical guidance.

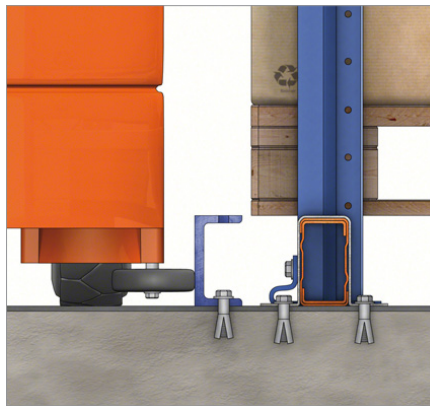


## Mechanical guidance



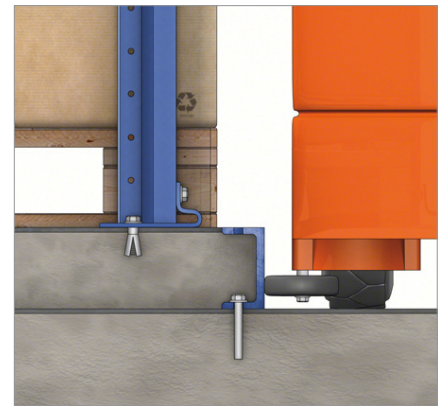
### Guidance using LPN 50 profiles

The pallets are set directly on the floor.



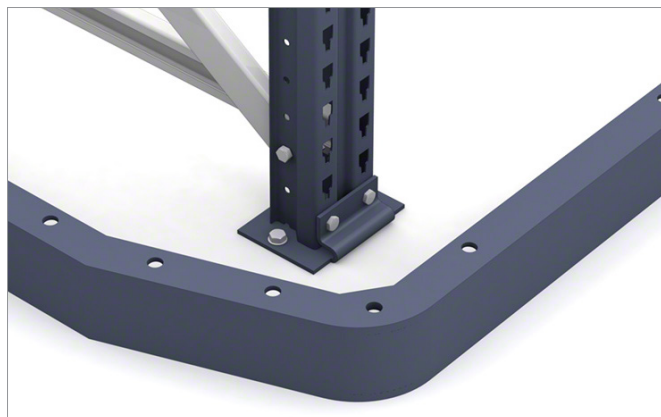
### Guidance using UPN 100 profiles

The pallets are set on profiles attached to the floor or on the beams.



### Guidance using UPN 100 profiles with a concrete platform

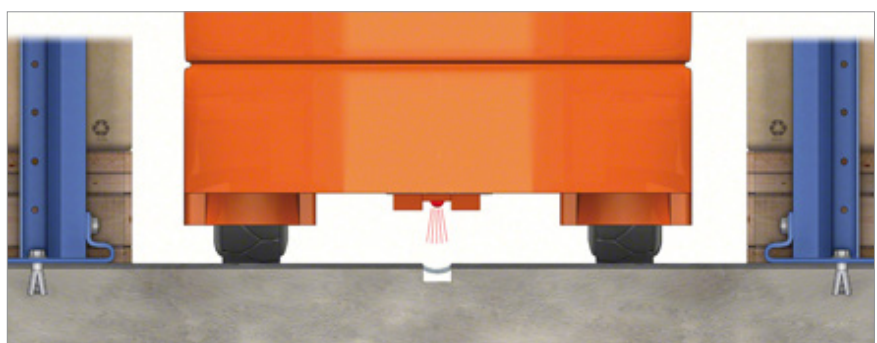
The space under the racks and between the guide rails is filled in with concrete. The racks are built on top of the concrete platform.



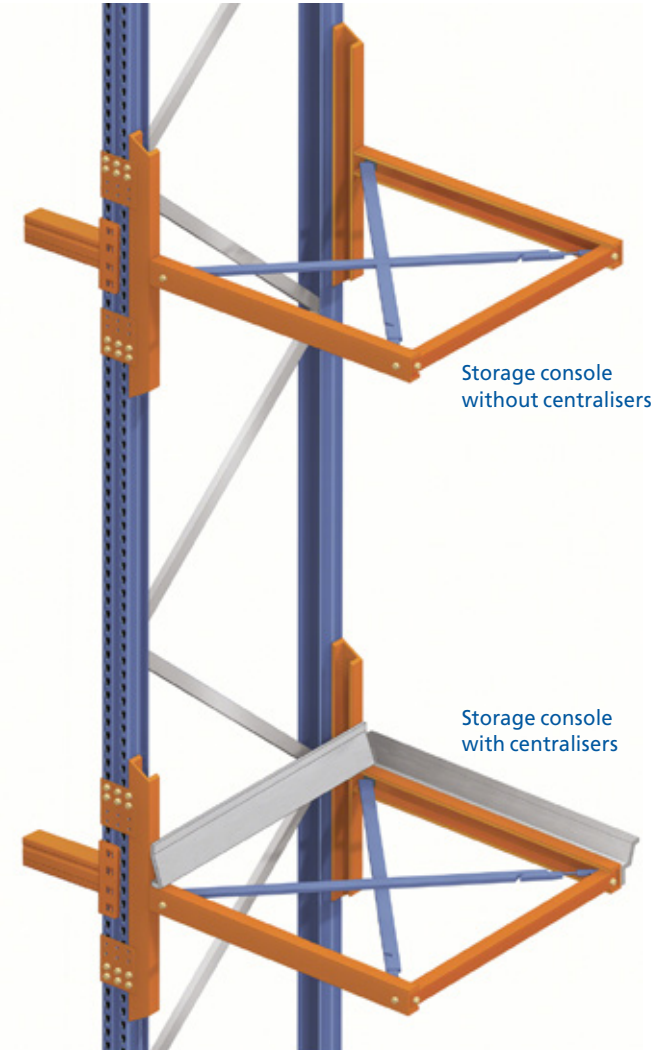
In mechanical guided aisle entry, profiles are fitted with reinforced entry rails to help centre the vehicles.

## Wire guidance

A wire embedded into the floor produces a magnetic field, which guides the vehicle.







### Storage consoles

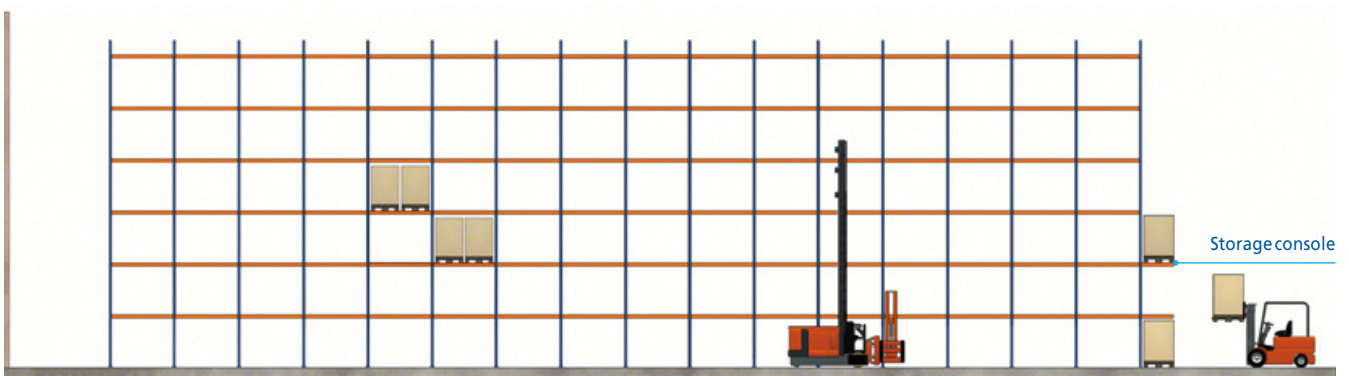
Storage consoles are installed at the rack ends to deposit a pallet temporarily. These are commonly used in narrow aisle systems.

Turret trucks, designed fundamentally to work inside the aisles, pick up and deposit the pallets on the consoles.

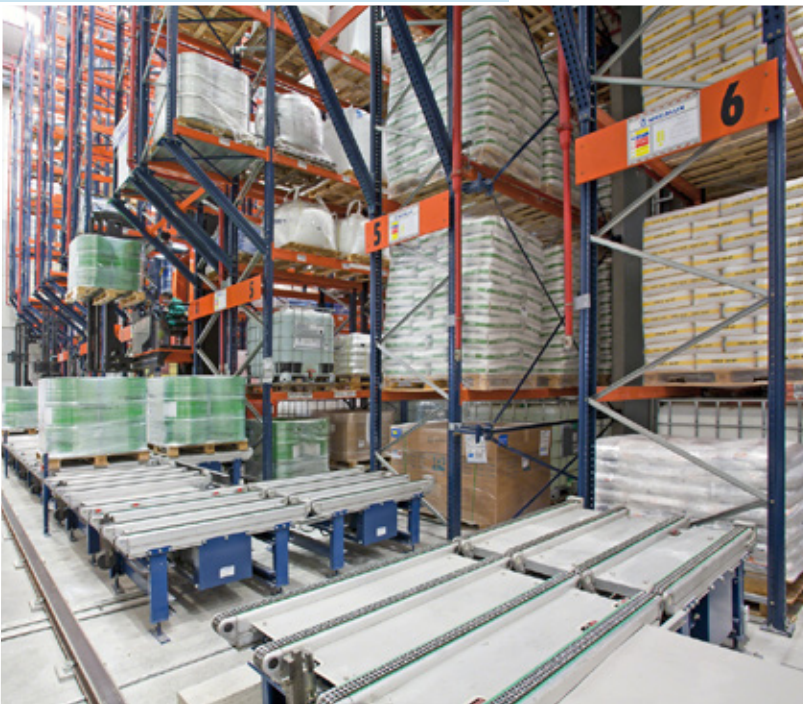
Other more conventional type forklifts then handle the pallets from this point. A number of different consoles are available. They have been designed to fulfil different storage needs, depending on the required height, size, loads, etc. Consoles can also be fitted with pallet centralisers, enabling pallets to be

positioned with greater precision. This feature makes it easier to place pallets in locations with lower clearance margins.

When guidance is done mechanically, pallet support rails must also be fitted at the rack ends.







### Conveyor systems

In high bay warehouses of this type, transporting pallets from the docking area to the rack's main conveyor circuit can be automated. The warehouse is equipped with roller and chain conveyors for that purpose. In some installations, shuttles are also used. These move the pallets to and from the rack's entry and exit points.

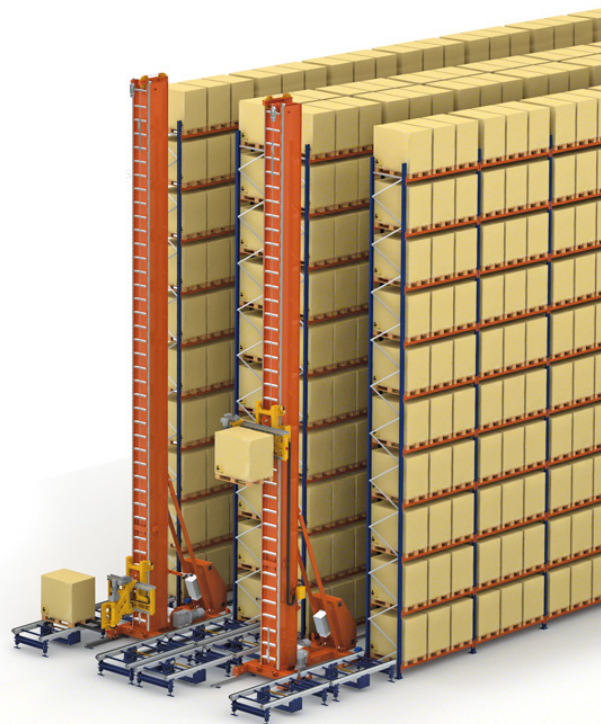


### Automatic trilateral stacker cranes

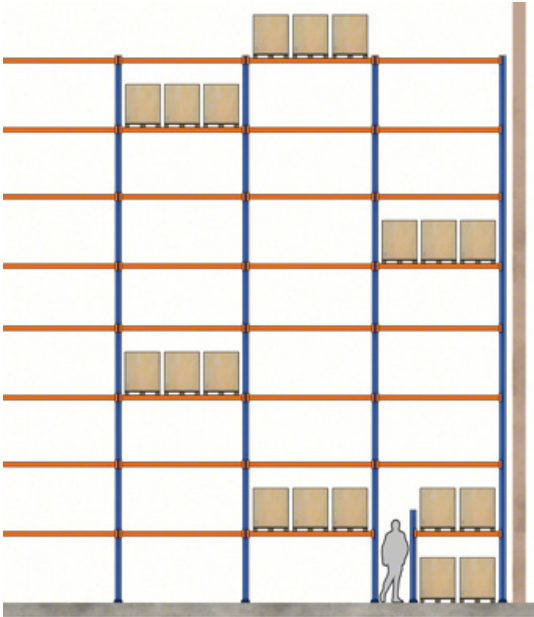
A warehouse with up to 15 m high conventional racks can be easily automated using this solution.

The stacker crane moves the pallets to the end of the aisle leaving the load on a rack or automated transport system. It picks up and leaves pallets in three different positions, i.e., in front and at either side, by means of its rotating head.

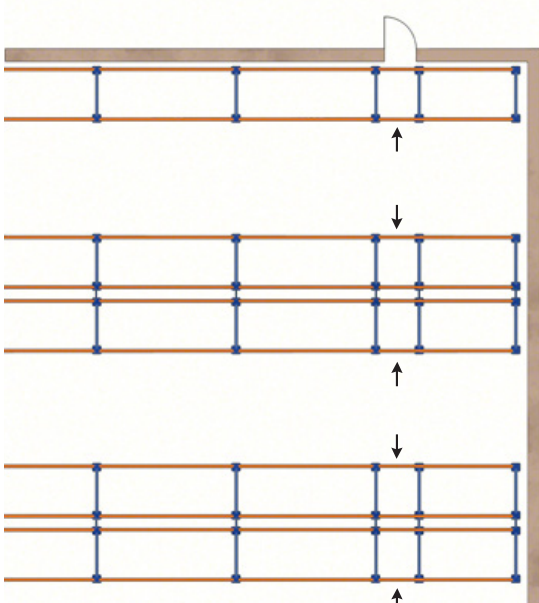
Operations are fully automated. All stacker crane movements are done according to storage or retrieval commands sent from the control system, which optimises its movements.







Side view of an installation with a passageway



Top view of an installation with a passageway



### Safety accessories

#### Safety passageways

For safety reasons, an installation may require ground-level passageways running through the racks as emergency exits.

#### Top portal tie

High bay racks are often connected at the top by portal ties to provide additional stability.

These portal ties must be attached above the maximum reach height of the lifting devices, including the mast and the cabin.



Close-up of a portal tie





### Fire safety systems

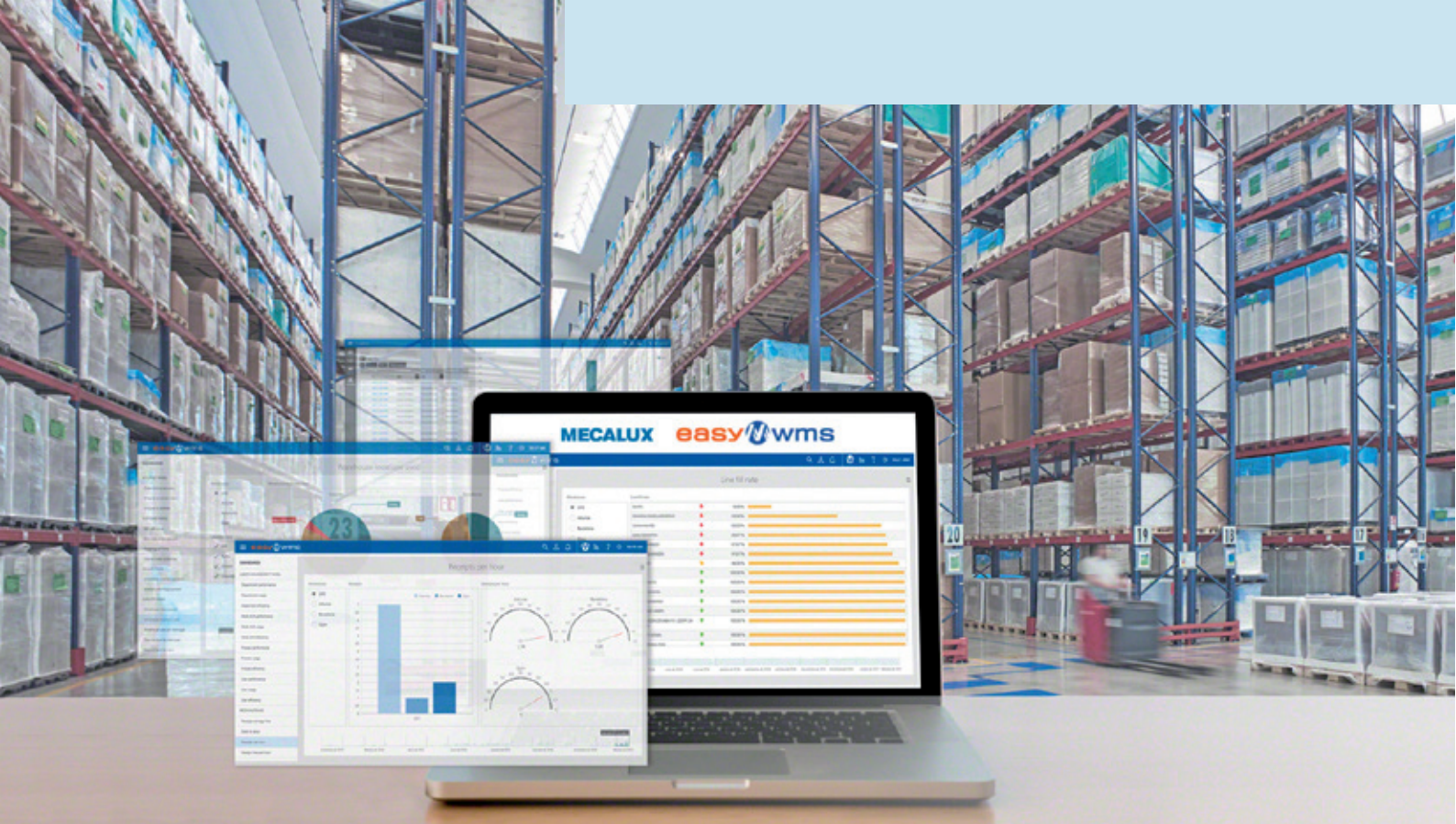
High bay racks are usually equipped with a built-in fire protection system.

As such, the clearances between the racks and between the levels need to be determined for the pipes and sprinklers to be installed.

The pipes and sprinklers should coincide with the position the beams are fitted.







## Easy WMS warehouse management system

### The brain of the facility

Easy WMS is a powerful, versatile, scalable and flexible software program that can manage a manually operated warehouse (paper- or radiofrequency-device-run), a mixed facility or a large automated warehouse with the same efficiency.

Use it to streamline physical product flows and document management, from warehouse inputs to dispatches, for guaranteed, full end-to-end traceability.

#### Advantages

- > Real-time stock control
- > Lower logistics costs
- > Increased storage capacity
- > Reduced handling tasks
- > Error elimination
- > Accurate, high-speed picking
- > Adaptation to new e-commerce needs
- > Management of omnichannel operations
- > Fast ROI (in 12-18 months)



**Mecalux works with leading suppliers that attest to the quality, reliability and technical level of the Easy WMS platform:**

ORACLE

Partner

SAP  
Partner

Microsoft Partner

ZEBRA  
TECHNOLOGIES  
SEE MORE. DO MORE.



# Interconnected solutions for your supply chain



**Multi Carrier Shipping Software**  
Automates product packaging, labelling and shipping. Coordinates direct communication between the warehouse and the various transport agencies.



**Store Fulfillment**  
Synchronises inventory and workflows to ensure optimal stock management between the central warehouse and the network of brick-and-mortar shops.



**Marketplaces & Ecommerce Platforms Integration**  
Synchronises the stock in the warehouse with the online catalogue in real time. Easy WMS automatically connects to the main digital sales platforms and marketplaces, e.g., Amazon, eBay and PrestaShop.



**WMS for Manufacturing**  
Facilitates traceability in manufacturing processes. Guarantees the continuous supply of raw materials to the production lines.



**Supply Chain Analytics Software**  
Analyses the thousands of pieces of data generated daily in a warehouse, allowing managers to make strategic decisions based on the real throughput of operations.



**3PL Warehouse Management Software**  
Manages billing between a 3PL and its customers. A dedicated access platform provides information on stock condition and how to place orders or request customised shipments.



**Yard Management System**  
Supervises the movement of vehicles in the yard at the warehouse or distribution centre. Optimises loading dock operations to improve vehicle flow and avoid bottlenecks with inbound and outbound goods.



**Labor Management System (LMS)**  
Maximises operational productivity. It objectively measures operator throughput, detecting opportunities for improvement for the company.



**Warehouse de Slotting Software**  
Optimises slotting management in the warehouse. It determines the optimal slotting for each SKU based on a set of predetermined rules and criteria (historic, current and future demand).

## Easy WMS in the cloud

- » **Lower initial investment** since in-house servers are not needed.
- » Faster, simpler **implementation**.
- » Easier, more affordable **technical support and maintenance**. Total security with Microsoft Azure.
- » Software **version up-to-date** at all times.
- » **Maximum availability** to guarantee business continuity.
- » **Fees adapted** to the needs of each business.

**Gartner**

**MECALUX IN THE  
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FOR WMS**

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**Mecalux has a presence in more than 70 countries worldwide**

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Italy - Mexico - Netherlands - Poland - Portugal - Romania - Slovakia - Slovenia - Spain - Turkey - United Kingdom  
Uruguay - USA

