



# Mezzanines

Multiply useful surface area by adding one or more additional floors



## An intelligent, economical solution to fully utilise warehouse spaces at heights

Mecalux mezzanines are steel structures consisting primarily of main beams, secondary beams and columns. They create new elevated surfaces on warehouse or facility floors, providing additional storage space in a quick, inexpensive way.

Considering that land is an increasingly rare and expensive commodity, especially in urban areas, mezzanines offer a cost-effective and highly versatile solution for companies that need to increase their storage surface area without affecting their bottom line, or when it is not possible to expand a warehouse due to the nature of the space.

In addition to the load bearing structure, mezzanines consist of the floor of the newly created surface, the handrails, the access stairs and sometimes the gates to access goods. Mecalux has a wide variety of sizes and finishes to suit all needs, both for load capacity and space distribution.

In other words, installing a mezzanine doubles or triples storage surface area. It is the best way to solve space problems at a minimal cost.





*There are virtually endless possible uses of mezzanines. Both the variety of sizes and the various constructive systems, add-ons and finishes result in customised projects suited to the space available and each customer's requirements.*

# Key advantages

The most cost-effective way to optimise space at heights in your warehouse

1

## Space saving

The possibility of building one or several raised floors on the ground floor of an installation can double or triple its useful surface area.

- The various constructive systems **allow raising structures with large distances between columns** and a diaphanous floor space that increases the capacity of the warehouse, as well as improves the manoeuvrability of the handling equipment.
- The Mecalux Engineering department can **design custom projects** that perfectly adapt to the space available in warehouses with complex features. They circumvent any potential constraints within the building, making full use of the entire surface area.

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## Cost savings

The cost per square metre of a mezzanine is significantly lower than what it would cost to expand the main floor's surface area.

- It does not require a foundation, so it is **totally removable and reusable**. This offers the possibility of modifying its structure, dimensions and location, reinstalling all its components.
- There is the possibility of dispensing with annexed facilities **to build two or three differentiated zones in the same warehouse** by devoting, for example, the bottom part to picking and the upper floors to storing pallets or boxes.
- **Assembly is quick, easy and does not generate filth**, so the work cycle within the company is not interrupted.





3

## Versatility

The diversity of the profiles, sizes, floor types and finishes converts Mecalux mezzanines into a system suitable for a variety of uses within production centres, storage and industrial warehouses, workshops, etc.

- Any type of load capacity or space distribution requirement is perfectly outfitted by the **three** available **constructive systems**.
- They can be complemented with **different racking systems**.
- **Platform and goods lifts** can also be incorporated to facilitate the movement of goods from one level to another.

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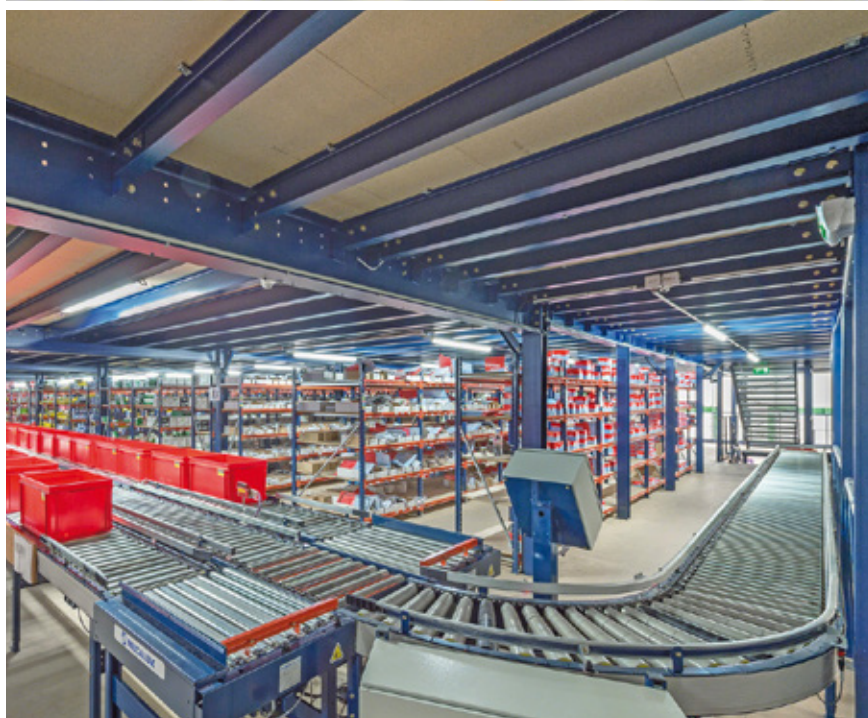
## Safety

Mecalux mezzanines comply with regulations worldwide for this type of construction.

- **To ensure the maximum resilience and stability of the structure**, Mecalux uses calculation software that designs a layout and calculates the optimum features of the different mezzanine floor elements on a case to case basis, considering factors such as:
  - . Use overload  $\text{kg/m}^2$  (load requested by the customer).
  - . Floor type to be used.
  - . Height of the mezzanine floor.
  - . Overhanging main and secondary beams.
  - . Adjacent spaces/obstacles.
  - . Live loads (pallet trucks, etc.).
  - . Characteristics of the premises and additional specifications of the customer.
- In all projects, **the rules of calculation, safety coefficients and permitted deflections are monitored**. For example, to calculate structures that make up mezzanines, the Eurocode 3 guidelines of the European standard are taken into consideration.
- The **storage or mezzanine floor structure is calculated in 3D** using the finite element program, always applying a second order calculation to take into account the influence of the structure's deflection. Simultaneously, Mecalux collaborates with external laboratories to perform tests on the connections between the different components.
- **Fire protection**: according to the intended end use of the mezzanines, the constructive system employed, and national and local regulations, structures can be protected against fire by applying intumescent paint making them heat-resistant.
- Mecalux follows a **comprehensive assembly safety protocol** to prevent work related accidents.

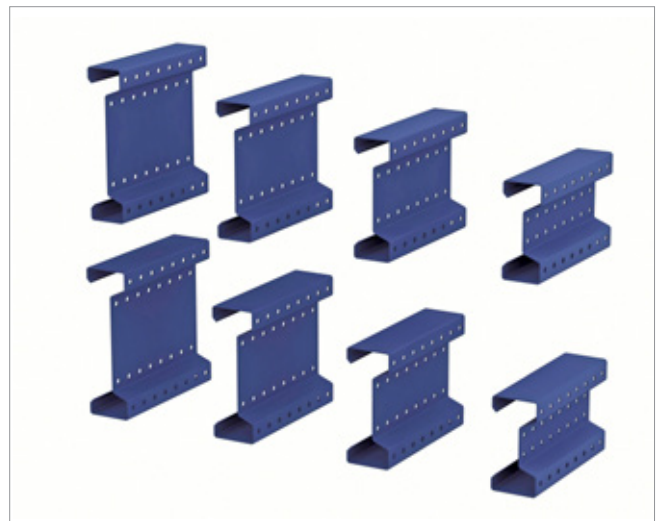
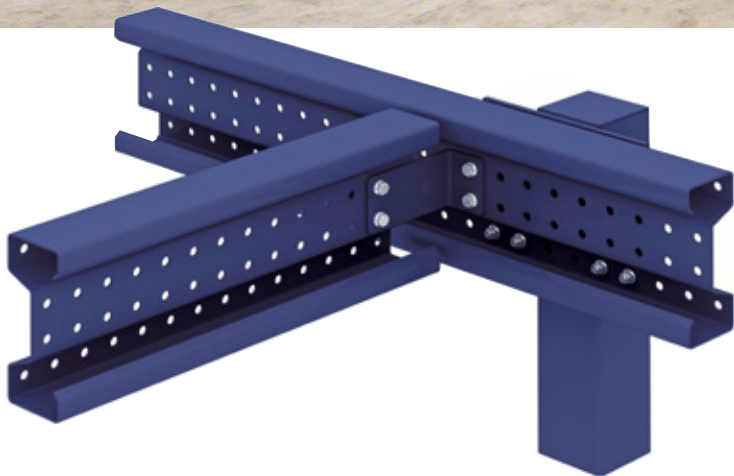
# Constructive systems

Three constructive systems to suit all types of loads and uses



In order to offer the ideal solution in each individual case, Mecalux has three mezzanine constructive systems to choose from based on the load, the distances between columns and the use for which they are intended.

When designing a mezzanine floor with any of the mentioned constructive systems, the constraining factors within each case are taken into account. These include factors such as accesses, the work system, the product, the loading and unloading area, the handling equipment or the floor type (e.g. asphalt, tiles or terrazzo are not suitable to bear the load of the posts).



Diversity of Sigma profile thicknesses

# 1

## Sigma system

This type of mezzanines are composed of cold-profiled elements. Both the columns and the beams with Sigma profiles are manufactured in various heights, lengths, thicknesses, drill hole diameters, etc., which makes it possible to create multiple combinations.

Sigma cold-formed, steel profiles can act as main beams, and as secondary beams that rest on the main beams. Its standardised length is between 1,000 and 12,000 mm in 250 mm sections, with a height ranging from 240 to 400 mm and a width of between 100 and 120 mm.

This system creates a diaphanous surface under the mezzanine floor, given that its high resilience supports a large distance between columns.



Drill holes for additional elements

Sigma profiles have holes that make it easy to attach elements to the girder, such as electrified monorails, overhead conveyor systems, support structures, work accessories, etc. These additional items must be considered in calculations when you plan to install them.

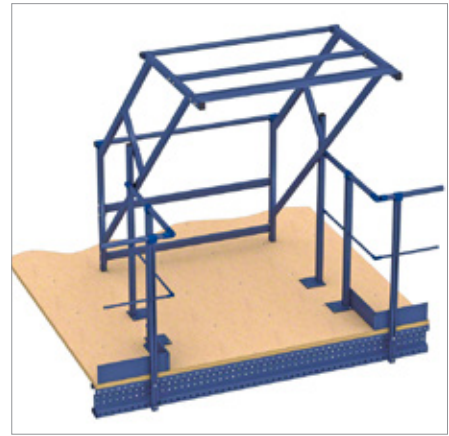




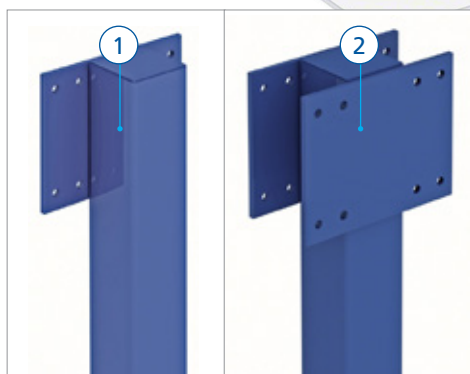
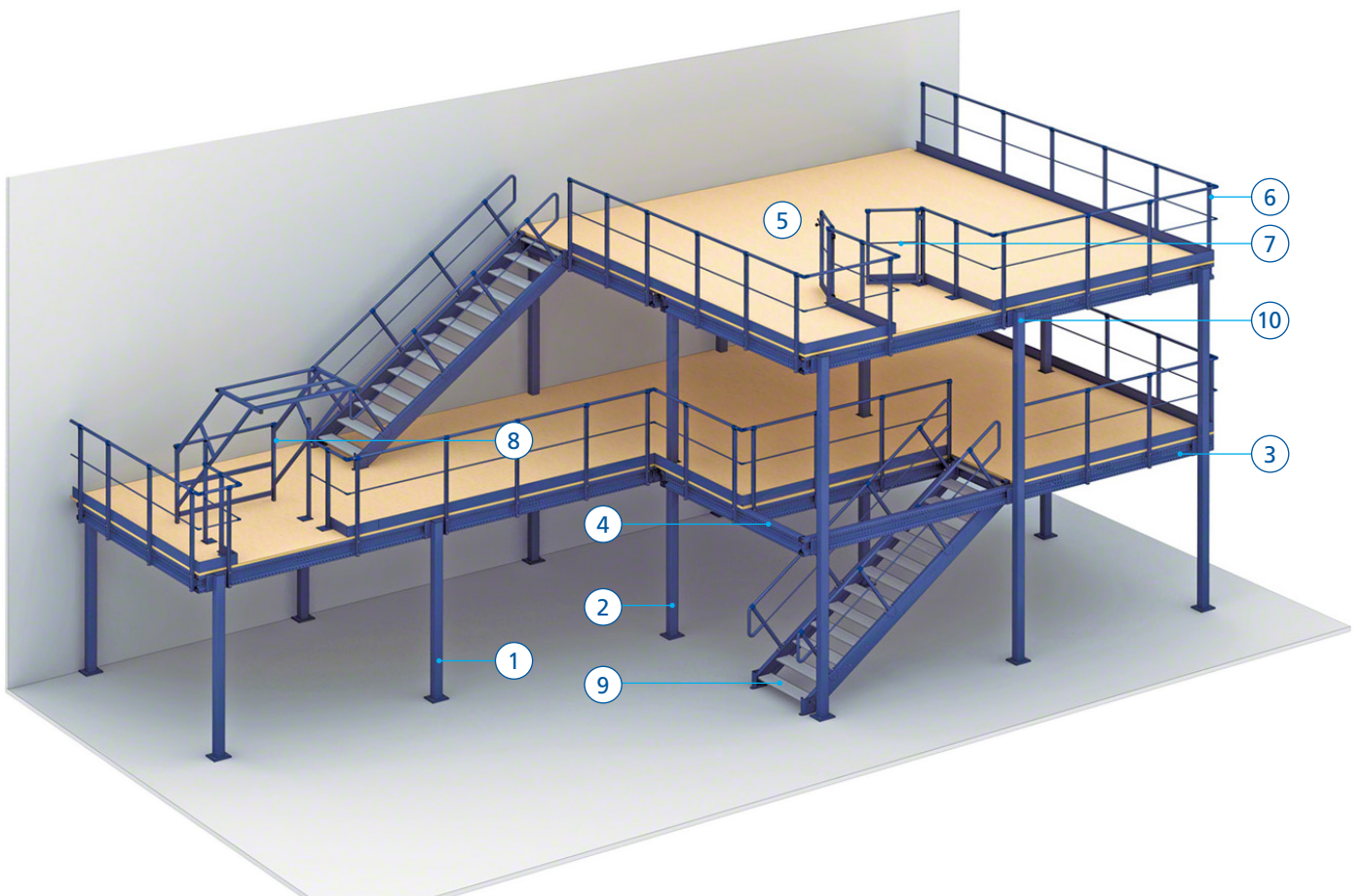
Safety rail



Swing gate

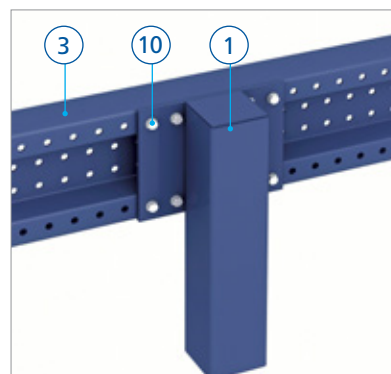


Up and over pallet gate



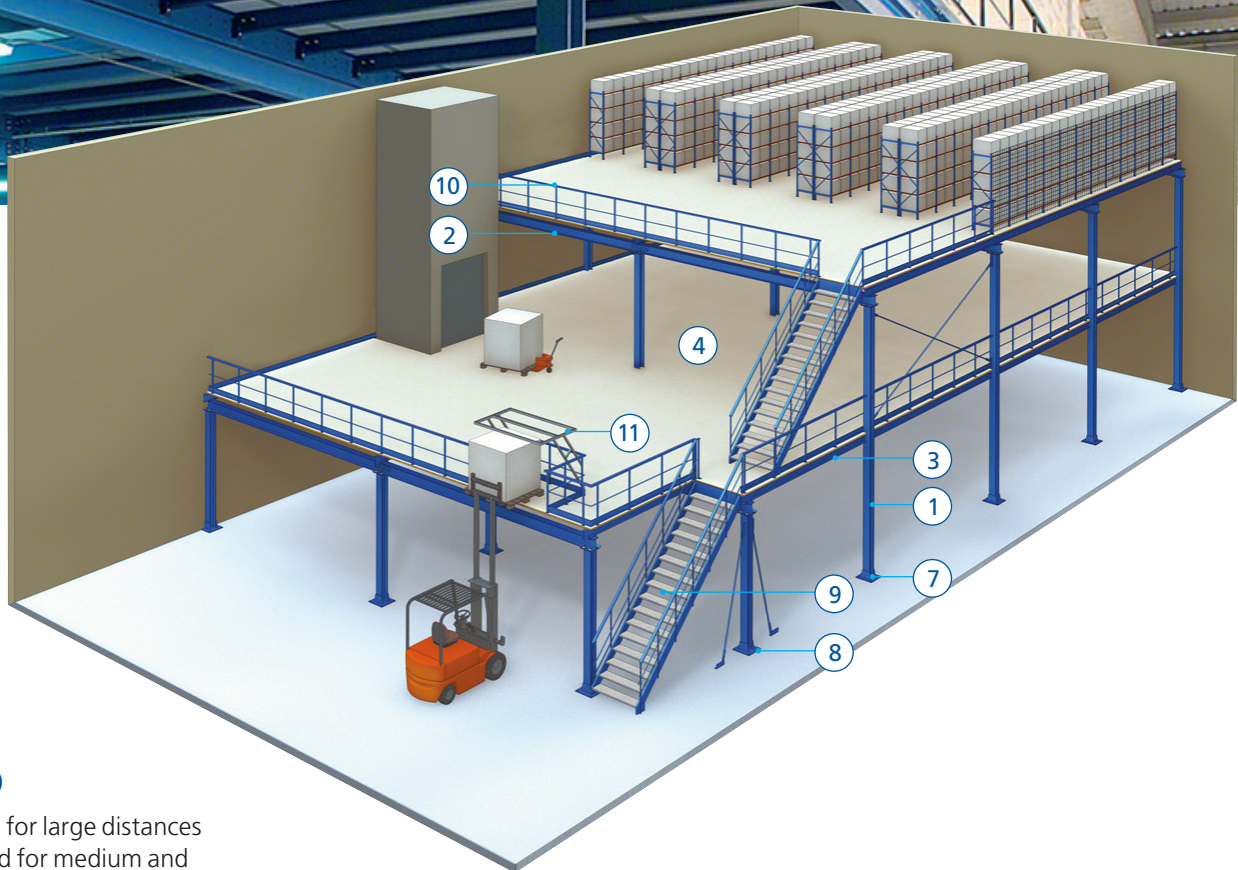
Single column

Double column



### Basic components

1. Single column
2. Double column
3. Main beam
4. Secondary beam
5. Floor
6. Safety railing
7. Swing gate
8. Up and over pallet gate
9. Staircase
10. Fastening plate



## 2

### GL system 2000

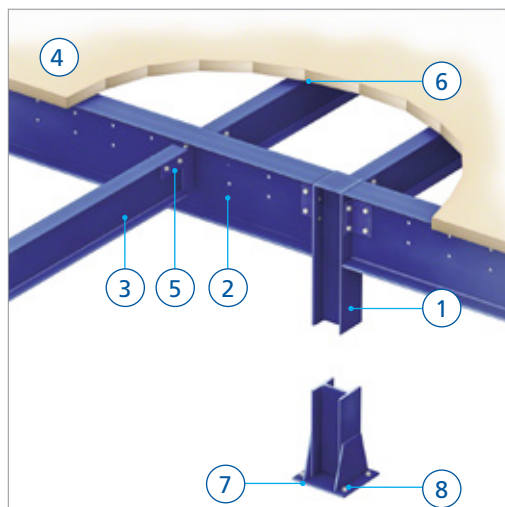
This system is ideal for large distances between pillars and for medium and heavy loads.

It is constructed with standardised hot-rolled, IPE profiles (section is parallel sided and double T shaped).

The secondary beams are embedded in the main beams and joined together via brackets, which are bolted to the beam cores.

The columns are made out of HEA profiles (H shaped sections). Holes are drilled into the beam flanges so that the beams can be held in place using lateral brackets.

As an option, they can be painted with intumescent paint for fire protection.



#### Basic Components

1. Column
2. Main beam
3. Secondary beam
4. Floor
5. Support angle bracket
6. Floor attachment clamp
7. Column base plate
8. Anchors
9. Staircase
10. Handrail
11. Up and over pallet gate

This constructive system enables various floors to be installed one on top of another.



### 3

#### Mixed systems

When it is necessary to build large sized structures, the two systems mentioned above may be conjoined.

Many combinations are available, although it is most common to use main beams manufactured

in hot-rolled, T shaped, IPE steel profiles joined to secondary beams with Sigma profiles.

In addition, columns are often built using H shaped, hot-rolled HEA steel profiles.



# Floor types

Different options for a perfect finish that match the setting and use

There are different types of floors that adapt to different needs depending on: the load, the type of work, the movement of forklifts, the ventilation requirements, etc. They are made from standard sized and finished pieces that are fastened to the beams using flanges and clamps.



## Wooden flooring

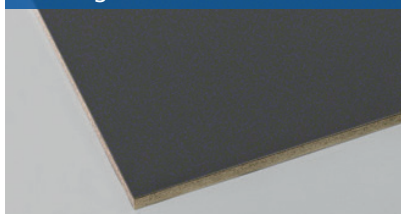


### Chipboard panel flooring



It is built with 30 mm thick chipboard panels that are interlocked via splices or tongue and groove joints. Once the panels are in place, the floor provides a smooth, unfinished surface. An alternative is fireproof panel flooring, treated to prevent the spread of fire and rated M1.

### Melamine chipboard flooring MA/ML



It is made out of 30 mm thick chipboard panels that feature tongue and groove joints, so their installation is fast and the joints line up perfectly without needing splice pieces. Both sides have a melamine finish: white on the bottom side, and a black, textured finish on the top side that provides an anti-slip, scratch resistant surface. Overall, it gives a professional looking finish and a brighter work area below.

### Wooden flooring with sheet metal



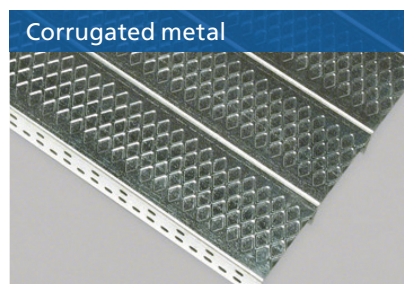
Conglomerate wood flooring can be covered with 1.5 mm thick galvanised steel when any sort of pallet truck or heavy trolley circulates on the mezzanine floor. Thus, wear and tear to the wood is avoided, and resulting noise levels are minimised.



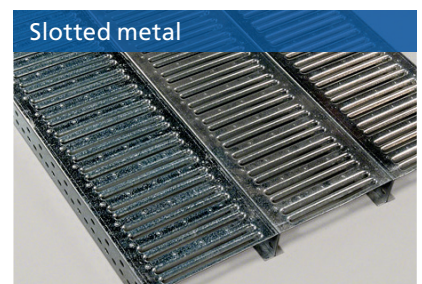
## Metal floors

Metal floors are manufactured out of galvanized steel and have a high load capacity.

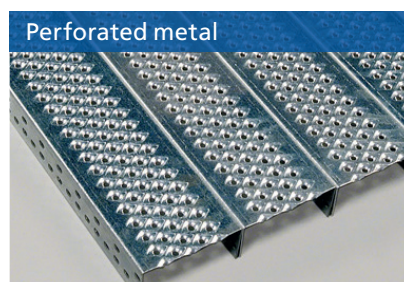
The different models come in a variety of slotted or perforated surfaces depending on the ventilation requirements and the water supply in fire protection systems.



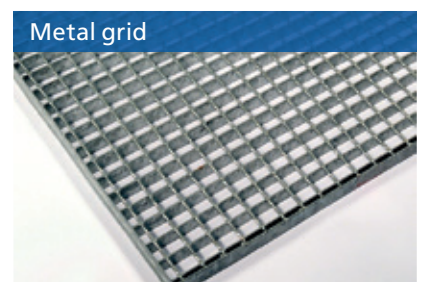
Corrugated metal



Slotted metal



Perforated metal



Metal grid

# Railings and staircases

Add-ins that are essential for the safety and accessibility of the mezzanine floor

## Handrails

It is mandatory to install handrails around the perimeter of the mezzanine floor, which is not located directly up against walls. This is a safety element for the protection of staff working in the installation.

Its main components are the handrail, the handrail post (with a maximum separation between posts of between 1,100 and 1,500 mm depending on the constructive system), the intermediate rails and the kickboards (to prevent objects from falling).

## Accessories

In certain mezzanines, it may be necessary to set up an area to give access to pallets. To do this, a few openings in the handrails are made to install available gate models:



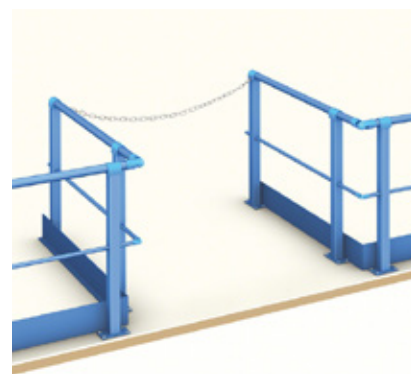
## Swing gate

It opens inward to facilitate the input of merchandise from the exterior. It incorporates a lower bumper and an upper hand-operated latch to close it securely. Two gates can be set up for a 1,500 mm wide access, or a single one for a 750 mm wide access.



## Up and over pallet gate

This kind of access offers maximum safety for operators loading and unloading pallets. The space is always protected because to access goods the opposite side of the railing must be pushed downwards. The height of the load to be handled may vary, depending on the sweep of the gate and the location of the pallet.



## Safety zone

This constitutes the railing itself, creating a space for depositing goods when a loading and unloading area is required. The number of chain guards to install, and the separation between them, will depend on the norms in vigour within each country.



## Staircases

Preassembled Mecalux staircases are easy to set up, resilient, adaptable to different heights and comply with the constructive standards applicable on an international level. Normally 8, 10, 12 and 15 step staircases are installed, depending on the height to be filled. From 15 steps and upwards, several flights must be installed which incorporate intermediate landings.

The best type of staircase will be chosen on an individual basis depending on the number of steps, the staircase width (standardised sizes are 800 and 1,000 mm wide) and the number of railings (1 or 2, based on the location of the staircase).

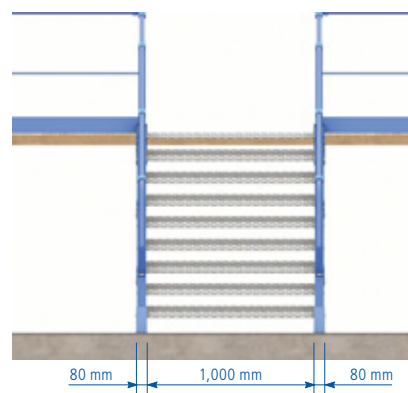
The configurations of the staircases vary according to the floor distribution and the space available.

### Intermediate landings

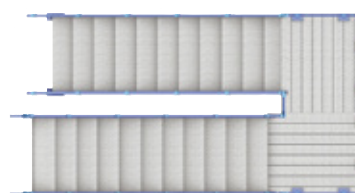
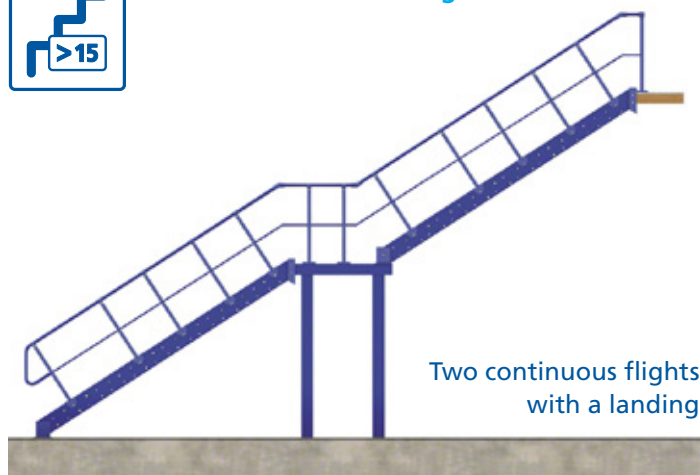
- The flights of stairs maintain the same direction (continuous staircase).
- The flights of the stairs form a 90° angle.
- The flights of stairs turn at a 180°.



### Staircases without landings



### Staircases with landings



Two flights of stairs at 180°



Two flights of stairs at 90°

# Uses

## New life at heights



The surface area obtained at heights by installing a new mezzanine floor can be used for a variety of applications such as workstations, component assembly areas and picking or storage zones. Here are few examples:

### **A mezzanine for large amounts of SKUs in a variety of sizes**

In this example, there are two mezzanine levels to store low turnover consumer products. The floors are connected by a continuous and automated conveyor system making it possible for the operators prepare orders by areas.



In this warehouse, different rack distributions and sizes are installed on each level. Bulkier products for direct preparation are allocated to the ground floor. Meanwhile, the second and third levels have very similar layouts and both stored identically sized products.





### Reception area and order preparation

The mezzanine floor pictured above is linked to a picking warehouse by walkways, and used as an order preparation and reception area. There is an adjoining lift platform to move the goods between levels.



### Storing products of varying formats

In this example, upper warehouse spaces are used to deposit boxes of various formats directly on the floor, while lower spaces are equipped with cantilever racks to store very long format profiles.



**Mezzanines with rail systems for hanging garments**

Both mezzanines, in cases with multiple levels, are reserved for classification zones and the storage of hung garments. The structure itself also supports the rolling elements of the shuttles carrying garments.



**Separate work area**

A common application is to use the bottom level as a work zone and the top level as a product assembly area, isolated by aluminium partitions and false ceilings for a quieter environment. The enclosure is also used to restrict access to where valuable products are stored.



**Workshop warehouse**

In this implementation, the bottom part is used as a zone for assembling electrical panels and the top as a warehouse of its components.



### **Combination of the conveyor circuit and the storage area**

There is an order preparation work area on the mezzanine floor in the above image. It is provisioned thanks to a conveyor circuit for boxes that was set up. This circuit connects this floor with the lower level where these orders are classified.

What stands out is the fire protection system installed, which consists of a structure of pipes and branches with sprinklers attached to the beams of the mezzanine floor. In addition, the painted parts were treated with an intumescent paint as an additional fire-resistance measure.



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