

Mezzanine Floors



ESMENA

The key to a logistics project

We can offer fifty-plus years of experience in advising clients, applying the latest in calculation and design programs and facilitating contact with the professionals from leading handling equipment, cladding and engineering businesses with whom we collaborate when it comes to carrying out your project.



Quality

The complete automation of our production processes makes us a market leader and allows us to compete in over fifty countries on five continents. All of this consolidates us among the largest sector manufacturers in the world.

Esmena has earned ISO 9001 quality certification for the design, manufacture and installation of metal rack storage structures, as well as certification to the ISO 14001 standard for Environmental Management Systems. The quality of the steel used in our projects is determined according to the specifications found in the European standards EN 10 025 and EN 10 147.

Experience

Since 1956, our company has created a solid business structure whose objective is the design, manufacture and installation of all types of storage systems. Our product range includes everything from large automated installations to manual loading or light-weight shelving units.

Technology

A constant commitment to research, development and innovation requires exclusive resources, which is why Esmena has its own technological centre. More than twenty experts dedicated to optimizing and creating new products make our storage systems the most state-of-the-art and competitive systems on the market worldwide.

Mezzanine Floors



Mezzanine floors enable the working height of a space to be utilised to its full potential by doubling or tripling the surface area. They can be designed as storage areas, changing rooms or offices, among other concepts.

Installing a mezzanine floor is the best way of optimising available space.

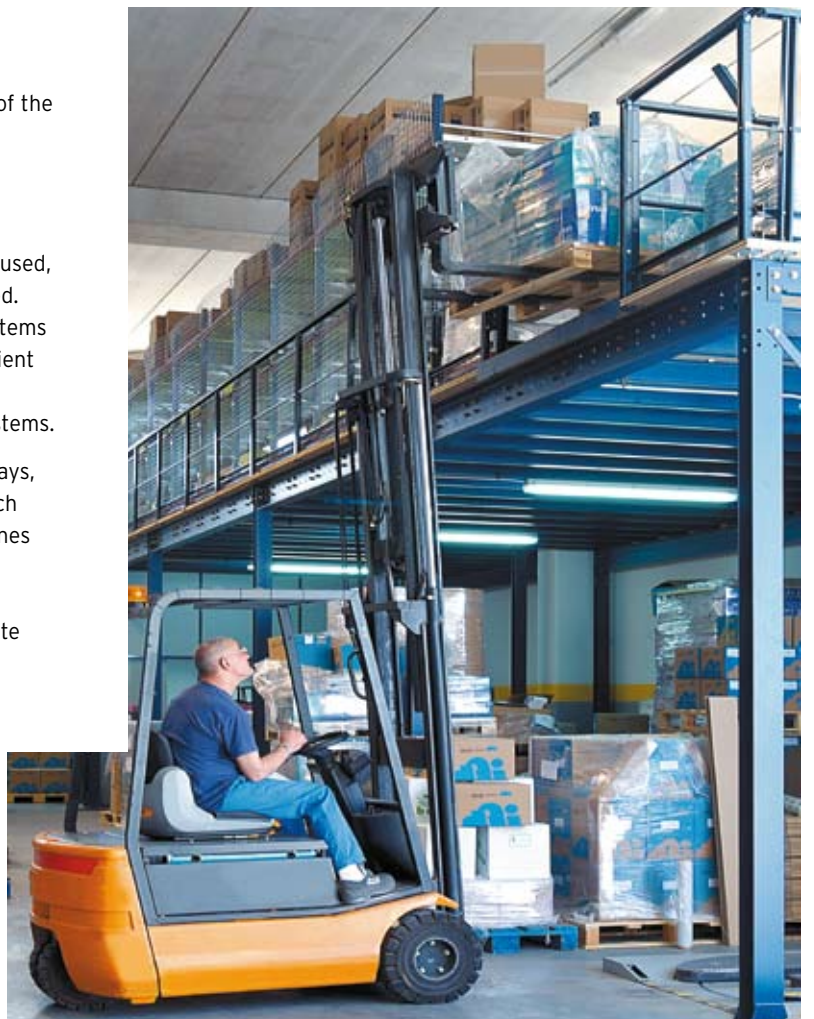
They can occupy the whole space or just the highest parts of the room.

Advantages

- They are quick, clean and easy to install.
- They can be completely disassembled; all parts can be reused, and their structure, size or location can easily be modified.
- The wide range of sizes, floor types and construction systems mean the mezzanines can be adapted to meet specific client needs.
- They can be complemented with a variety of shelving systems.

The mezzanine design must take into account the access-ways, work system, the product and handling methods so that such elements as stairs, handrails, and loading and unloading zones can be accurately planned.

Platform and goods lifts can also be incorporated to facilitate the movement of goods from one level to another.







Applications

Mezzanine floors can be used for a variety of applications, such as work areas, component assembly areas, order preparation zones, storage space or offices.



The installation consists of two raised floors. The ground floor has been fitted with shelves for storing medium to small sized goods and a larger amount of picking operations. The top floor is used to store large or less frequently consumed products.



The mezzanine is connected to a picking warehouse by gangways that serve as reception and order preparation areas. An adjacent platform lift enables goods to be raised and lowered to the different floors.



In this application, the bottom part is used as an electrical panel assembly area and the top part as a storage area.



Mezzanine with offices for the control and management area installed in a factory.



A common application is to use the bottom area as a work or order preparation zone and the top part as offices or isolated work areas, complemented by aluminium partitions and false ceilings for a more agreeable working space.



The mezzanine, in this case with several levels, is used as a classification and storage area for hanging items of clothing. The structure itself supports the elements required for the movement of the clothing trolleys.



In the bottom part of the mezzanine, bulky products are stored while shelving for storing small and medium-sized goods has been fitted in the top part.



In this installation, a work area for document classification has been located above the loading bays. The conveyor belts are hung from the mezzanine structure.

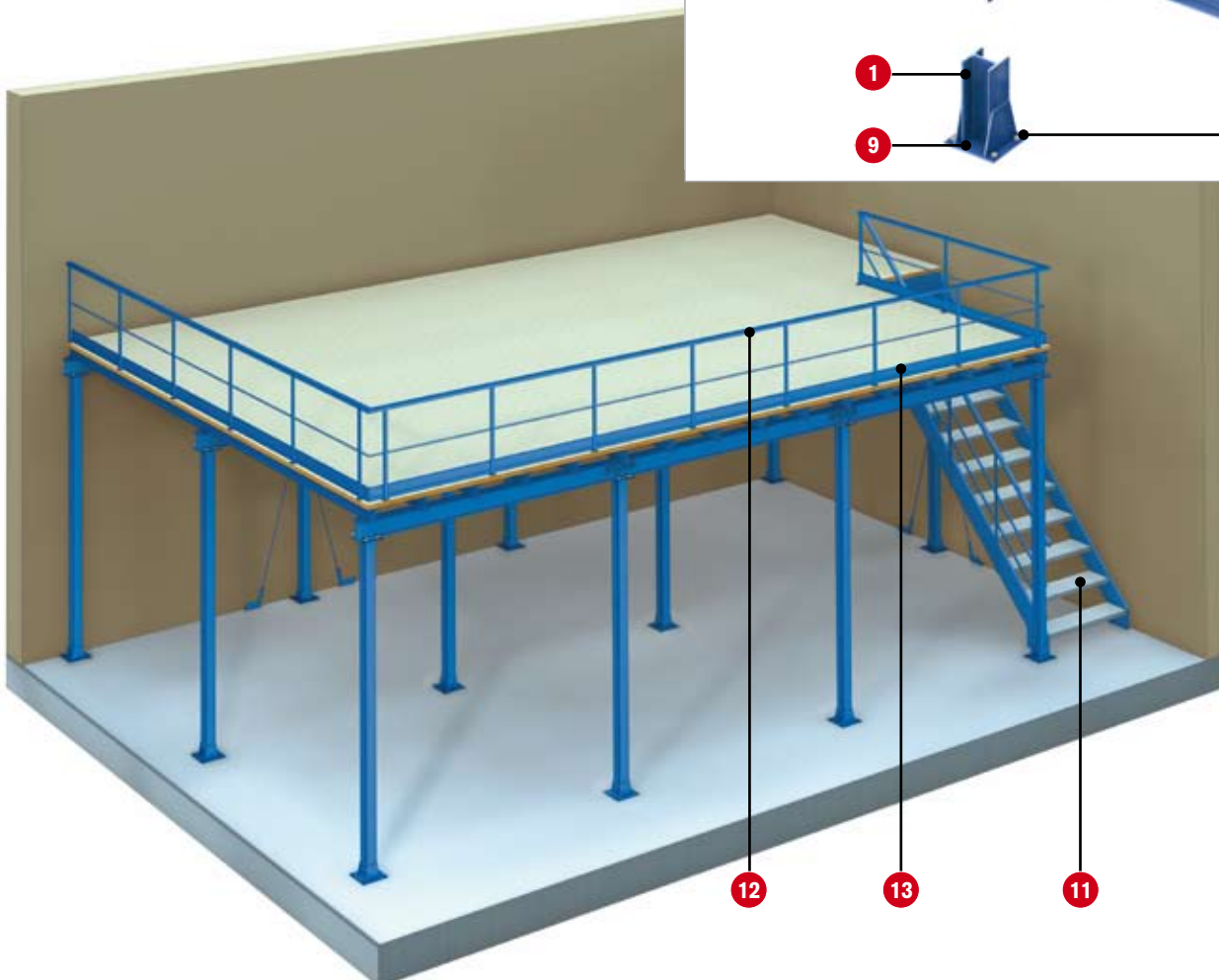
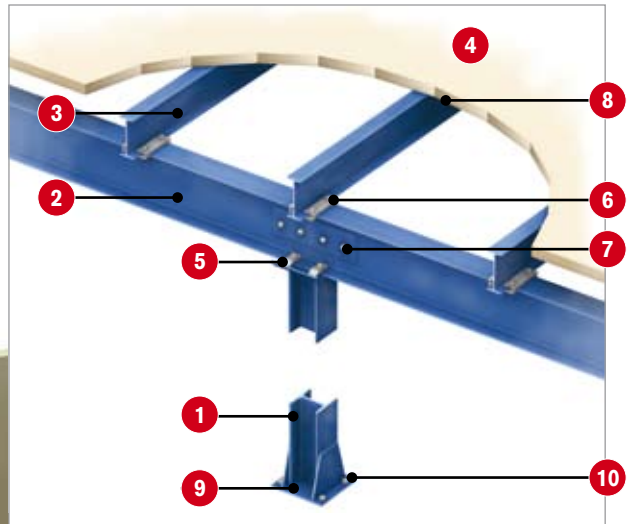
Construction Systems

Mecalux offers a variety of construction systems, depending on the load, the distance between columns and the planned use of the mezzanine. The most common systems are LM 1200 or GL 2000, both built with hot-rolled, standardised IPN or IPE beams.

LM1200 MEZZANINE FLOOR

This is especially designed for medium spans and loads.

The secondary beams are supported on the primary beams, and are joined together by a system of clamps. This system is highly mobile, making it easily adaptable to a variety of spaces.



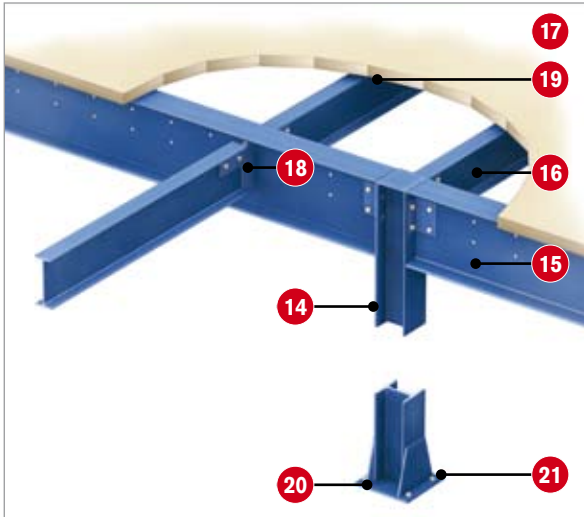
GL 2000 MEZZANINE FLOOR

This is ideal for large spans and medium to heavy loads.

The secondary beams are embedded in the primary beams and are joined together by brackets bolted to the beam cores.

The columns are made of HEA beams. Holes are drilled into the beam flanges so that the beams can be held in place using lateral brackets.

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



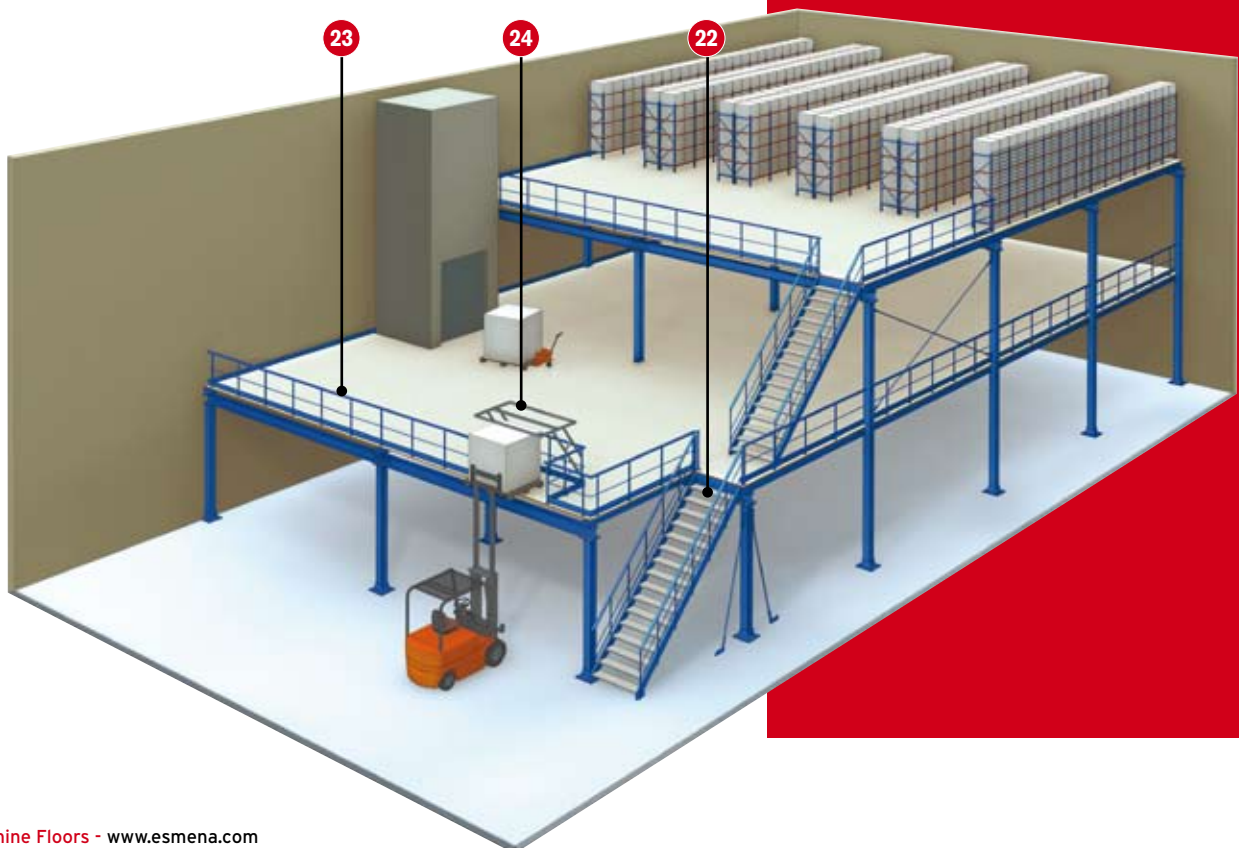
Component s

LM 1200 Mezzanine Floor

1. Column
2. Main beam
3. Secondary beam
4. Floor
5. Column clamp
6. IPN clamp
7. Beam splice
8. Floor clamp
9. Column base plate
10. Base plate floor fixing
11. Staircase
12. Handrail
13. Kick / toe board

GL 2000 Mezzanine Floor

14. Column
15. Main beam
16. Secondary beam
17. Floor
18. Floor support angle bracket
19. Floor attachment clamps
20. Column base plate
21. Base plate floor fixing
22. Staircase
23. Handrail
24. Up and over pallet gate



MEZZANINE FLOORING

A range of floor types are available to cover a variety of needs, depending on the load, type of work, lift truck use, ventilation requirements and other factors.



>> Wooden Flooring

This consists of chipboard panels interlocked in a bridge joint system for a strong floor.

An alternative wood floor is made of fire-resistant high-density fibres.



>> Wooden Flooring 38 MA-ML

This is a 38-mm chipboard panel with a rough, non-slip melamine finish on the top, highly resistant to abrasion. The bottom side is covered with white melamine for a brighter working environment.



>> Wooden Flooring with Steel Sheet

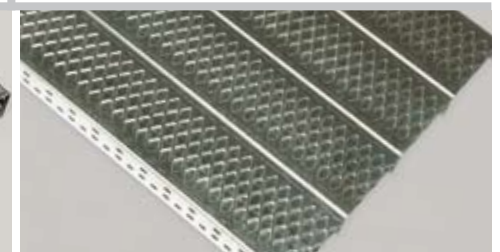
This is installed when heavy trucks or pallet forks are to be used on the top part and resulting noise levels need to be minimised.

>> Metal Flooring

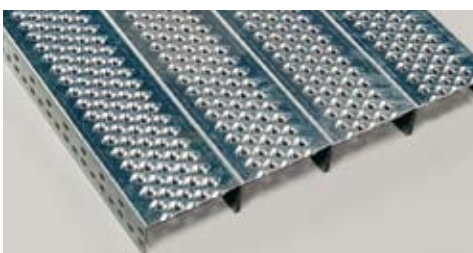
Metal flooring has a high load-bearing capacity and comes in a variety of grooved or perforated models, depending on the requirements for ventilation and water supply in fire-fighting systems.



Slotted Metal



Corrugated Metal



Perforated Metal



Metal Grid

>> Concrete Panel Flooring

When a mezzanine has to withstand heavy loads and have a high level of fire-resistance, it can be made by combining the metal structure with prefabricated concrete panels, covered with a layer of smooth mortar.

The metal structure can be made fire-resistant by using fireproof paint or mortar, with varying thickness depending on the degree of fire-resistance required.



RAILINGS

The protective railings consist of round and rectangular tubes joined together by flanged attachments. Protective kick boards are fitted around the bottom to prevent objects falling off the mezzanine.

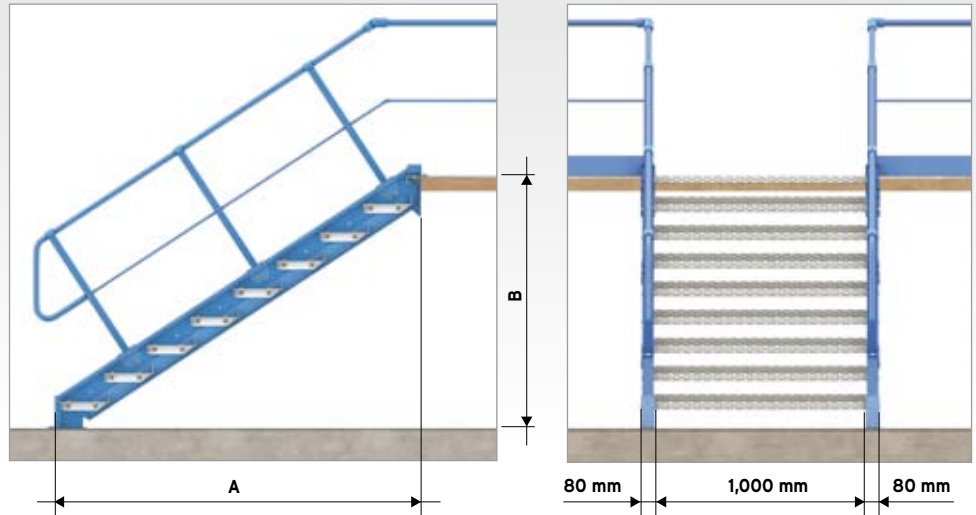
Railings on high floors are connected to banisters by means of joints which permit elements to be attached from varying angles. The banister components have similar characteristics to the railings.



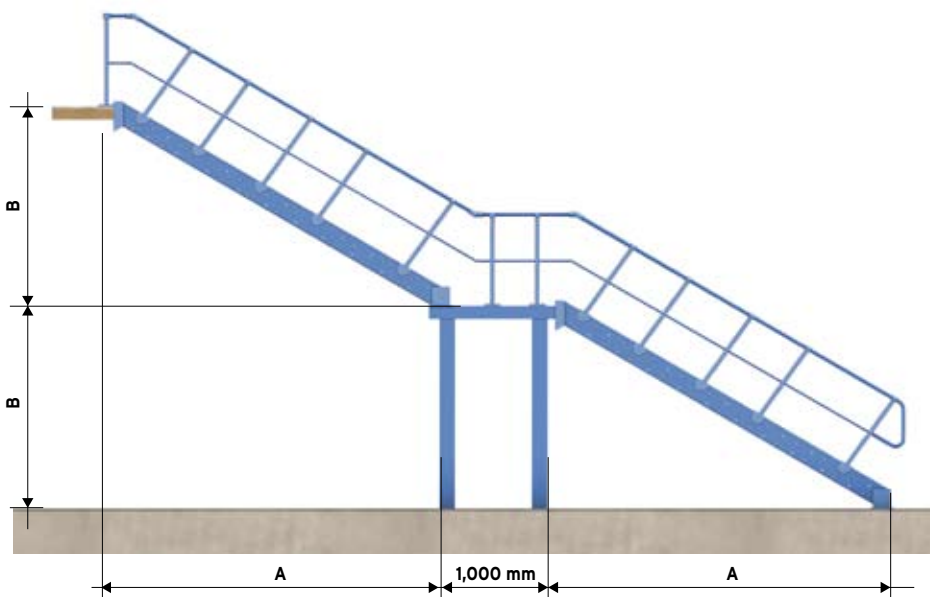
STAIRCASES

The stairs designed by Mecalux are easy to install, sturdy and adaptable to different heights (the same staircase can be used for different heights by adjusting the angle of incline). They also meet all current European building standards. Staircases of 8, 10, 12, or 15 steps can be installed, depending on the distance between the ground floor and the mezzanine floor. Extra flights of stairs are required for staircases over 15 steps.

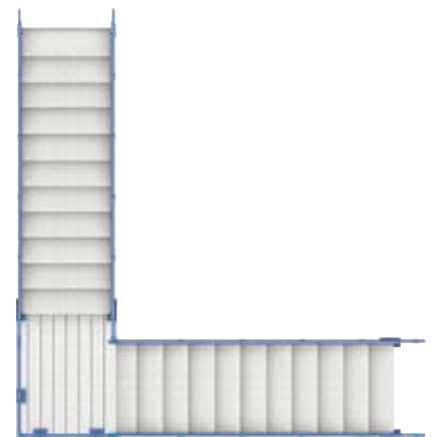
>> Single flight of stairs



>> Two continuous flights



>> Two flights of stairs at 90°



>> Two flights of stairs at 180°



Heights and steps available

Number of steps	A		B	
	Min.	Max.	Min.	Max.
8	2,418	2,585	1,320	1,655
10	2,990	3,200	1,615	2,030
12	3,560	3,810	1,910	2,400
15	4,415	4,730	2,350	2,960

Heights in mm

ACCESSORIES

>> Swinging Door

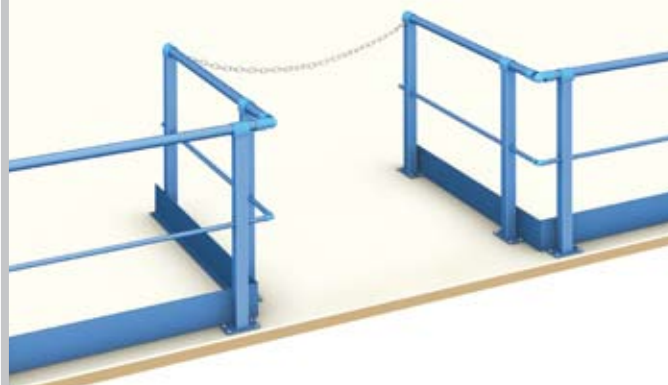
This opens inwards, with a stop at the bottom and a security latch at the top. It permits access to goods from outside or limits the work area.



>> Sliding Door

This opens inwards, with a stop at the bottom and a security latch at the top. It permits access to goods from outside or limits the work area.

>> Safety Zone

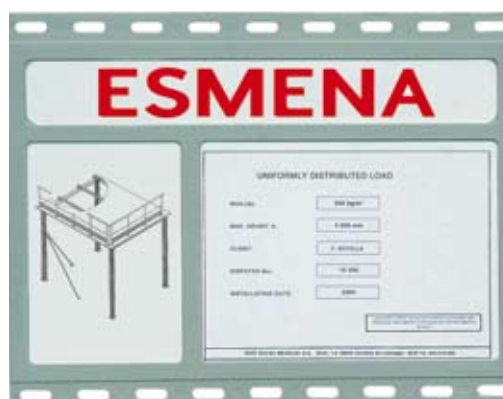


>> Up and Over Pallet Gate

This is the best system for creating a product loading and unloading bay when lift trucks and pallet forks are used. It has two positions, depending on the direction of access, which prevent the area from being entered from both parts at the same time. The weight of the assembly is balanced to make it easier to open and close the space.



>> Sign



Technical Specifications

PAINTING THE BEAMS

The basic components of a mezzanine floor are hot-rolled HEA, IPE or IPN beams. These beams provide the system with a greater load-bearing strength and impact resistance.



The beams are covered with calamine, a layer of impurities produced on the surface of steel from heating during the rolling process. This layer must be properly removed before painting, in order to ensure that the paint adheres correctly, a basic requirement for rust prevention. Chemical treatment is not sufficient to remove the calamine.

The complete process by which Mecalux treats these parts consists of three consecutive phases:

- Shot-blasting to remove the calamine.
- Painting.
- Polymerising in a drying oven.

Shot-blasting consists of removing the calamine mechanically, through the high-pressure impact of small steel balls. These balls break the calamine and remove it from the surface. They also remove any layers between the calamine and the surface of the beam, thereby preventing rust starting points from developing.

At the same time, all dirt and the lubricant used in the machining process are removed, leaving the part in perfect condition for applying paint and ensuring it will adhere properly.

The painting phase is carried out automatically immediately after shot-blasting, thereby preventing rust developing between phases.

The paint used is blue acrylic (RAL 5001), with a thickness of 50 micras and polymerised in a drying oven.

INTUMESCENT PAINT RESISTANT TO THE FIRE

Depending on the function of the mezzanine structures and the applicable national and local regulations, the structures may need to be made fire-resistant by using intumescent paint.

All structural systems become weaker with exposure to the high temperatures caused by fire, thereby losing their mechanical properties and, therefore, strength.

By using intumescent paint-based protection, the heating of these

structures can be delayed. This system consists of applying a layer of paint to the finished assembled structure on site. The thickness of the layer varies, depending on the beams that are to be painted and the degree of fire-stability required.

In appearance, intumescent paint is similar to any other type of paint, but on contact with fire it serves a protective function by expanding and forming an effective insulation, while keeping the base structure sufficiently cool during the calculated time.





HOT-ROLLED BEAMS

In order to guarantee the effectiveness of this paint protection system, it is essential that the beam mass be taken into consideration. Therefore, in some cases, cold-rolled beams with a low iron thickness may not be suitable. Another characteristic to consider is shape: an open shape is required for the protection to be applied correctly, as semi-closed shapes have areas that are difficult to access, hindering the application of the necessary paint thickness.

Mecalux mezzanine floors are manufactured with hot-rolled, standardised HEA, IPE or IPN beams, all of which are open and thick enough for the correct application of intumescent paints.

Ideally, the structure should be protected at the assembly phase, before installing the mezzanine flooring or any other element attached to it, thus avoiding thermal bridges which could transmit heat to the beams.

For high fire-stability protection, applications may be carried out on the structure using perlite-based mortar projection. This technique also requires open beams.

Mecalux provides all the experience of its technical departments to offer advice on the most suitable solution.

CALCULATION STANDARDS

For the calculations required with the mezzanine structures, the guidelines in standards EUROCODE-3 and NBE-EA-95 have been observed.

Among other calculations, the following points are considered:

- Safety coefficient of the stored load: 1.5
- Safety coefficient of the structure weight: 1.5

- Maximum deflection for beams < 5m: 1/300 of the span.
- Maximum deflection for beams > 5m: 1/400 of the span.

Also, the distribution and transmission of forces are analysed and studied, and the necessary cross bracing is calculated to ensure the stability of the installation and give it the required strength.

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