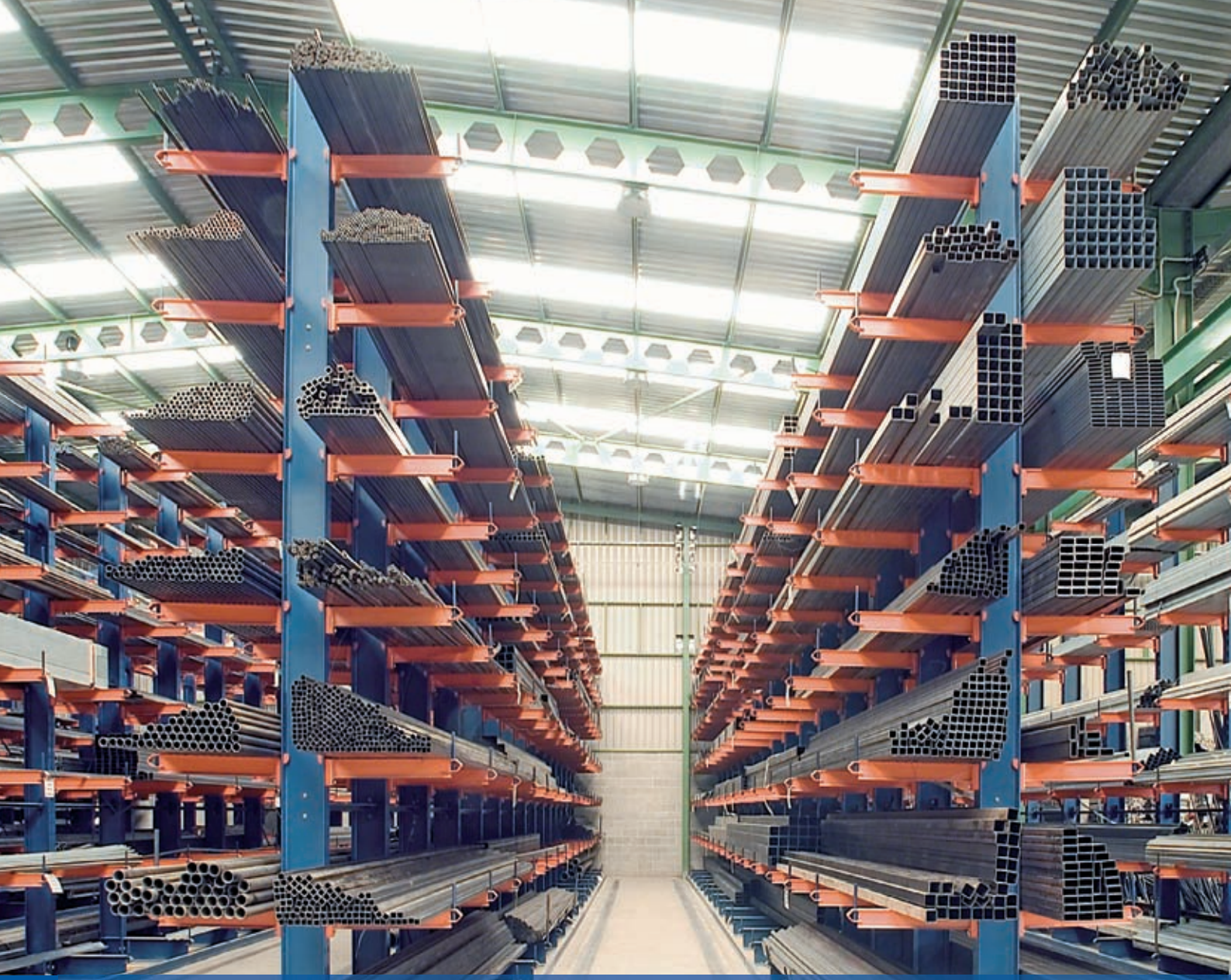


Cantilever Racking

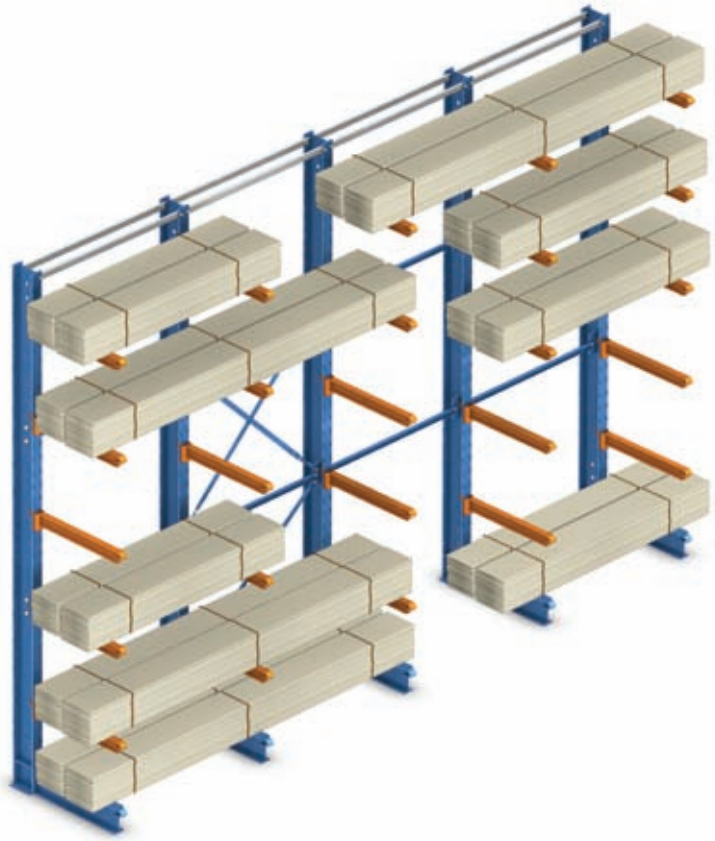
MECALUX

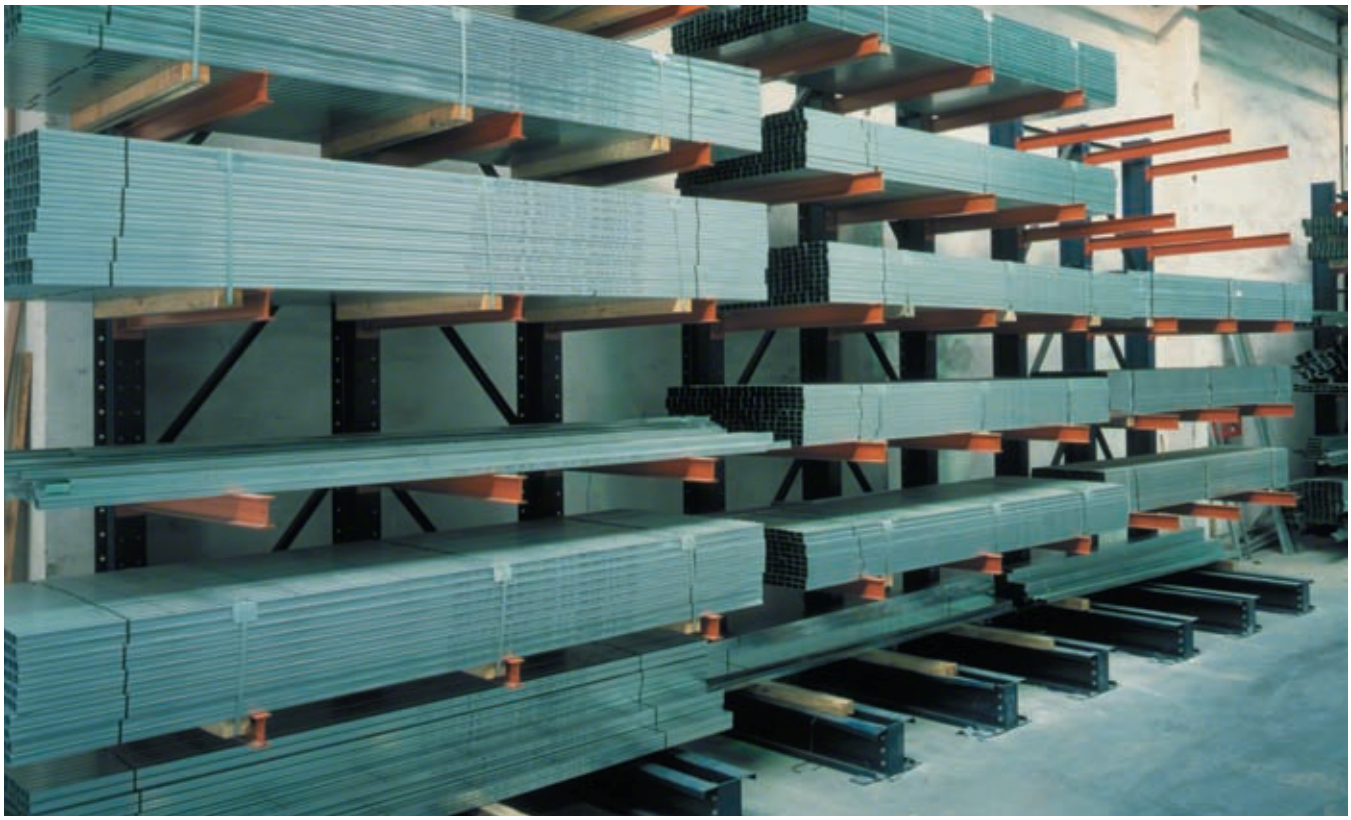
Cantilever Racking

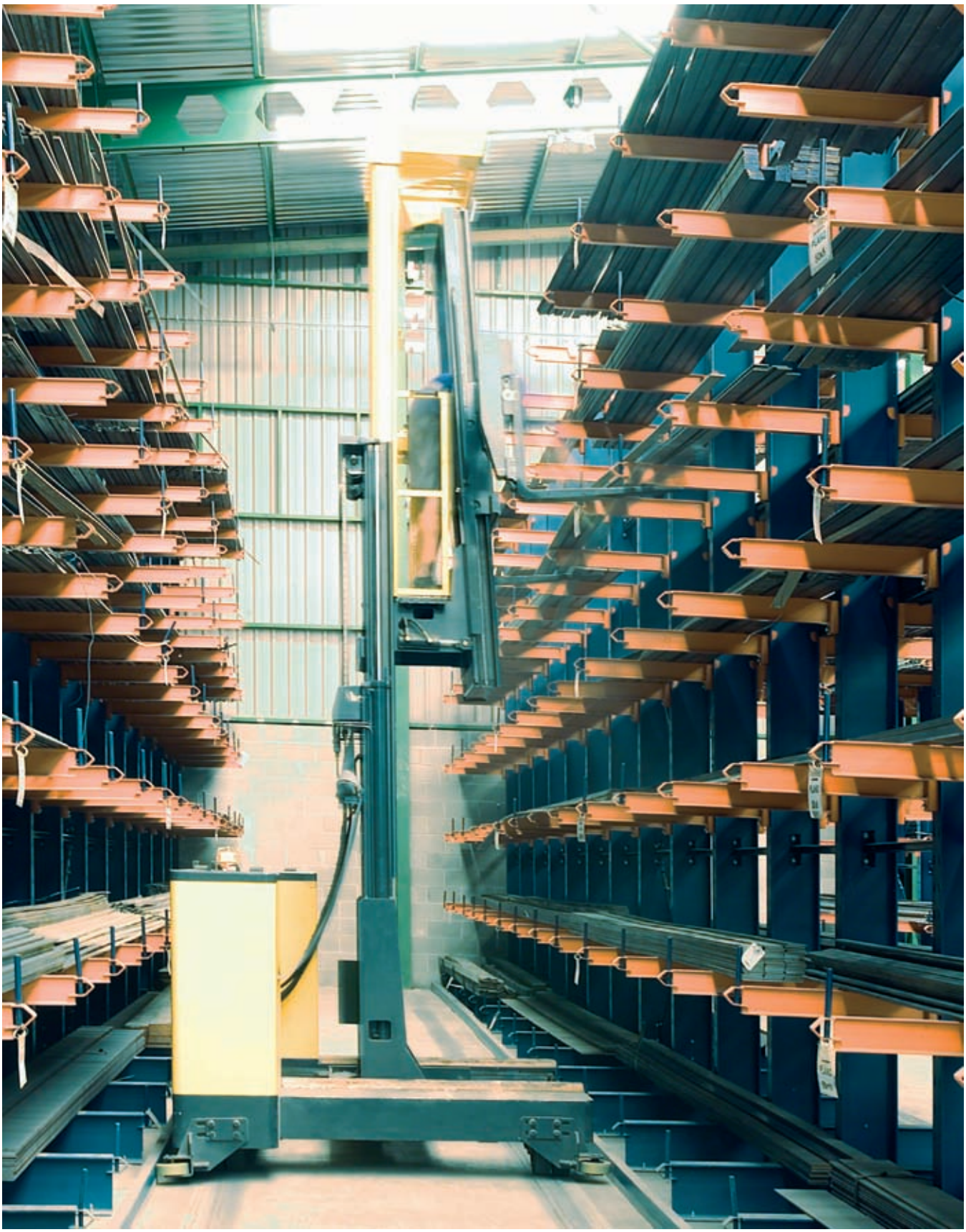
Cantilever raking is specially designed to store long or varying length items, such as metal beams, pipes, moulding, wooden boards, metal and plastic sheets among other materials.

The system basically consists of columns with a vertical beam and one or two horizontal beams at the base to provide stability. A series of arms are attached on which the load is placed.

Loads may be handled manually when they are lightweight, or by using lift trucks or other appropriate lifting systems when heavy items are involved.

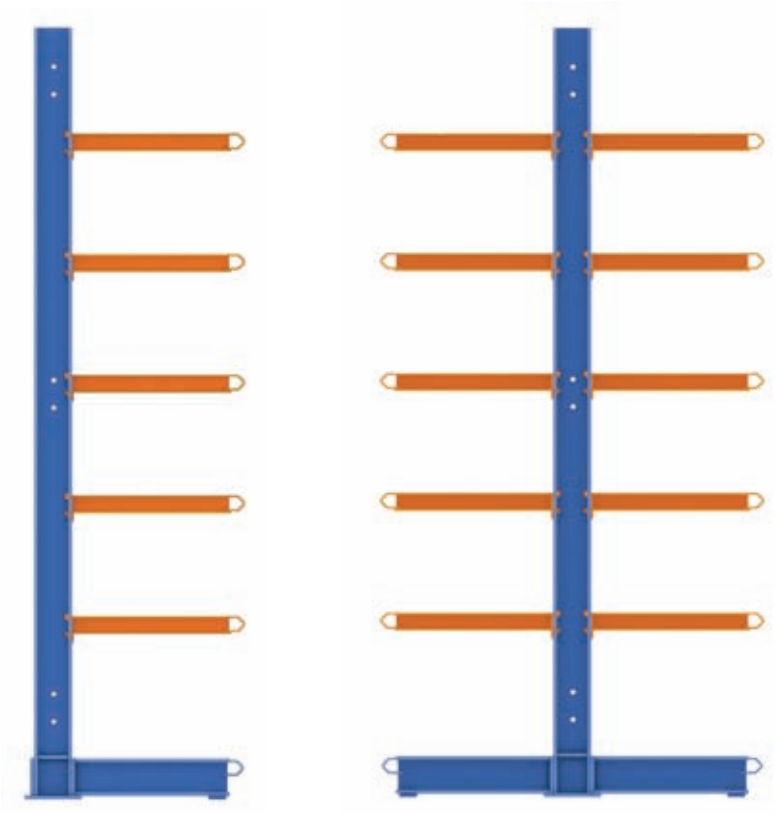






Single and Double sided versions

The warehouse is laid out with a combination of single sided Cantilever, normally placed against the walls with access from one side only, and double sided Cantilever which can be accessed from both sides.

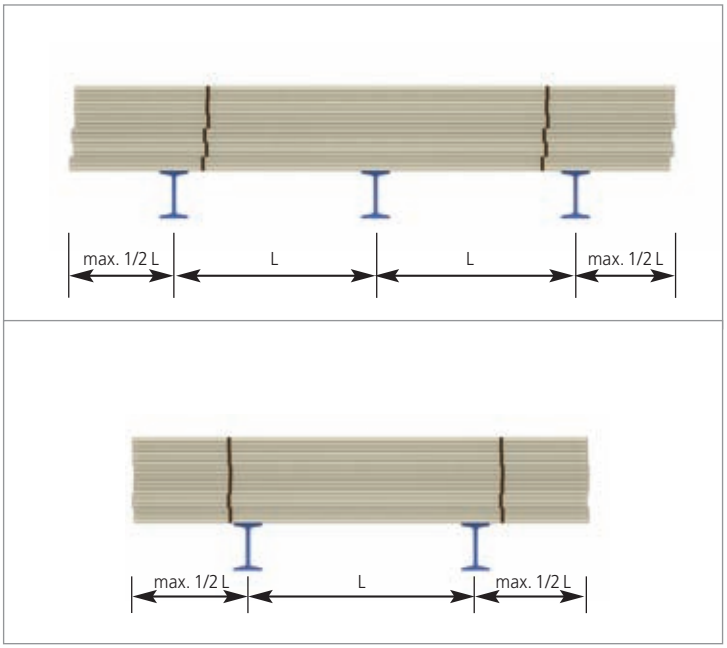


Single sided Cantilever **Double sided Cantilever**

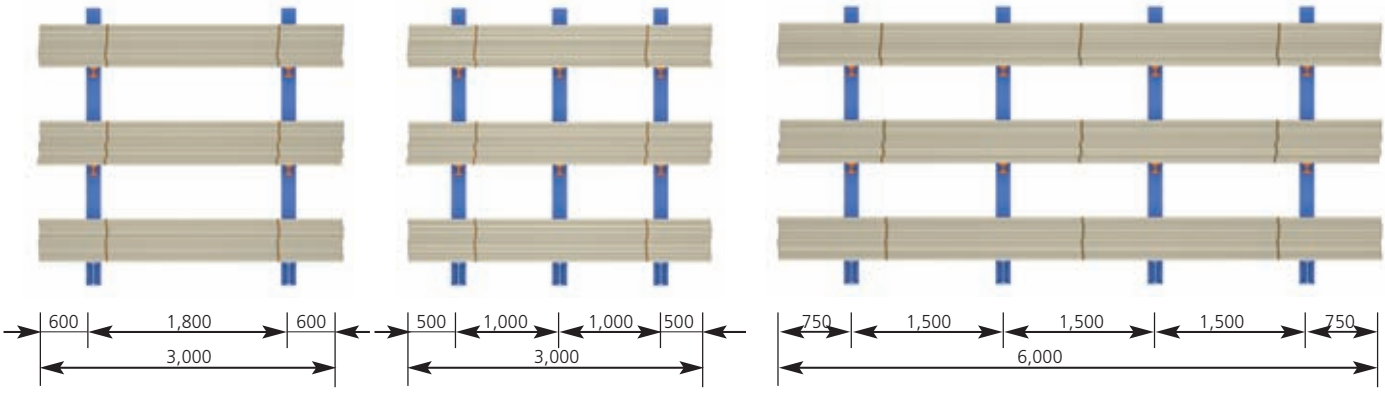
Load Distribution

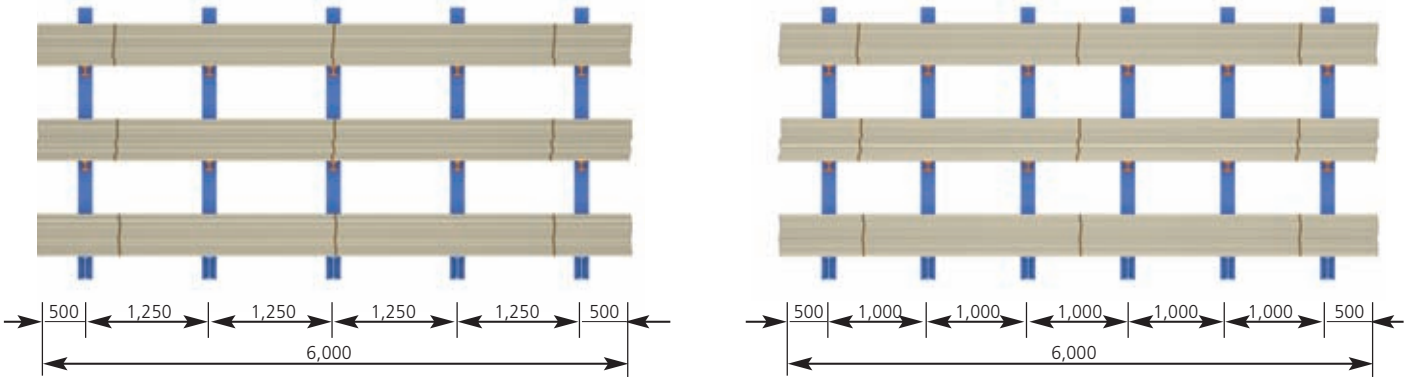
For the distribution and calculation of these racks, the size, weight and rigidity of the goods, the handling equipment used (generally lift trucks) and the tolerance, among other factors, must be taken into consideration.

Each load must be supported by at least two arms. Products may protrude from the sides of both arms by up to a maximum of 50% of the horizontal distance between adjacent arms, thereby ensuring stable support and uniform load distribution.



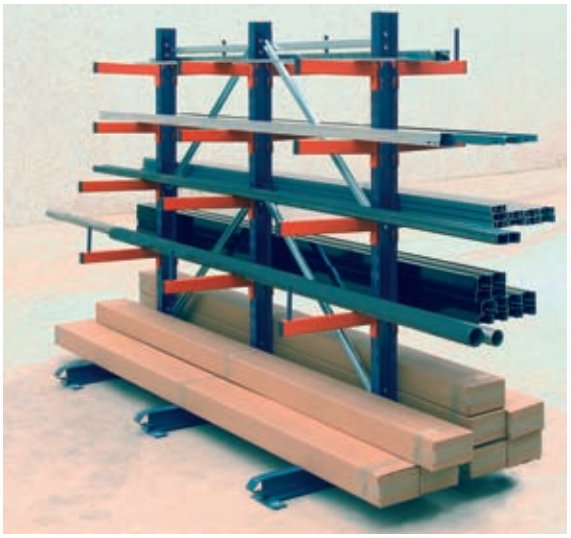
Examples of the Most Common Distribution Layouts





Construction Systems

Mecalux has developed a basic range of three Cantilever raking systems to cover all market needs: light, medium and heavy duty. The choice of the most appropriate system depends on the characteristics of the product to be stored, in particular the weight, size and the height.



Light Duty Cantilever

This system has been developed for storing loads manually. All the elements involved fit together easily. The system is made out of beams appropriate for the loads placed on them.

Medium Duty Cantilever

This system is manufactured using the same easy-to-assemble, modular concept as the light Cantilever. They are made of beams appropriate for mechanically handled medium-weight loads.

Heavy Duty Cantilever

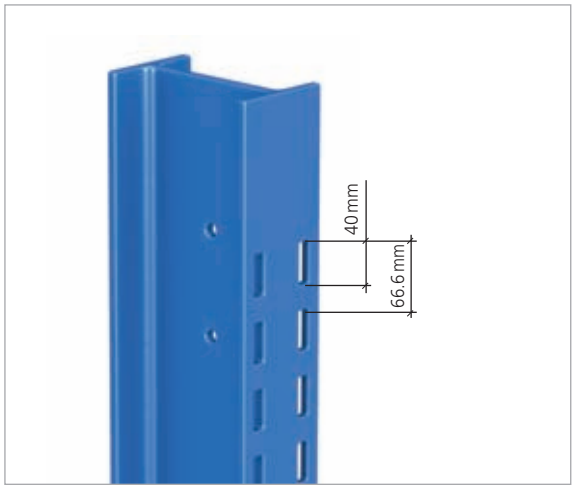
This is the top-of-the-range shelving system, with a high-load bearing capacity for goods handled using lift trucks, mobile cranes, stacker cranes, and other such machinery. As with the other two systems in the range, it is easily assembled, with interlocking parts that provide excellent mobility. This means that the system can be adapted to any possible future needs.

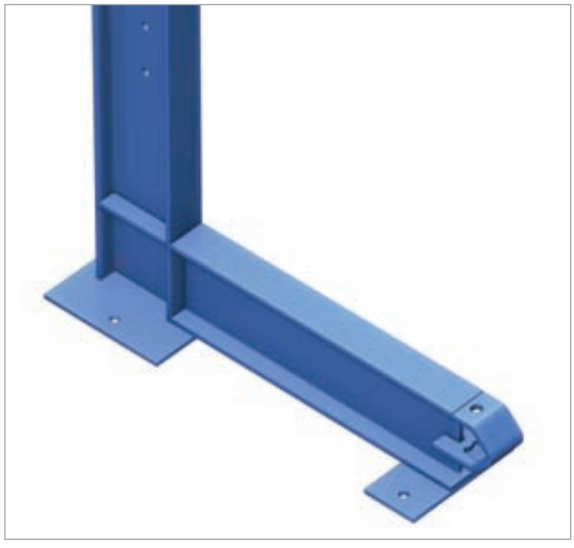
Light Duty Cantilever

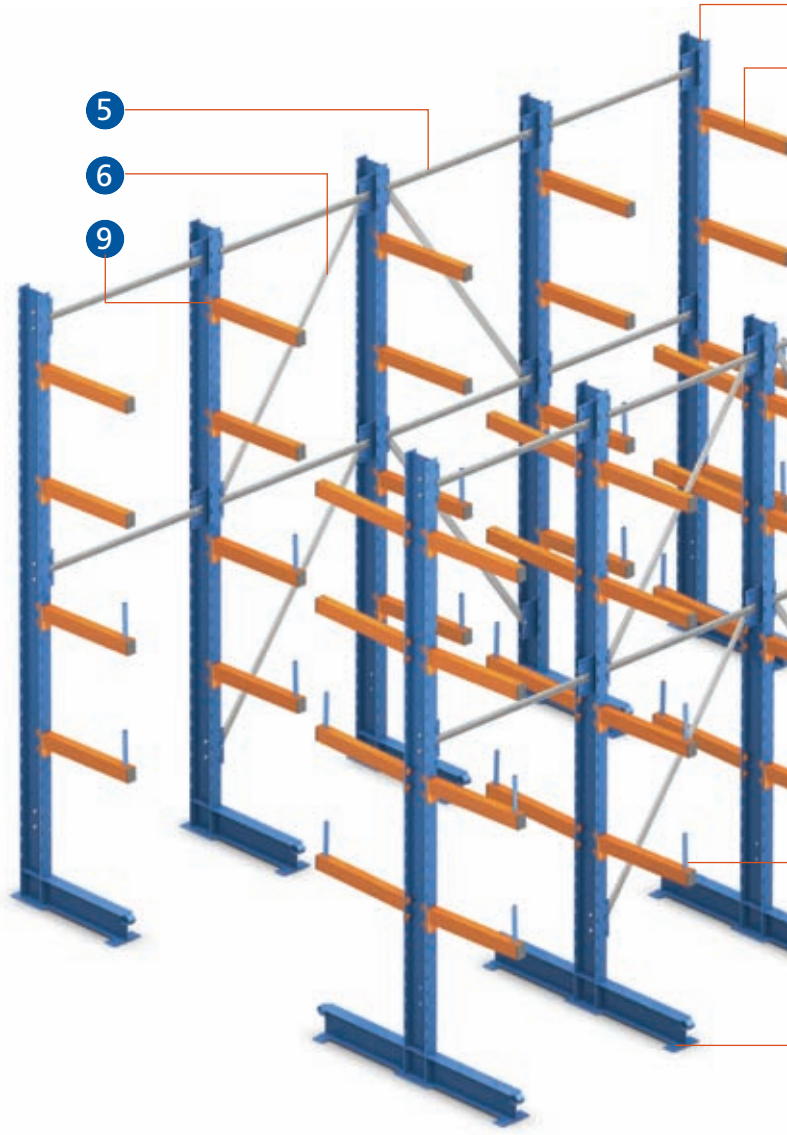
This system is specially designed for manual loading.

The columns have a base at the bottom and can be supplied at heights of 2, 2.6 and 3 metres. The slots in the column flanges mean that the individual arms can be placed at intervals of 66.66 mm.

The system for attaching the arms to the columns does not require bolts or tools. Lengthwise stability is obtained by attaching sets of vertical braces and joining all the columns vertical braces and joining all the columns.



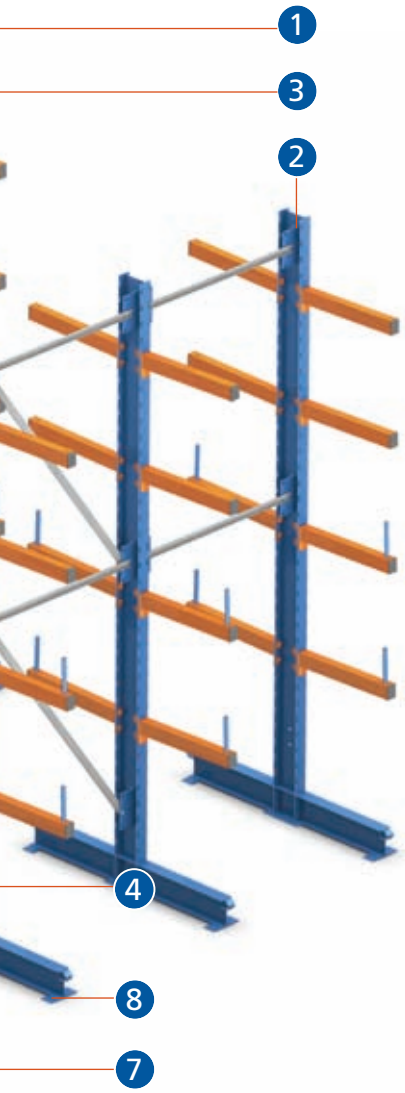




Detail of column/base

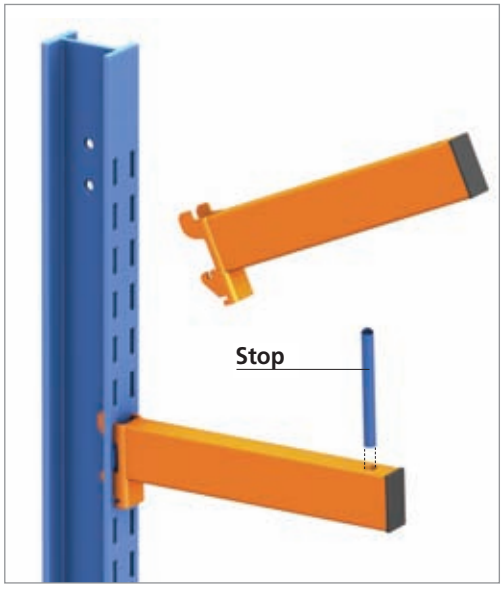
The columns and bases make up a single unit, manufactured from hot-rolled I-beams. The plates at the bottom provide support and enable the columns to be easily levelled and anchored to the floor, if required.

The front of the bases includes supports for stops.



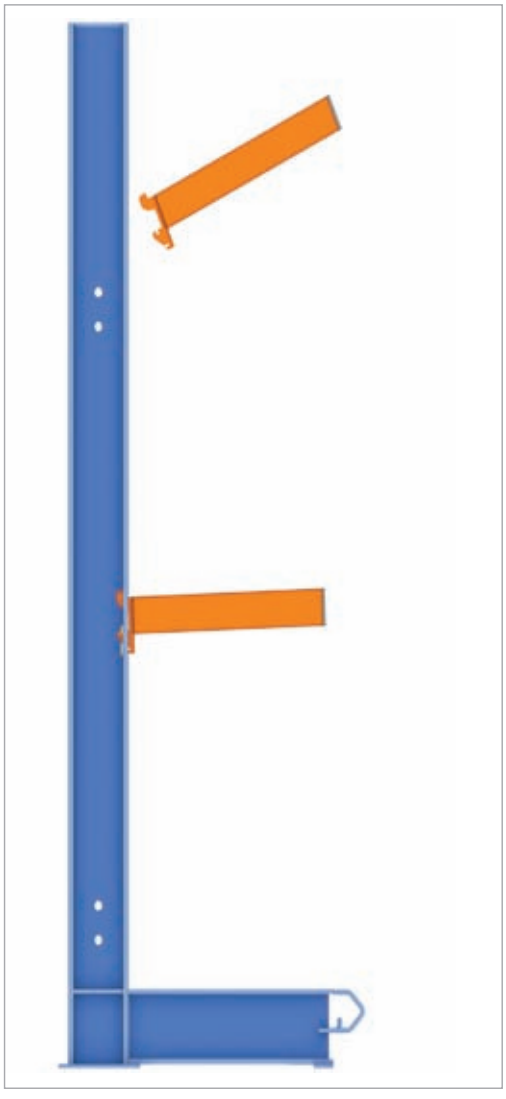
Basic Components

1) Single CTVL columns
2) Double CTVL columns
3) CTVL arms
4) Arm stops
5) CTVL column joints
6) CTVL cross bracing
7) CTVL levelling plates
8) Anchoring plates
9) Safety pin



Arms

The arms are made of rectangular tube beams with hooks on one end for positioning and attaching to the columns. A plastic protector is attached to the protruding end. Once assembled, the arms slope slightly towards the column in order to provide extra safety. The most common arm lengths are 400, 500, 600 and 700 mm.



Stops

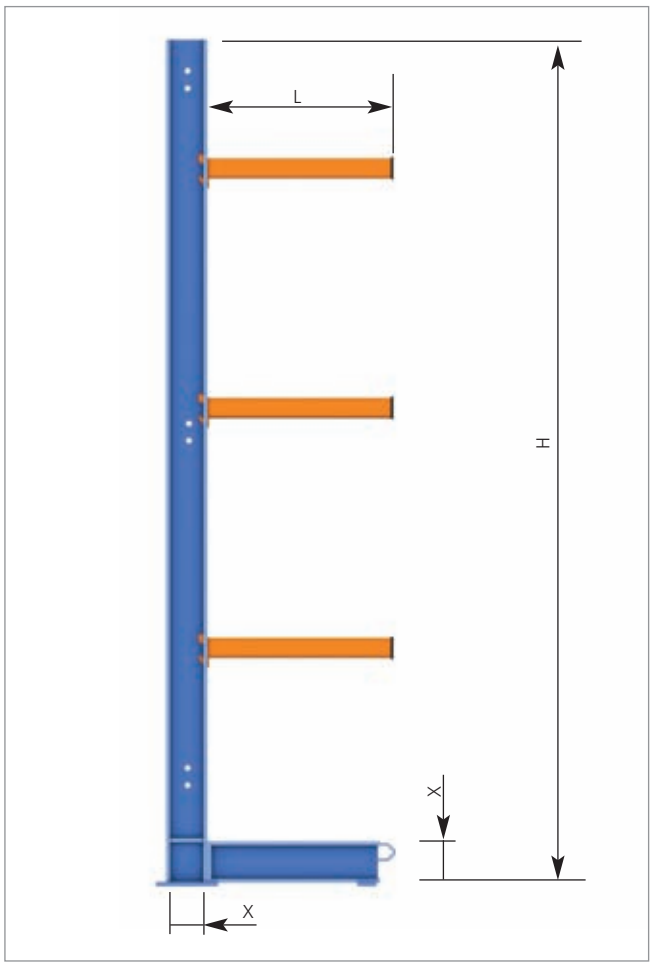
These are an optional extra. They are manufactured from 18-mm tube and have a plastic plug attached at one end that serves as a protector. They fit into an allocated hole at the protruding end of the arms.

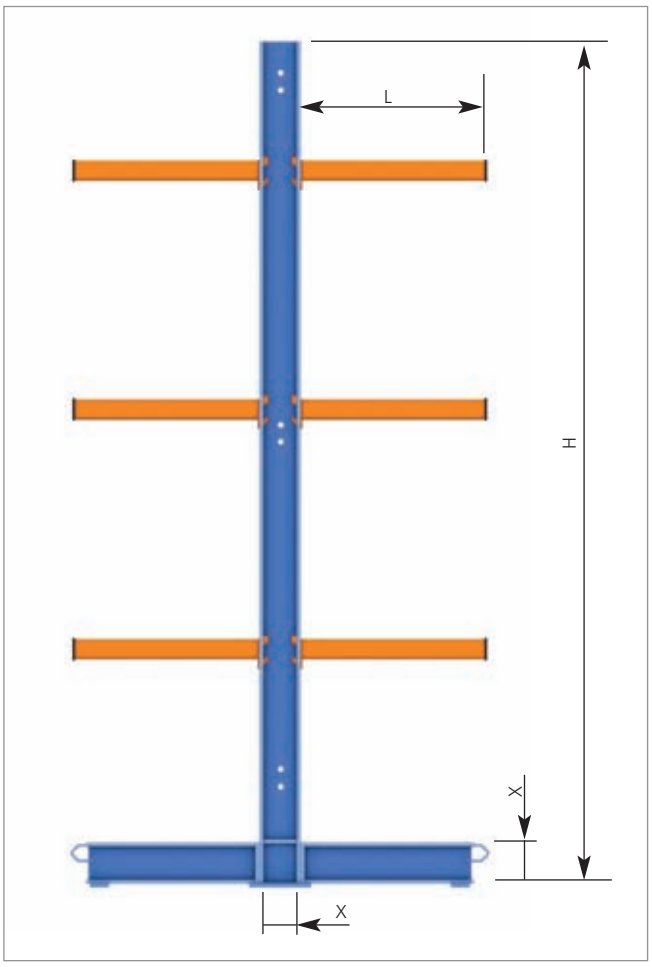
Safety Pins

These prevent the arms from accidentally slipping out of place.

Light Duty Cantilever

Column Load-bearing Capacity





		SIDE COLUMN		CENTRAL COLUMN	
H (Column)	L (Arm)	X = 100	X = 120	X = 100	X = 120
2,000	400	760/860	900/1,525	1,520/1,720	1,800/3,050
	500	620/690	690/1,235	1,240/1,380	1,380/2,470
	600	515/570	540/1,025	1,030/1,140	1,080/2,050
	700	435/480	450/875	870/960	900/1,750
	800	375/410	375/745	750/820	750/1,490
2,600	400	640/670	900/1,195	1,280/1,340	1,800/2,390
	500	520/545	690/980	1,040/1,090	1,380/1,960
	600	435/455	540/820	870/910	1,080/1,640
	700	370/390	450/700	740/780	900/1,400
	800	320/335	375/610	640/670	750/1,220
3,000	400	535/575	900/1,030	1,070/1,150	1,800/2,060
	500	435/475	690/850	870/950	1,380/1700
	600	370/395	540/710	740/790	1,080/1,420
	700	315/340	450/615	630/680	900/1,230
	800	275/295	375/530	550/590	750/1,060

The load is given in kg.

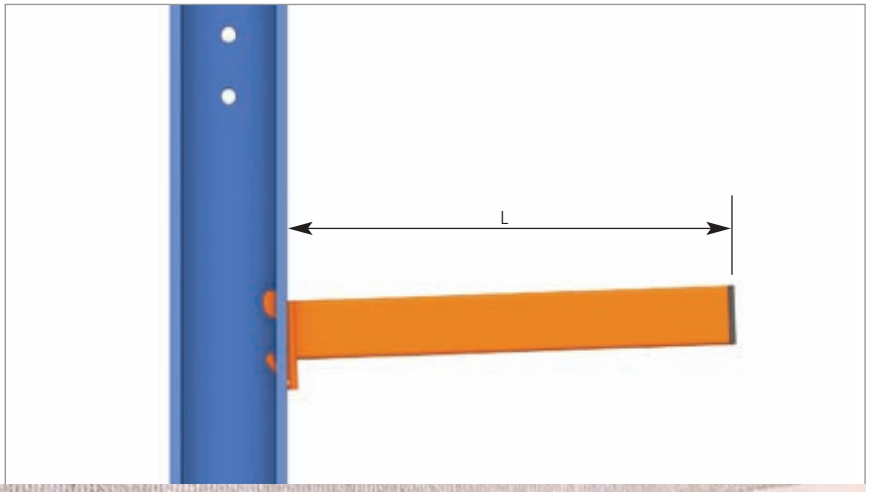
The load varies according to the number of arms and their layout.

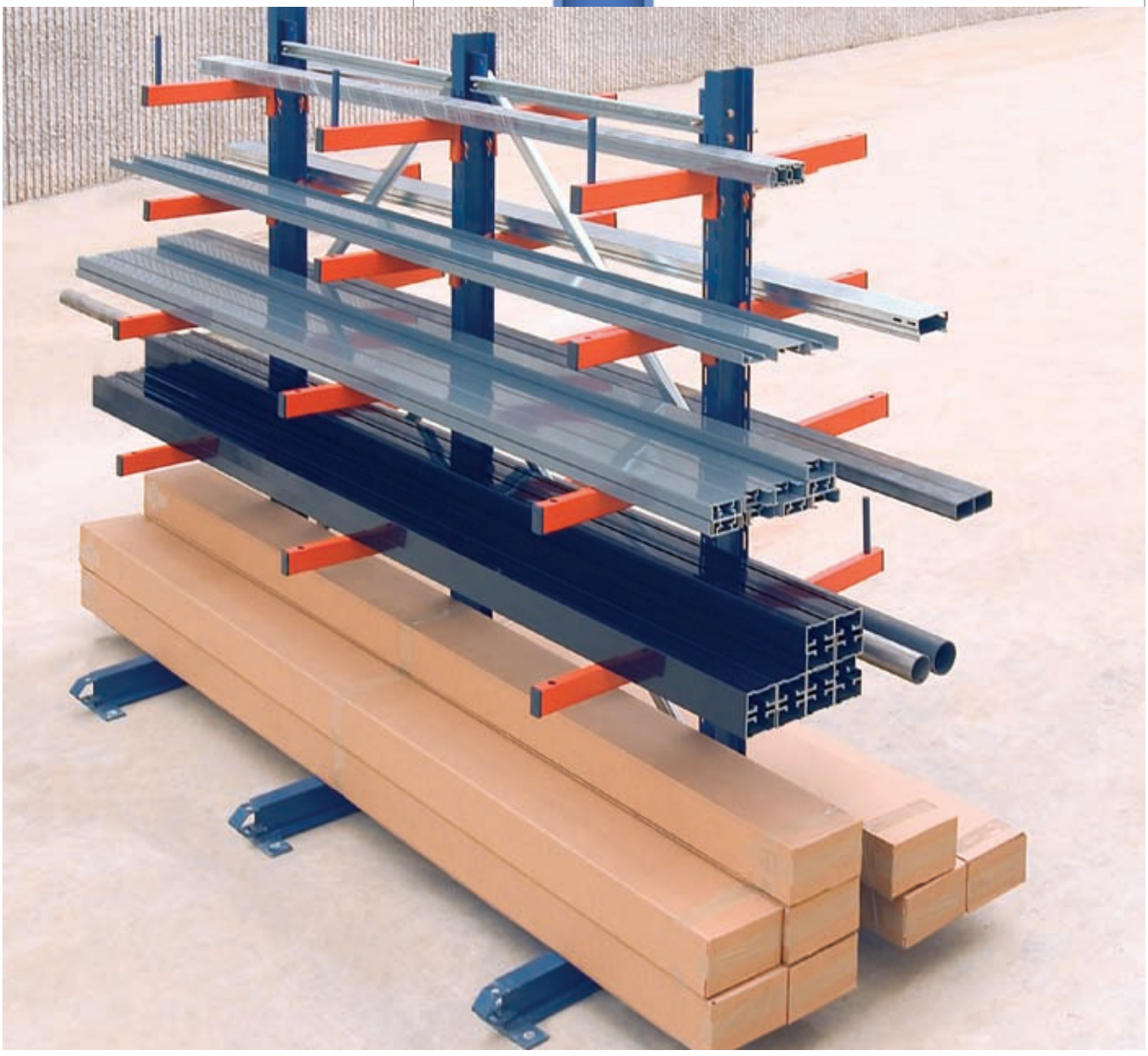
The load calculated for the central columns is the sum of the two sides (50% per side).

Arm
Load-bearing Capacity

L	kg
400	300
500	230
600	180
700	150
800	125

The evenly distributed load is calculated in kg.





Medium Duty Cantilever

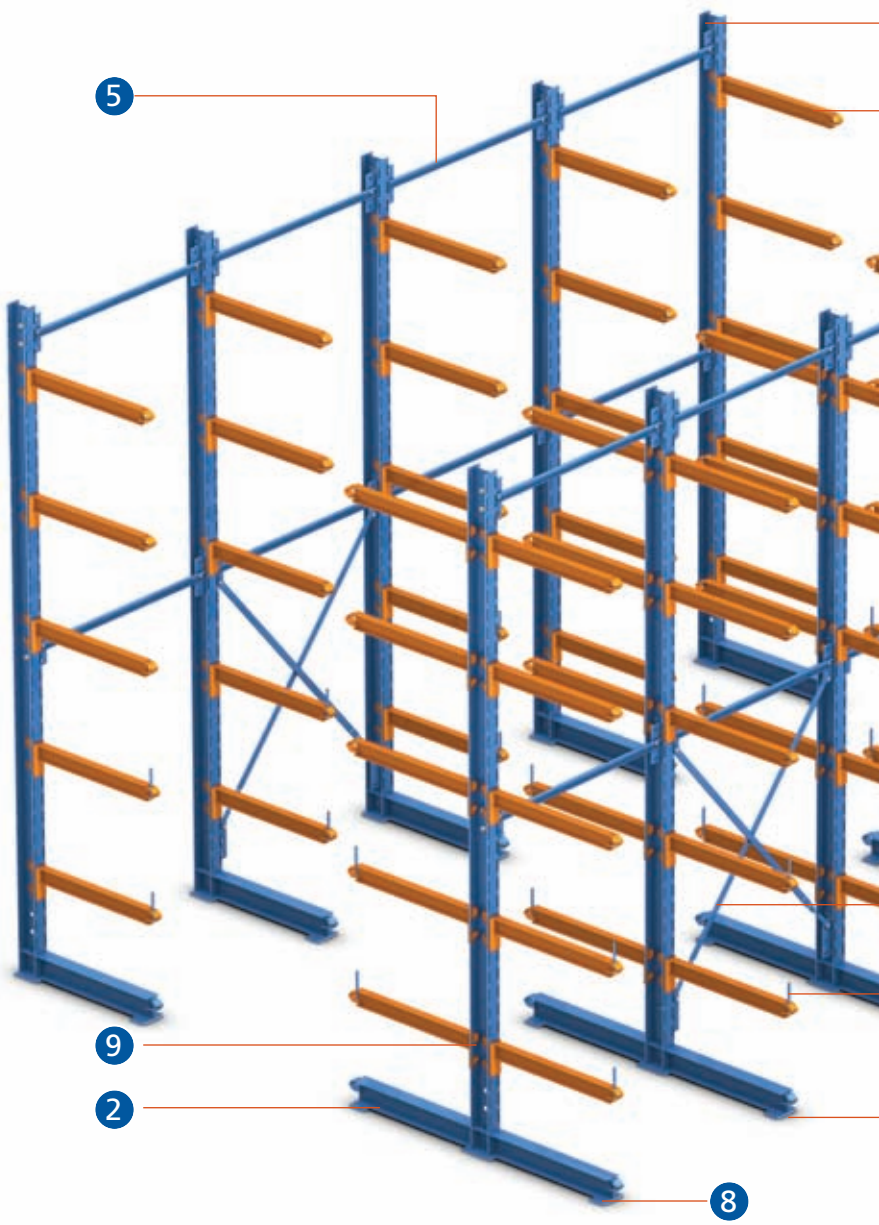
This system is made of hot-rolled metal beams at heights of 3 - 4 m. It is designed to support medium loads.

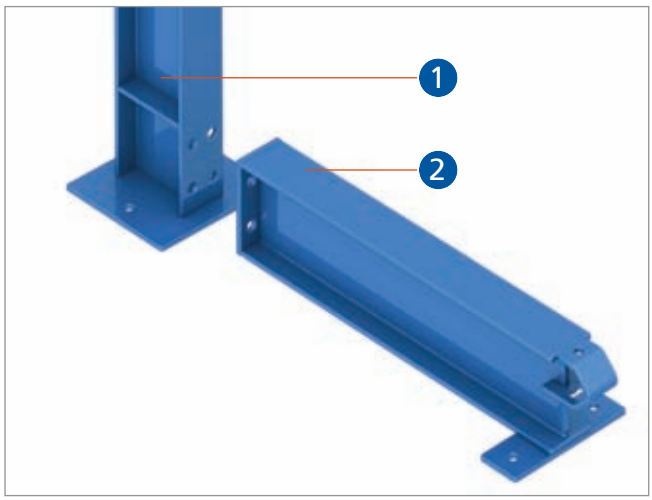
The parts are designed to allow the shelves to be assembled quickly and easily.

The slots in the columns and the arm attachment system means the distribution of shelves can be changed easily.

Basic Components

1) **CTVM columns**
2) **CTVM bases**
3) **CTVM arms**
4) **Arm stops**
5) **CTVMH column joints**
6) **CTVMH cross bracing**
7) **CTVM levelling plates**
8) **Anchoring plates**
9) **Safety pin**



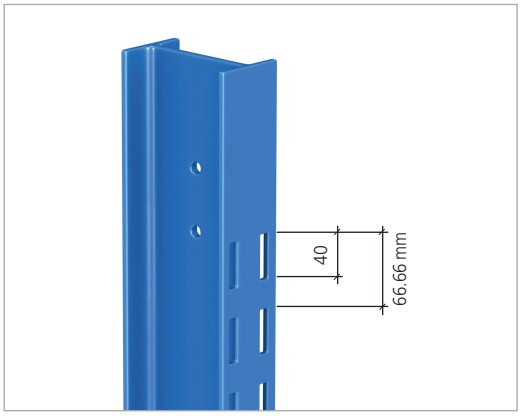


Base Detail

The base is bolted to the column by means of an attachment plate.

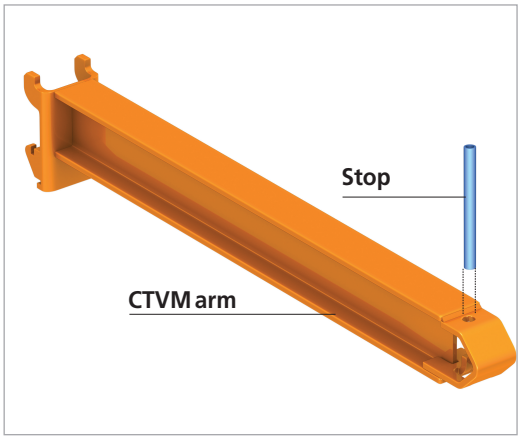
At the other end, the stop attachment parts facilitate placement of the loads.

The plates are ready for anchoring to the floor.



Columns

These are manufactured from IPE140 or IPE160 beams. The positioning of the slots means the arms can be placed at intervals of 66.66 mm. The core has attachment points for joints and cross bracing.



Arms

These are manufactured from IPN beams with hooks welded to one end for inserting into the slots on the columns. No tools are needed for their attachment. At the opposite end, a curved part facilitates placement of the loads. The stops are optional and are inserted in the top hole, while slotting into the bottom hook at the same time. Once assembled, the arms slope slightly towards the column in order to provide extra safety.

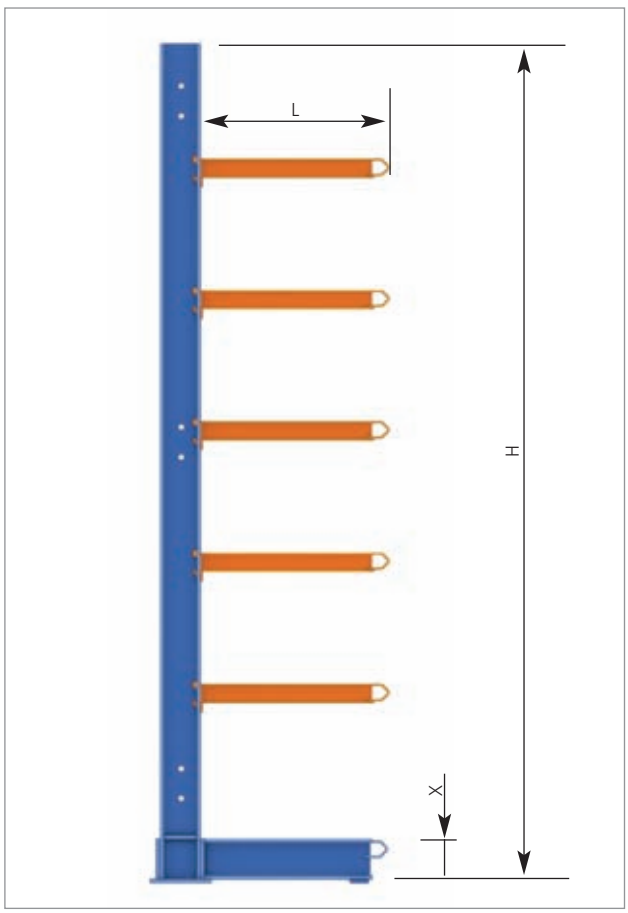
Cross Bracing

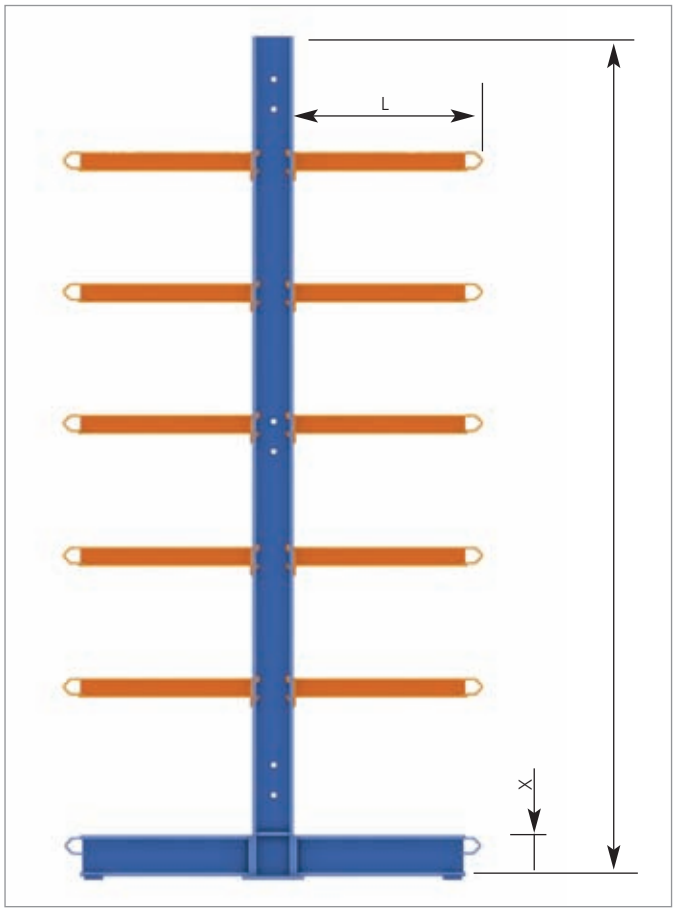
Cross Bracing with tensioners and column joints connect columns together along the length of the system for rigidity purposes thus providing a solid stable structure.

Safety Pin

Medium Duty Cantilever

Column Load-bearing Capacity





		SIDE COLUMN			CENTRAL COLUMN		
H (Column)	L (Arm)	X = 140	X = 160	X = 180	X = 140	X = 160	X = 180
3,000	400	1,440/2,280	1,550/3,510	2,585/5,110	2,880/4,560	3,100/7,020	5,170/10,220
	600	930/1,560	1,000/2,420	1,670/3,340	1,860/3,120	2,000/4,840	3,340/6,680
	800	680/1,150	725/1,800	1,215/2,430	1,360/2,300	1,450/3,600	2,430/4,860
	1,000	530/900	565/1,410	945/1,890	1,060/1,800	1,130/2,820	1,890/3,780
	1,250	425/690	455/1,080	765/1,530	850/1,380	910/2,160	1,530/3,060
3,600	400	1,440/1,920	1,550/2,960	2,585/4,605	2,880/3,840	3,100/5,920	5,170/9,210
	600	930/1,325	1,000/2,070	1,670/3,005	1,860/2,650	2,000/4,140	3,340/6,010
	800	680/990	725/1,560	1,215/2,270	1,360/1,980	1,450/3,120	2,430/4,540
	1,000	530/780	565/1,220	945/1,790	1,060/1,560	1,130/2,440	1,890/3,580
	1,250	425/600	455/950	765/1,390	850/1,200	910/1,900	1,530/2,780
4,000	400	1,350/1,670	1,550/2,580	2,585/3,775	2,700/3,340	3,100/5,160	5,170/7,550
	600	930/1,165	1,000/2,285	1,670/2,795	1,860/2,330	2,000/4,570	3,340/5,590
	800	680/880	725/1,380	1,215/3,020	1,360/1,760	1,450/2,760	2,430/6,040
	1,000	530/695	565/1,095	945/1,680	1,060/1,390	1,130/2,190	1,890/3,360
	1,250	425/540	455/855	765/1,310	850/1,080	910/1,710	1,530/2,620

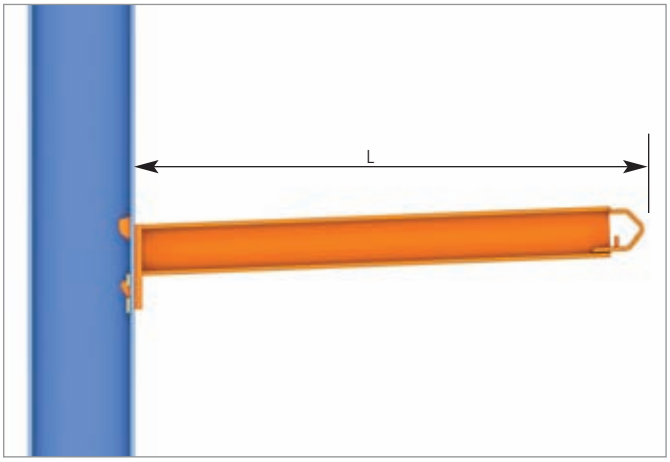
The load is given in kg.
The load varies according to the number of arms and their layout.
The load calculated for the central columns is the sum of the two sides (50% per side).

Arm Load-bearing Capacity

LOAD PER ARM IPN 80

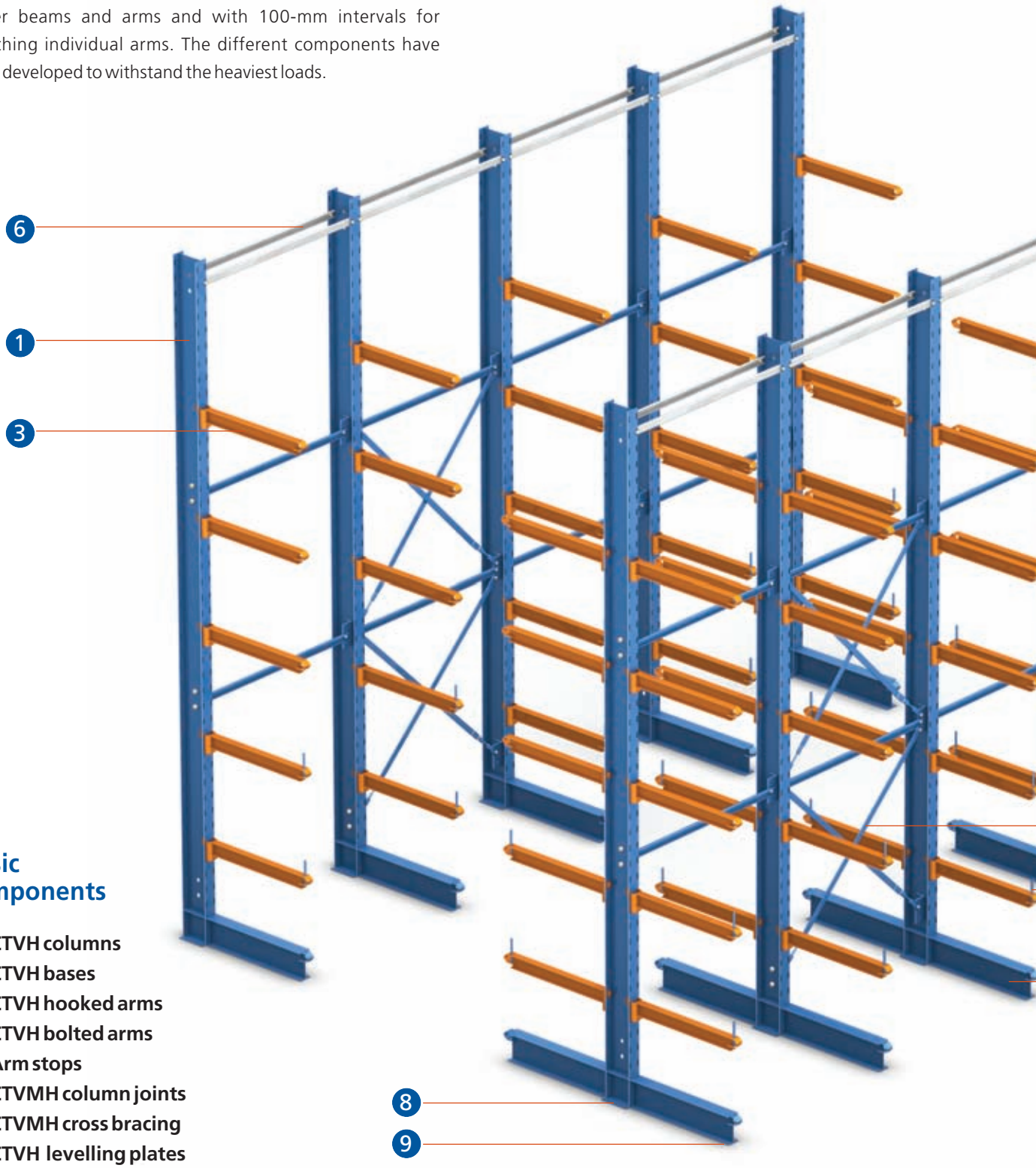
	L (Arm length)				
Column type	**400**	**600**	**800**	**1,000**	**1,250**
IPE 140	480	310	225	175	140
IPE 160	515	330	240	185	150
IPE 180	515	330	240	185	150

The evenly distributed load is calculated in kg.



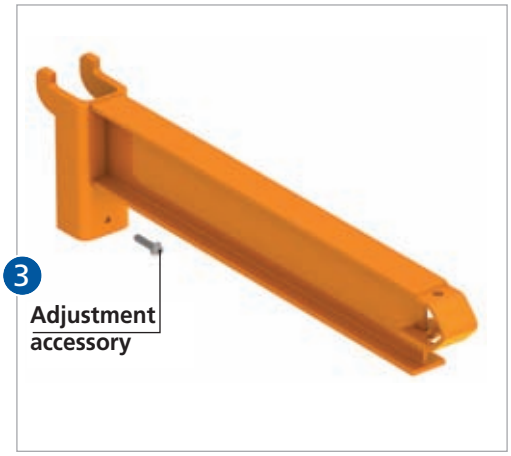
Heavy Duty Cantilever

This is a similar system to the medium Cantilever, but with larger beams and arms and with 100-mm intervals for attaching individual arms. The different components have been developed to withstand the heaviest loads.



Basic components

1) CTVH columns
2) CTVH bases
3) CTVH hooked arms
4) CTVH bolted arms
5) Arm stops
6) CTVMH column joints
7) CTVMH cross bracing
8) CTVH levelling plates
9) Anchoring plates

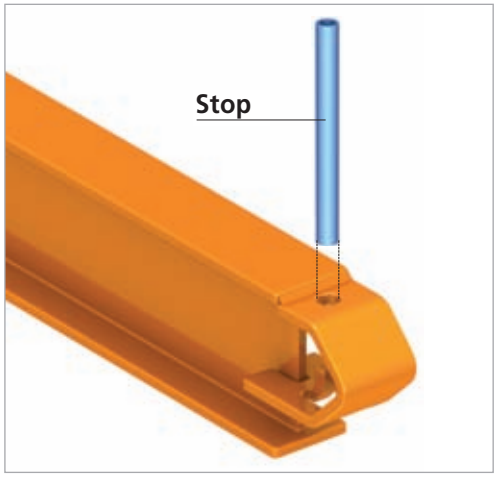


Hooked Arms

The arms are attached to the columns by means of hooks at one end. This original attachment system fits into the slots on the columns at the required position, thereby preventing the arms from accidentally slipping out while enabling them to support heavy loads at the same time. Also, it will move slightly if accidentally knocked from the bottom or the side, thereby preventing them from becoming deformed and minimising any possible damage to the goods. The attachment device has an accessory for adjusting the slope slightly.

Bolted Arms

These are generally used with very heavy loads or in situations where minimal movement of the arms is required. They consist of IPN beams with a plate at one end for bolting them to the columns, while a curved part at the other end facilitates the placement of the loads, as well as serving to attach the stops. The slight slope of the arms towards the column once assembled provides extra safety.



Arm Stops

The stops consist of a round tube and a plastic protection plug which are inserted in the top hole on the supports and fit into the lower tab, thereby preventing loose goods from falling.

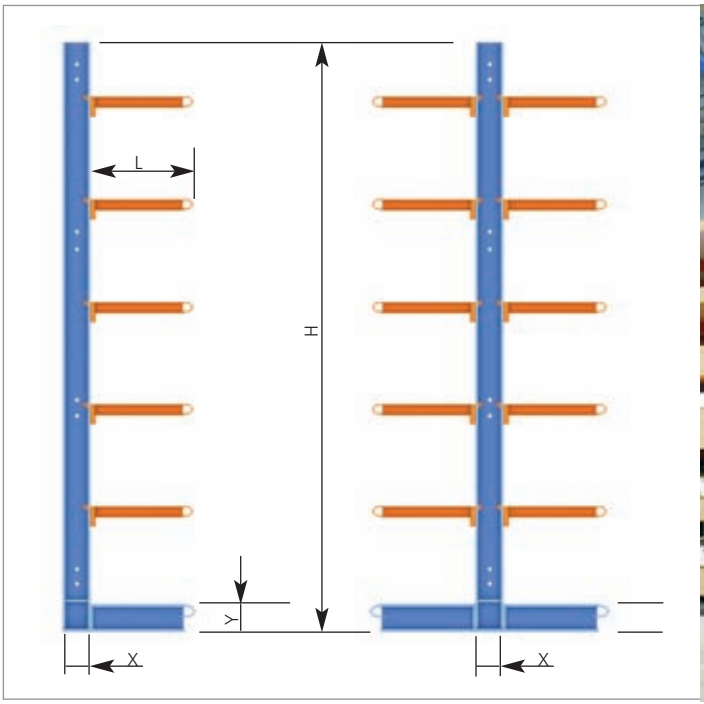
Heavy Duty Cantilever

Sizes and Loads

MOST COMMON SIZES	
H	3,000, 3,500, 4,000, 5,000, 6,000, 7,000
X	180, 200, 220, 240
L	600, 700, 800, 1,000, 1,250, 1,500, 1,800, 2,000

		SIDE COLUMN				CENTRAL COLUMN			
H (Column)	**L (Arm)**	**X = 180**	**X = 200**	**X = 220**	**X = 240**	**X = 180**	**X = 200**	**X = 220**	**X = 240**
3,000	400	5,460/5,550	7,755	8,100	10,100	10,920/11,100	15,510/15,510	16,200	20,200
	600	4,055/4,325	5,820/6,030	8,090/8,100	10,095/10,100	8,110/8,650	11,640/12,060	16,180/16,200	20,190/20,200
	800	3,110/3,230	4,100	4,670	6,225	6,220/6,460	8,200	9,340	12,450/12,450
	1,000	2,490/3,130	2,490/4,130	3,735/4,980	3,735/6,230	4,980/6,260	4,980/8,260	7,470/9,960	7,470/12,460
	1,250	1,990/2,820	1,990/3,745	2,990/4,910	2,990/6,185	3,980/5,640	3,980/7,490	5,980/9,820	5,980/12,370
	1,500	1,660/2,500	1,660/3,195	1,660/4,150	2,490/5,380	3,320/5,000	3,320/6,390	3,320/8,300	4,980/10,760
3,500	400	4,680/4,985	6,650/7,085	9,185/9,530	12,365/12,400	9,360/9,970	13,300/14,170	18,370/19,060	25,370/24,800
	600	3,480/3,850	4,985/5,515	6,945/7,680	9,530/10,025	6,960/7,700	9,970/11,030	13,890/15,360	19,060/20,050
	800	2,770/3,525	3,985/4,670	4,670/5,405	6,225/7,980	5,540/7,050	7,970/9,340	9,340/10,810	12,450/15,960
	1,000	2,300/2,925	2,490/3,880	3,735/5,160	3,735/6,875	4,600/5,850	4,980/7,760	7,470/10,320	7,470/13,750
	1,250	1,895/2,415	1,990/3,210	2,990/4,285	2,990/5,715	3,790/4,830	3,980/6,420	5,980/8,570	5,980/11,430
	1,500	1,620/2,055	1,660/2,740	1,660/3,660	2,490/4,895	3,240/4,110	3,320/5,480	3,320/7,320	4,980/9,790
4,000	400	4,095/4,360	5,820/6,195	8,045/8,335	10,940/11,345	8,190/8,720	11,640/12,390	16,090/16,670	21,880/22,690
	600	3,040/3,365	4,365/4,825	6,080/6,720	8,330/8,880	6,080/6,730	8,730/9,650	12,160/13,440	16,660/17,760
	800	2,420/3,110	3,490/4,440	4,670/5,405	6,225/6,975	4,840/6,220	7,880/8,880	9,340/10,810	12,450/13,950
	1,000	2,015/2,560	2,490/3,705	3,735/4,765	3,735/6,230	4,030/5,120	6,980/7,410	7,470/9,530	7,470/12,460
	1,250	1,665/2,115	1,990/2,990	2,990/3,955	2,990/5,000	3,330/4,230	3,980/5,980	5,980/7,910	5,980/10,000
	1,500	1,410/1,800	1,660/3,810	1,660/3,320	2,490/4,280	2,820/3,600	3,320/7,620	3,320/6,640	4,980/8,560
5,000	400	3,275/3,620	4,650/4,960	6,435/6,850	8,755/9,075	6,550/7,240	9,300/9,920	12,870/13,700	17,510/18,150
	600	2,435/2,840	3,490/3,860	4,860/5,375	6,665/7,100	4,870/5,680	6,980/7,720	9,720/10,750	13,330/14,200
	800	1,945/2,910	2,790/3,555	3,915/4,670	4,670/6,225	3,890/5,820	5,580/7,110	7,830/9,340	9,340/12,450
	1,000	1,610/2,415	2,330/2,960	2,490/3,815	3,735/4,995	3,220/4,830	4,660/5,920	4,980/7,630	7,470/9,990
	1,250	1,330/1,995	1,925/2,450	1,990/3,160	2,990/4,155	2,660/3,990	3,850/4,900	3,980/6,320	5,980/8,310
	1,500	1,130/1,660	1,645/2,090	1,660/2,700	1,660/3,560	2,260/3,320	3,290/4,180	3,320/5,400	3,320/7,120
6,000	400	2,725/3,185	3,875/4,290	5,360/5,925	7,290/7,770	5,450/6,370	7,750/8,580	10,720/11,850	14,580/15,540
	600	2,030/3,045	2,905/4,150	4,050/5,160	5,550/6,480	4,060/6,090	5,810/8,300	8,100/10,320	11,100/12,960
	800	1,620/2,420	2,330/3,110	3,110/4,145	4,490/5,235	3,240/4,840	4,660/6,220	6,220/8,290	8,980/10,470
	1,000	1,340/2,010	1,945/2,490	2,490/3,465	3,735/4,390	2,680/4,020	3,890/4,980	4,980/6,930	7,470/8,780
	1,250	1,105/1,660	1,600/2,040	1,990/2,875	1,990/3,655	2,210/3,320	3,200/4,080	3,980/5,750	3,980/7,310
	1,500	945/1,410	1,365/1,740	1,660/2,460	1,660/3,125	1,890/2,820	2,730/3,480	3,320/4,920	3,320/6,250
7,000	400	2,340/2,730	3,330/3,675	4,595/5,080	6,255/6,910	4,680/5,460	6,660/7,350	9,190/10,160	12,510/13,820
	600	1,735/2,610	2,490/3,740	3,470/4,420	4,760/6,060	3,470/5,220	4,980/7,480	6,940/8,840	9,520/12,120
	800	1,385/2,075	1,995/3,115	2,790/3,555	3,840/4,670	2,770/4,150	3,990/6,230	5,580/7,110	7,680/9,340
	1,000	1,150/1,725	1,665/2,490	2,330/2,970	2,490/3,760	2,300/3,450	3,330/4,980	4,660/5,940	4,980/7,520
	1,250	945/1,420	1,375/1,995	1,935/2,465	1,990/3,130	1,890/2,840	2,750/3,990	3,870/4,930	3,980/6,260
	1,500	810/1,210	1,170/1,660	1,655/2,105	1,660/2,680	1,620/2,420	2,340/3,320	3,310/4,210	3,320/5,360

The load is given in kg.
The load varies according to the number of arms and their layout.
The load calculated for the central columns is the sum of the two sides (50% per side).



LOAD FOR HOOKED ARMS

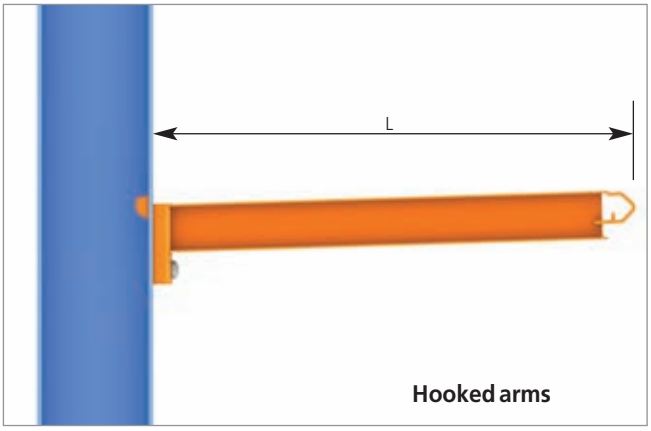
Column Type	Arm Type	L (Arm length)					
		400	600	800	1,000	1,250	1,500
IPE 180	IPN80	1,050	650	475	325	250	175
	IPN100	1,640	1,040	750	575	440	350
	IPN 120	2,070	1,340	950	725	575	450
IPE 200	IPN80	1,050	650	475	325	250	175
	IPN100	1,780	1,125	810	620	470	360
	IPN120	2,200	1,430	1,000	775	625	475
IPE 220	IPN80	1,050	650	475	325	250	175
	IPN100	2,075	1,300	925	700	530	420
	IPN120	2,425	1,560	1,130	875	675	525
IPE 240	IPN80	1,050	650	475	325	250	175
	IPN100	2,250	1,470	1,040	780	580	460
	IPN 120	3,100	2,000	1,440	1,100	840	670

The evenly distributed load is calculated in kg.

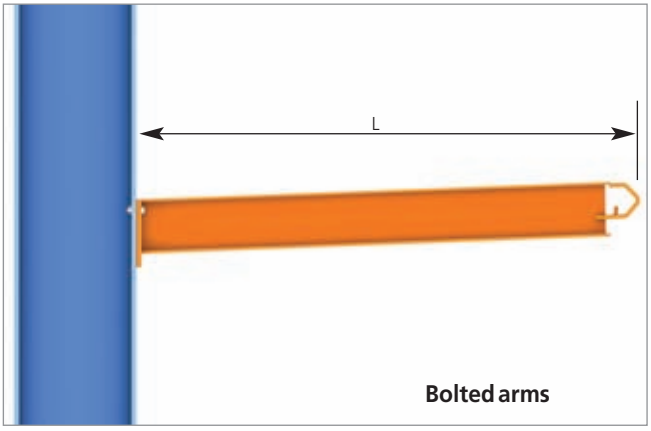
LOAD FOR BOLTED ARMS

Column Type	Arm Type	L (Arm length)					
		400	600	800	1,000	1,250	1,500
IPE 180	IPN80	1,100	700	500	350	280	200
	IPN100	2,000	1,250	850	645	485	380
	IPN 120	2,150	1,375	975	750	600	475
IPE 200	IPN80	1,100	700	500	350	280	200
	IPN100	2,000	1,250	850	645	485	380
	IPN120	2,250	1,450	1,050	800	640	500
IPE 220	IPN80	1,100	700	500	350	280	200
	IPN100	2,230	1,485	1,100	800	600	500
	IPN120	2,500	1,600	1,200	900	700	550
IPE 240	IPN80	1,100	700	500	350	280	200
	IPN100	2,300	1,500	1,150	890	710	580
	IPN 120	3,115	2,075	1,555	1,240	950	750

The evenly distributed load is calculated in kg.



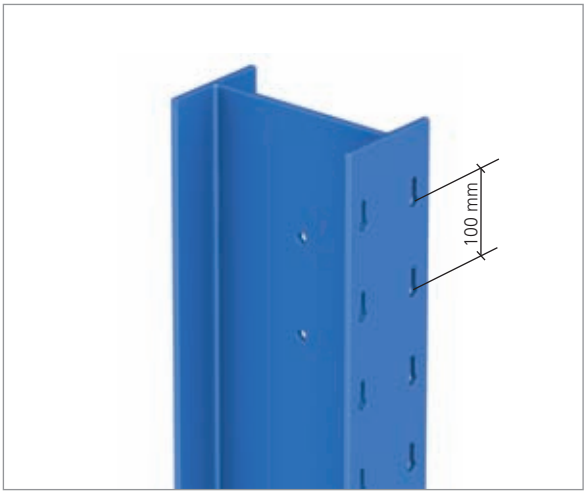
Hooked arms



Bolted arms

Columns

These are IPE 180, IPE 200, IPE 220 or IPE 240 beams, with slotted flanges for attaching the arms. At the bottom of the columns are support plates, reinforcements and holes for anchoring the bases.



Single column

The columns are generally made from single beams. If necessary, two beams may be joined together, thereby considerably increasing their load-bearing capacity.

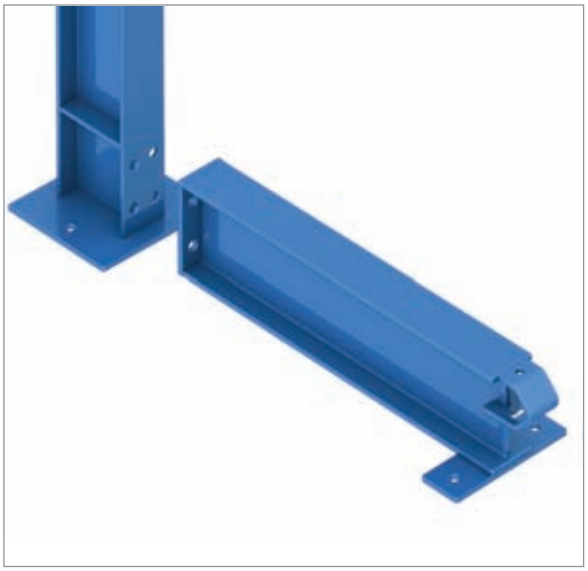
The slots on the columns are designed for both hooked and bolted arms to be fitted at 100 mm intervals.

Double column

Base Detail

The base is bolted to the column using an attachment plate.

At the other end, the curved stop attachment parts facilitate the placement of the loads.

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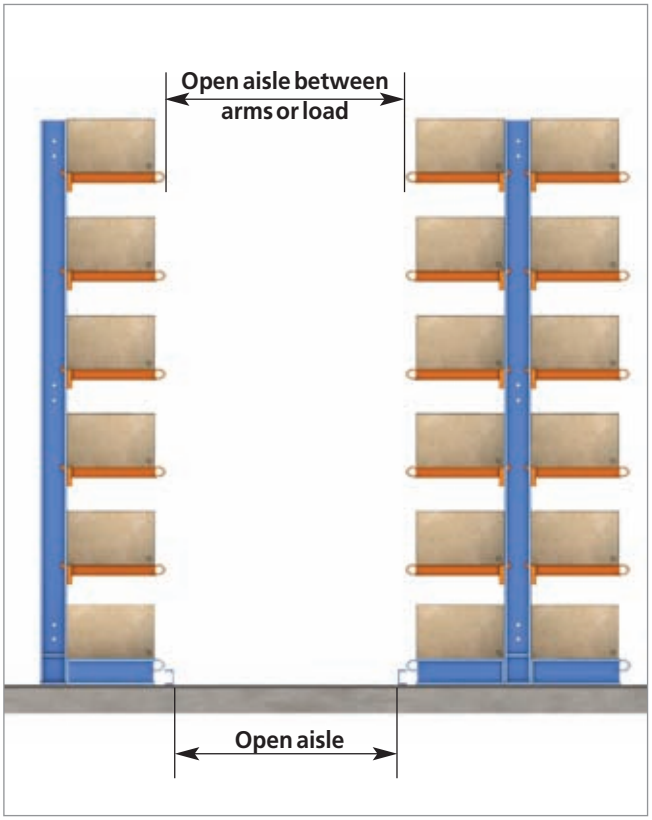
Accessories

Lift Truck Guides

The most suitable lift trucks for working with Cantilever racking are four-way side-loading lift trucks, which accept beam packages of up to 12 m in length. These trucks require lateral guides in the loading aisles in order to move around safely. The distance between the guides and loads, and the type of beam required, depend on the model of lift truck. The following detail shows the most frequently used beam, the UPN100. The required measurements for the aisles, which vary according to the machine, should be accounted for.

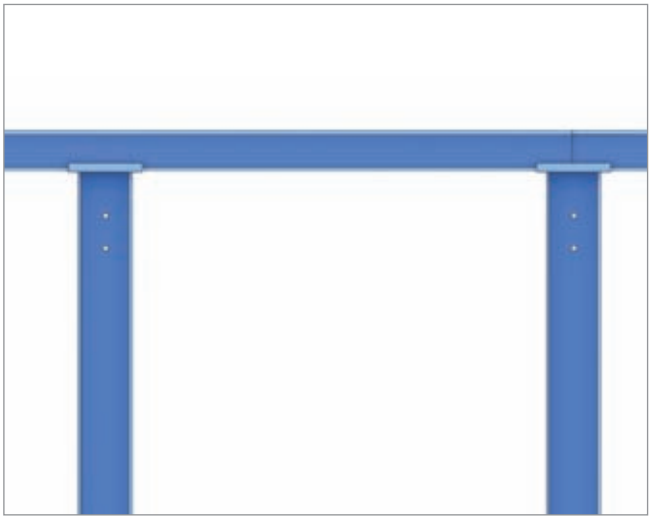


Guide Entrances

At the start of each aisle, the guides require entrances to enable the lift trucks to enter correctly. These entrances should be placed before the first package of goods stored.

Top-beam Joints

When required, the system may be fitted with a top-beam joint to connect the columns across the top for greater stability.

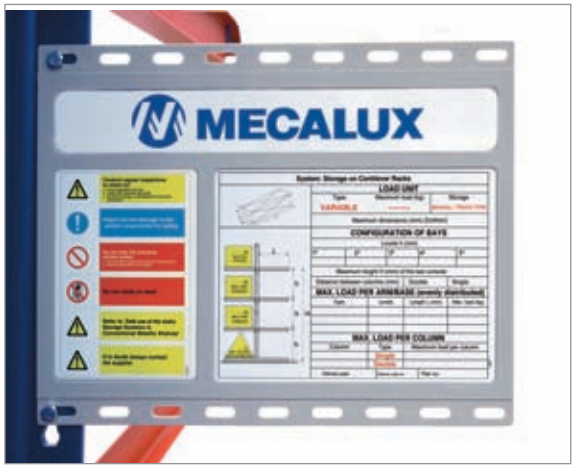


Protection

When guides are not used, CTV protectors may be fitted to protect the shelves from knocks from the lift trucks.

Load Safety Notices

These are plates providing information on the technical specifications of the installation. They are placed in visible areas at the ends of the installation.

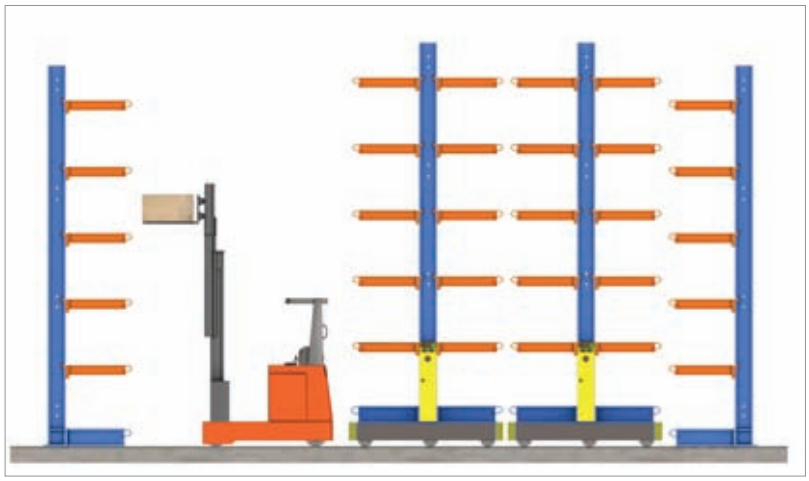


Cantilever on Mobile Bases

In order to increase the capacity of the space available, the Cantilever system may be placed on mobile bases.

The wheeled structure moves with integrated motors which run along rails set in the floor. These bases include a variety of control and safety systems to meet the needs of the client.

If you require more information, specific catalogues for shelving with mobile bases are available.

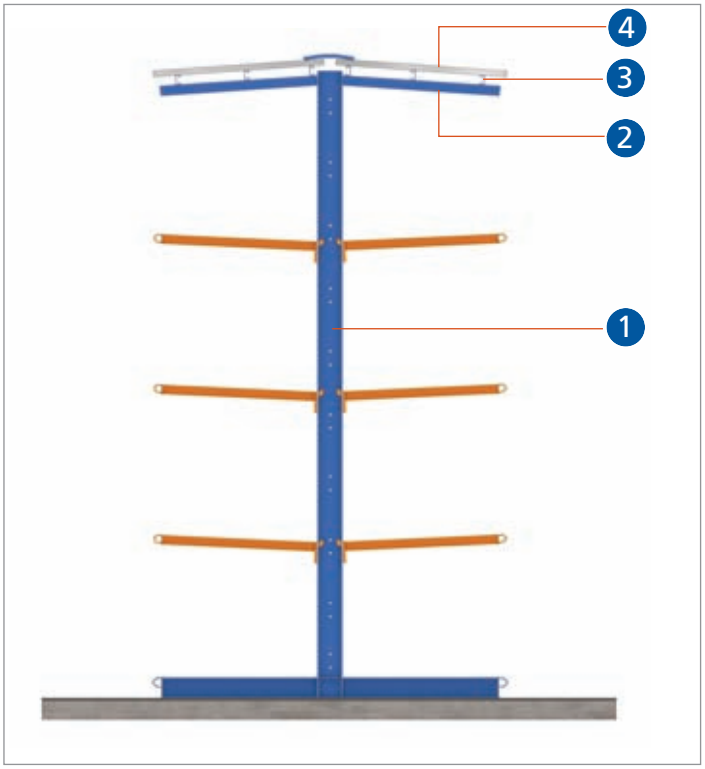


Outdoor Cantilever

Cantilever shelving is often installed outdoors.

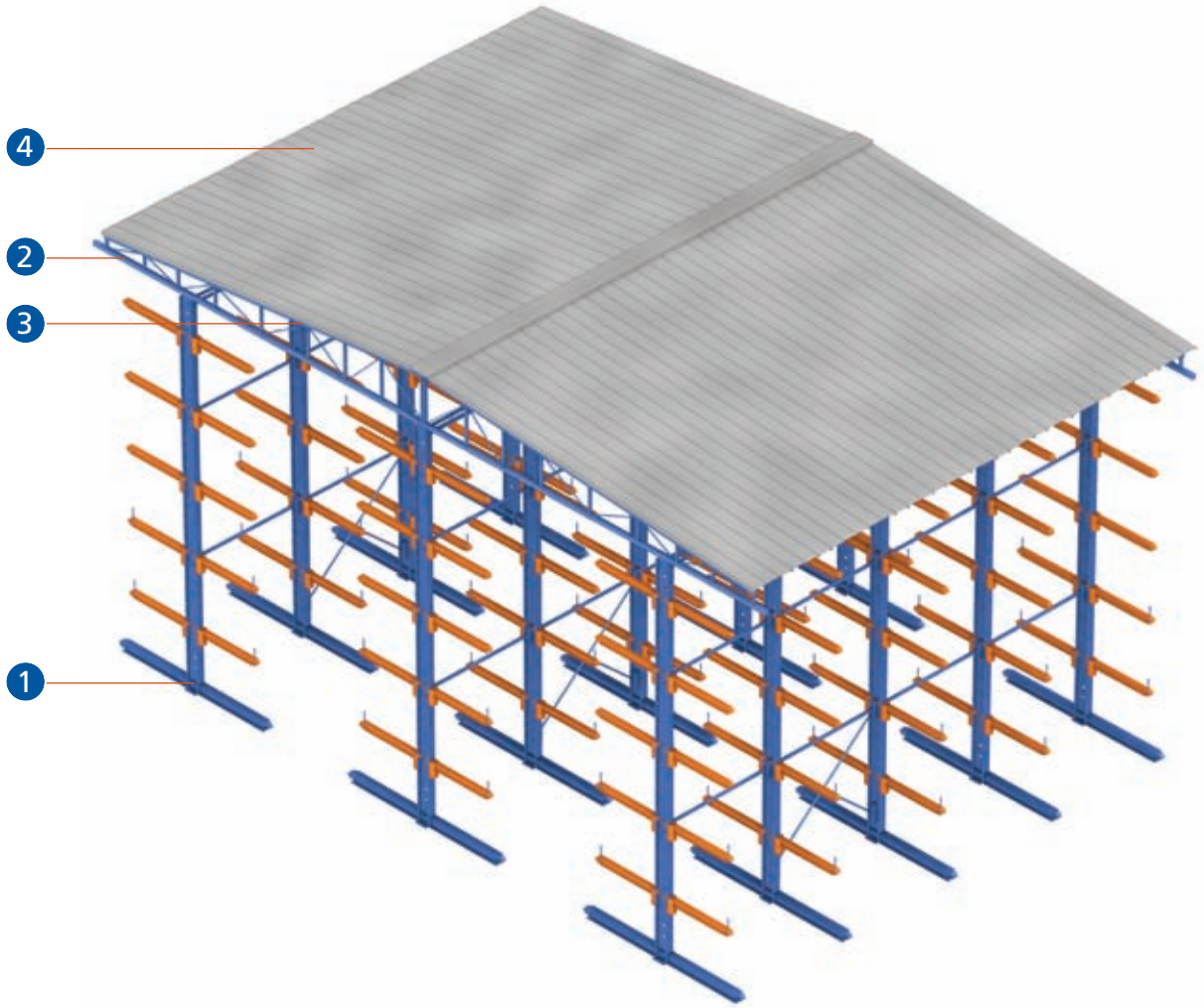
In such cases, Mecalux provides all necessary accessories to protect stored goods from the weather, such as roofing, facades and canopies.

The diagrams on this page show two possible solutions.



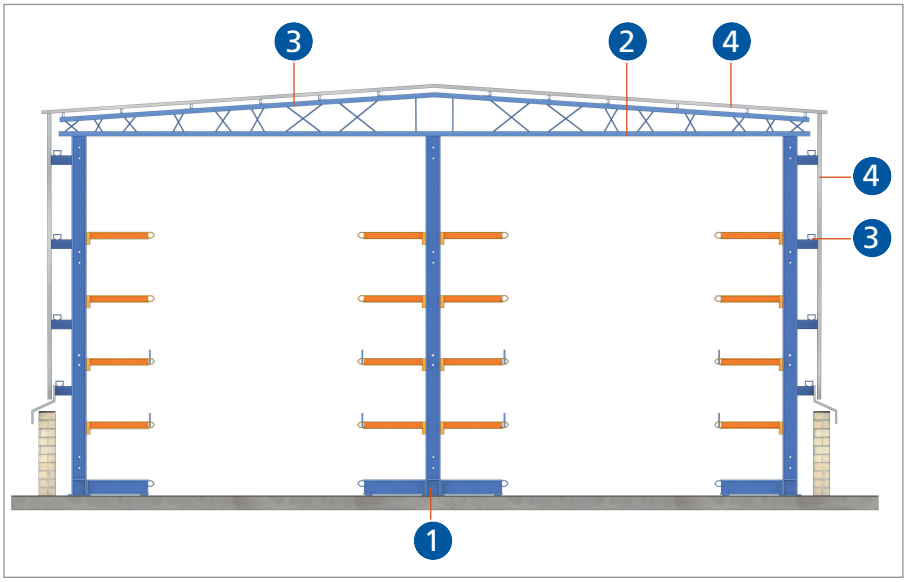
Basic Components

1) **Complete Cantilever unit**
2) **Inclined frame or top-beams**
3) **Purlins**
4) **Apex roof**



Self-supporting Warehouses

Due to the high cost of traditional building, it may prove more economical to use the shelves as support for both the weight of stored products and the building loads (wind, snow, seismic loads etc.); to do this, the system requirements are calculated and A-frames, secondary beams, roof and walls are installed, creating a self-supporting structure.



The paint process for Cantilever System

The basic components of cantilever racking are made from hot-rolled IPE or IPN beams. These beams provide the system with 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.

In the case of the arms, once shot-blasted, they are taken to an automatic chemical pickling tunnel (to remove any possible rust produced between phases), after which they are painted with orange water-soluble paints (RAL 2001) and dried at high temperatures.

Quality Principles

ISO 9001

Mecalux has obtained the ISO 9001 quality management certificate, which is applied to the design, production, installation and after-sales service of metal shelving. The ISO 9001 certificate has been awarded to the production centres in Spain, Poland, Mexico and Argentina for all static, mobile, and dynamic metal shelving, light-load shelving, mezzanines, lockers for changing rooms and partitioning.

ISO 14001

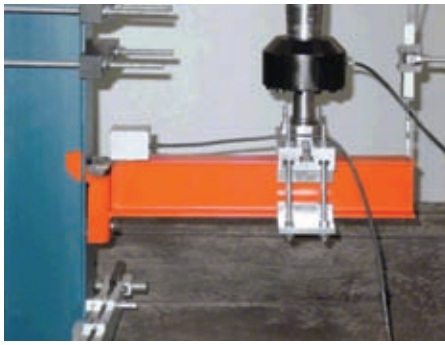
Mecalux is environmentally aware and conscious of the effect the activity carried out in their work centres may have on the environment. The application of the Environmental Management System to all activities guarantees that all organisational, production and technical tasks which affect the environment are planned, managed and controlled in such a way as to meet the requisites established in ISO standard 14001.

CALCULATION STANDARDS

For the required cantilever racking calculations, the calculation standards NBE-EA- 95, FEM 10.2.2 and RAL RG614 have been observed.

Among the guidelines given in these standards, the following are worth particular mention:
Columns: maximum movement at the top end of H/200
Arm: maximum deflection at outer end: L/100.

Safety coefficients of 1.5 in both variable and permanent actions.
The joints between arms and columns have been previously tested using authorised laboratories and methods in order to determine the degree of abutment; this data is required for the strength calculations.



The requirements for the calculations and tests to which the materials used, the beams, the manufacture and the assembly are subjected to provide greater safety margins for installations, the goods deposited on them and, above all, the personnel working in the warehouses.

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