EUROMECH
ENGINEERING EXCELLENCE

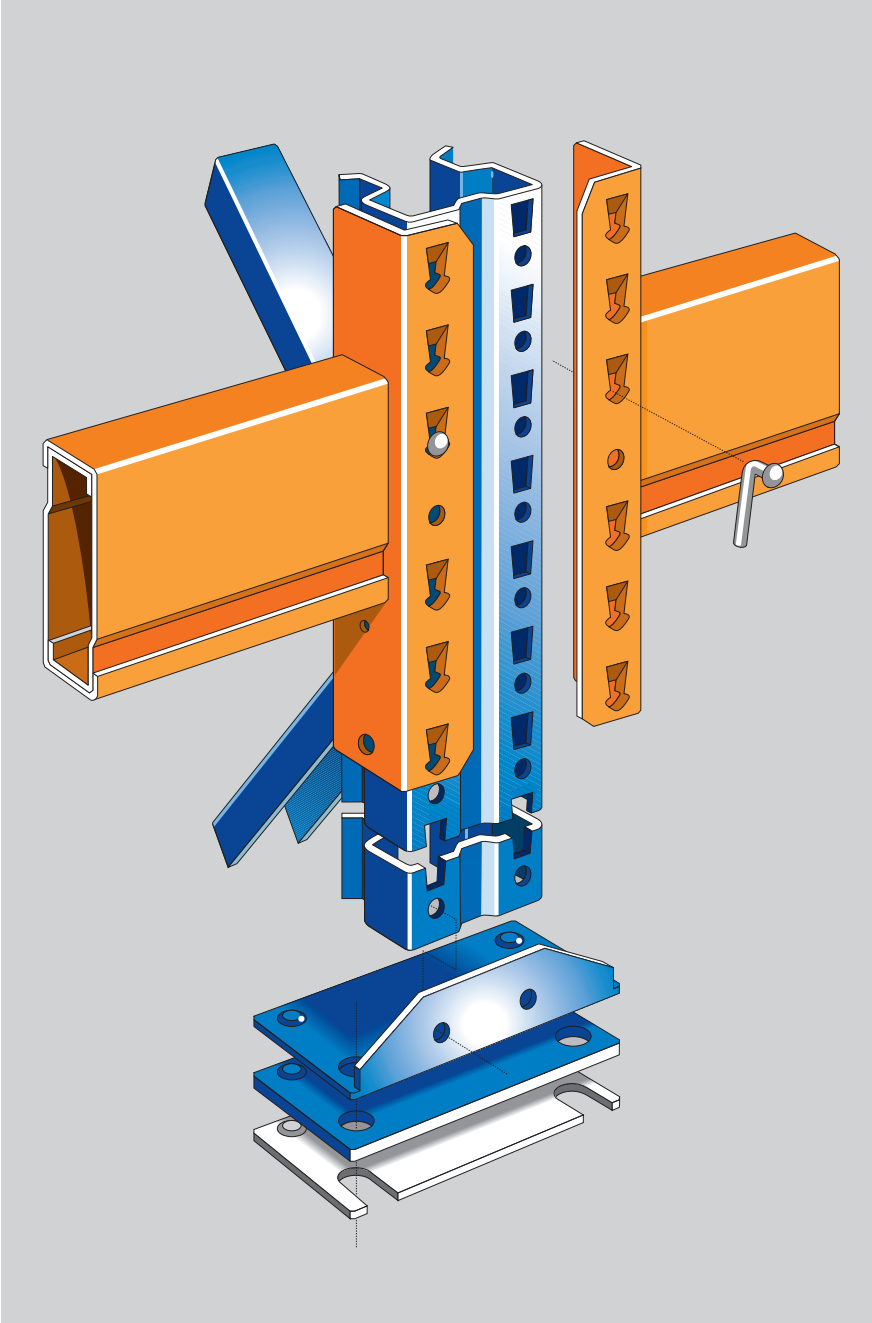
Pallet storage

Nedcon's extensive range of integrated pallet racking components offer safe and effective storage of all sizes and weights. Innovation, scientific and practical research, use of certified steels, high-quality epoxy powder coating and carefully selected components characterise all Nedcon pallet racks. Sometimes a more original approach is required when confronted by a particular application. Nedcon can then supply the ideal solution by selecting from this range of components.

Hook-in connectors allow for easy height adjustability and ensure quick and efficient assembly.
Often, bracing in the horizontal and vertical plane is undesirable due to lack of space. The stability and the strength of the racks are then determined to a large extent by the properties of the hook-in connections.

The hook-in connection is the heart of all unbraced pallet racking.

Poor fitting or inadequate design lead to reduced strength with regard to angular torsion; giving a reduction in the rotational spring constant (Cv) and reduced flexural moment capacity (Mv). The joints behave like hinges, allowing increased beam deflection and instability.

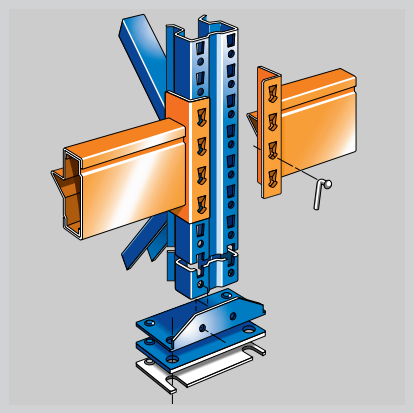


The heavy-duty hook-in connection is an extra strong model of the standard hook-in connection, which still fits into the same standard perforation. Height adjustability is 50 mm. The height of the beam end-connector is 350 mm, so that this connection can also be used with mezzanine floor systems.

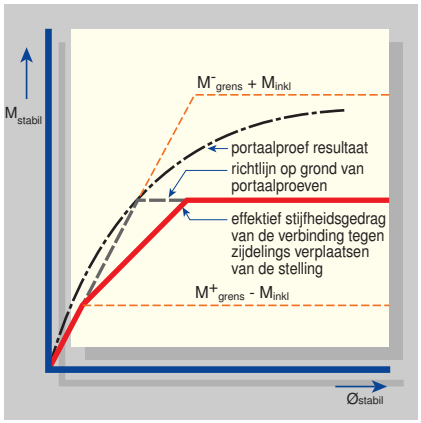
The heavy-duty hook-in connection is ideally suited for unbraced and heavily loaded, high structure racks due to its exceptionally high rotational stiffness.

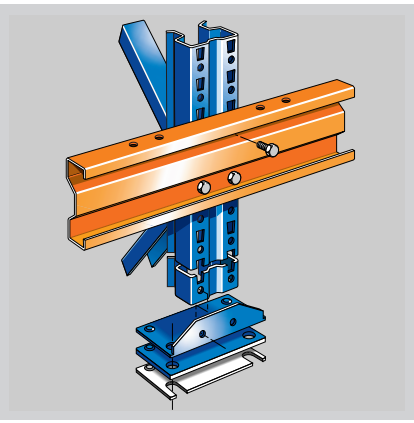
Locking

To prevent the hook-in connectors being dislodged by any upward force, they are secured with a solid safety pin with a diameter of 10 mm; these fit into the upright perforation with a minimum of clearance.



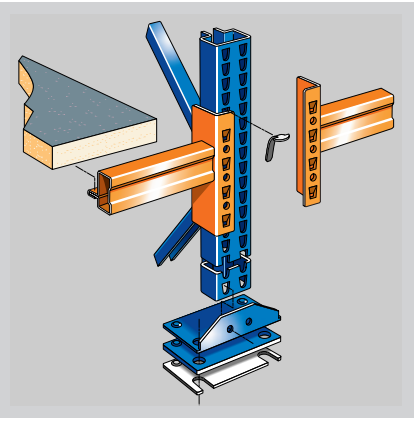
The **standard hook-in connector** fits into the conical upright perforations without any clearance. Height adjustability is 50 mm.
The height of the beam end-connector is 200 mm. These are made of high-quality micro-alloy steel.



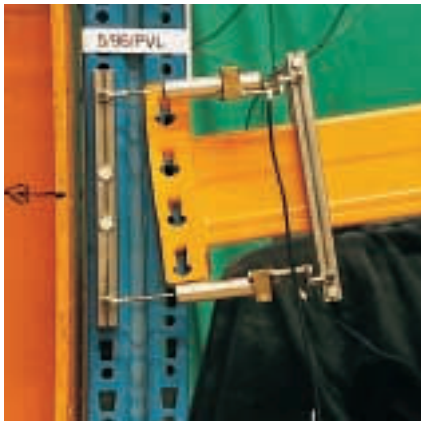


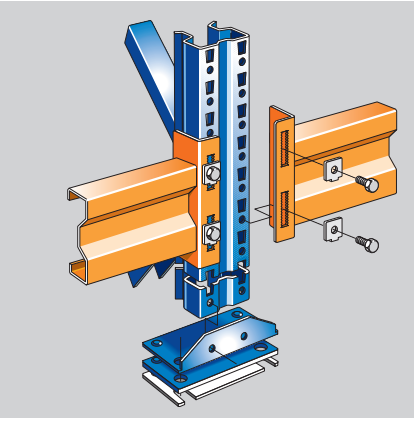
The **bolted connection** can be used when adjustability is not required, and bracing is not a problem. With this, multi-span beams are used to reduce beam deflection.

Nedcon has developed various types of connectors, each with their own specific application. Each type has been stringently tested by TNO-Construction in accordance with the NVN Standard 5053, in compliance with the Arbo (Health & Safety) Information Sheet AI 14 of the labour inspection.



For **wide-span shelving** there is also a hook-in connector, allowing height adjustment of 25 mm, available. The height of the beam end-connector is 200 mm. It has excellent rotational strength, so is suitable for the construction of high racks.





A fully patented **infinitely adjustable connector** is used for live storage racking.

Existing installations, which are fitted with our 100 mm connector can still be supplied.

Frame constructions

The Nedcon engineering department has available a wide range of combinations of upright frames and beam types for the safe design of racks up to a height of over 30 metres.

The frame diagonals can be chosen such that the optimum buckling length can be achieved for every possible combination of height and depth.

There are 36 types of upright profiles available, each of which differ in shape, dimension, effective material cross-section and thus in load-bearing capacity. All types are made of high-quality micro-alloy steel, so they can also be installed in cold stores.

The upright frames are assembled with bolted or riveted connections. They can be assembled on-site, or in production by Nedcon.

Bolted frame bracing

The junction in the frame between an upright and two full width diagonals is bolted. The ends of the diagonals are fitted with a bend part to avoid deformation by the bolt connection.

This joint being symmetrical, the upright will not twist under the effect of horizontal forces. This form of frame bracing is necessary for high-rise rack constructions, which have to conform to the tolerances as laid down in FEM 10.3.01 and FEM 9.831.

Use of the high-bay system means that the admissible frame load is high, as 30% less buckling length may be taken into account, in accordance with FEM 10.2.02 and Eurocode part 1.3 for high-bay systems.

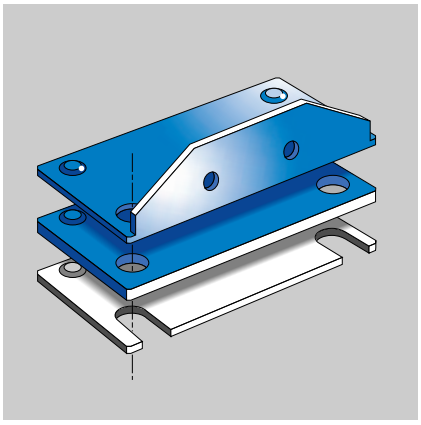
Upright profiles

These profiles are cold-rolled and perforated very accurately under electronic control in our own factory and can be produced in lengths of up to 14 metres in epoxy powdered finish or sendzimir galvanized.

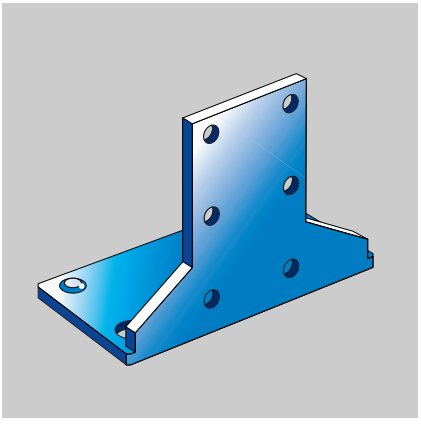
Upright profiles are available in 30, 45, 60, 80, 100, 120 and 140 mm widths and in a range of material thicknesses (t).
Tests by the TNO have shown that the cross-section of all profile types is 100% effective due to our chosen design.

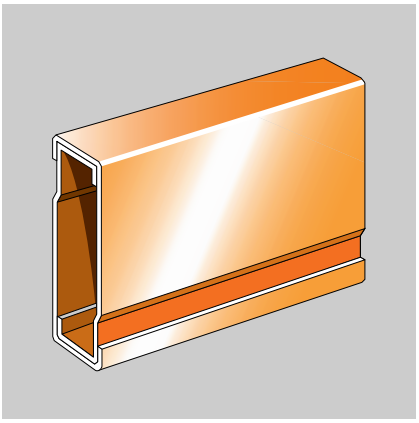
Base plates

The upright profile transmits a point-load on the floor via the base plate. The dimensions, type of steel, material thickness and any extra pressure distribution plates ensure sufficient spreading of this point load. Stiffness and strength at fixed ends - in other words, the extent to which the upright profile cannot hinge freely on the base plate - is primarily of importance with unbraced racks. This is tested by TNO-Construction (NVN 5053 Standard). With the right choice of upright width and base plate, load-bearing capacity of the frame can be increased by up to 30%. To accommodate tensile forces, the base plate is flanged and provided with two anchor holes.



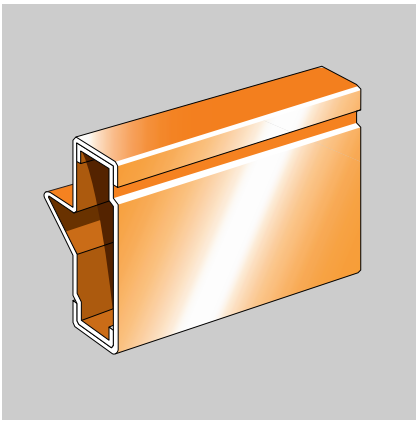
Special base plates are used when very high tensile forces need to be accommodated, in silo construction for example.





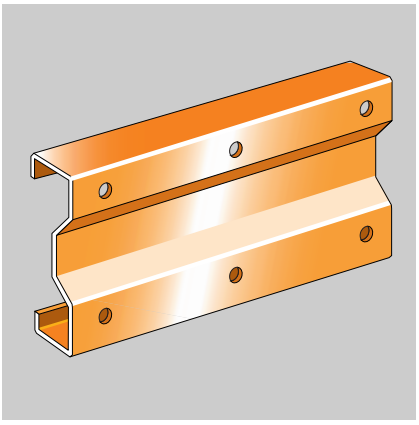
Beams, type CC

This beam type is available in a wide range of height and width dimensions, and in lengths up to 4,500 mm. The box shape is highly resistant to torsion and provides great strength and stiffness in the vertical and horizontal planes. Wide profiles are recommended for beam profiles in excess of three metres.



Beams, type NC

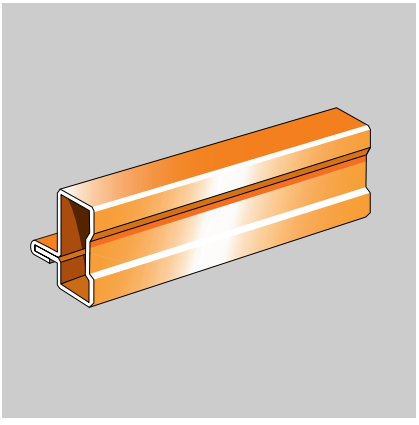
This beam type has the same properties of the type CC. But these NC beams have a profiled shelf support edge, suitable for use with recessed shelves, mesh panels and pallet supports.



Beams, type Sigma

This open profile is resistant to torsion, due to the careful design of the cross-force centre, whilst maintaining excellent load-bearing capacity.

Perforated Sigma beams are ideal for use with suppplements that are bolted, as with pallet live storage.



Beams for wide-span shelves

Box-shaped beams, highly resistant to torsion, with less profile height than the type CC, are used for wide-span shelving.

In the perforated form, these beams are used in beam type miniload systems.

Load-bearing capacity of beams

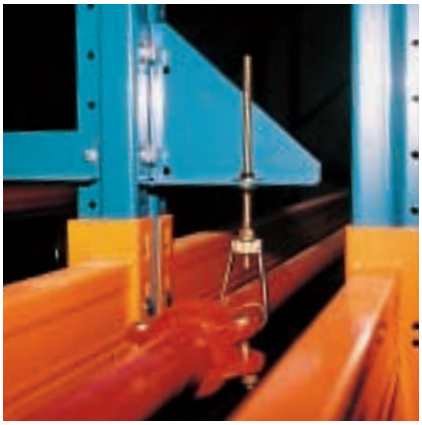
The load-bearing capacity of the beams is indicated by bay, thus per pair of beams and assumes an even distribution of load over the length of both beams. However, the load at the back may overhang more than at the front, and some goods can create point loading. In these cases, the load-bearing should be reduced in accordance with a supplementary calculation. If the operating equipment creates extra dynamic forces, this should be stated, in order to determine the precise load-bearing capacity.

Beam deflection

Independent of the load-bearing capacity of the beams, deflection will occur due to loads used. This deflection is reduced as the height of the beam profile is increased. The height effects bending in the third power.
The thickness of the material is only of linear influence on the bending.
The standard for deflection in pallet racks, is maximum 1/200 of the beam length. With long beams and in automated storage systems, deflection is limited to 1/300 of the beam length, in accordance with FEM guidelines.
The choice of hook-in connection will also have a considerable influence on beam stiffness.

Lateral stiffness of beams

When horizontal forces can occur, especially with long beams on which more than two pallets are positioned alongside each other, careful thought must be given to the lateral stiffness.
In general, right-angled box profiles behave two to three times better than IPE-profiles. The box profiles are available in widths of 40, 50 and 60 mm, so that sufficient stiffness can be accommodated in all circumstances.



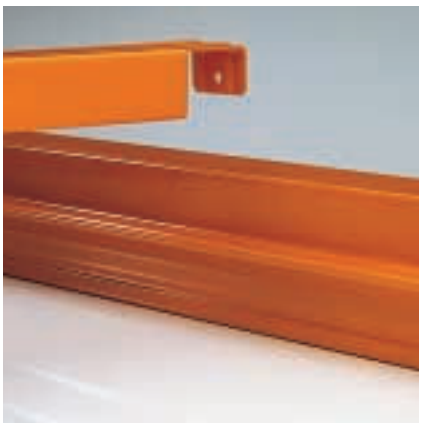
Sprinkler brackets

Sprinkler systems can be accommodated simply and easily during the rack construction by using face mounted and in-rack pipe support brackets.

Pallet supports

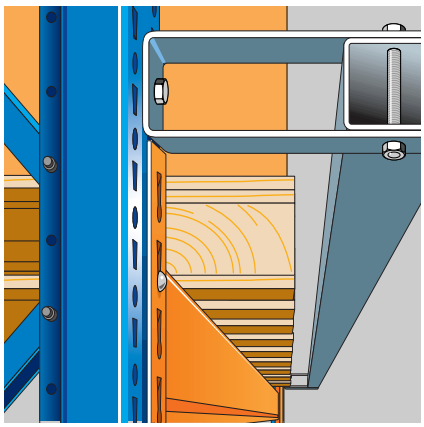
Depending on their quality, it may be necessary to improve the bearing of pallets with pallet supports:

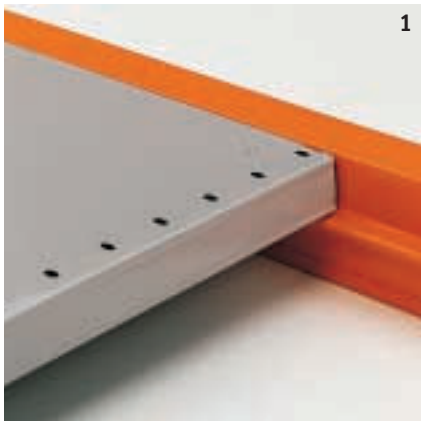
- model with welded hooks for fitting on CC-beams.
- model for fitting on the shelf support edge on NC-beams.
- model for fitting on a shelf support edge with perforations, for sideways fixing.



Push-through protection

If the clearance between pallets in a double entry pallet rack is 100 mm or less, push-through protection can be used. This will prevent the rear pallet being moved when the front pallet is positioned.
However, when using forklift trucks, there is the risk that excessive horizontal force could be applied to the rack.

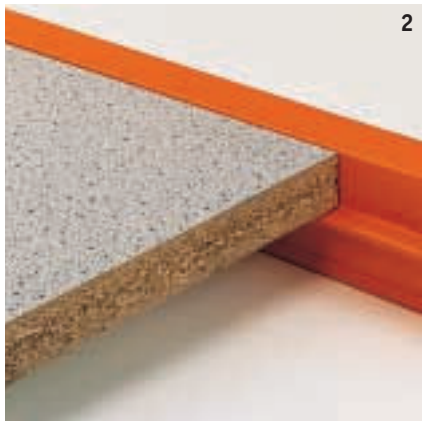


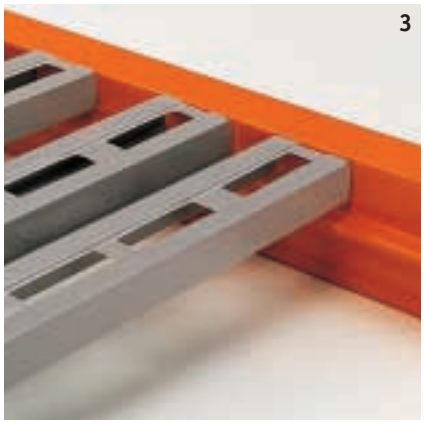


Shelves, unperforated

1. Type N, in galvanized sheet steel; profiled with box-shaped leading edges.

2. Chipboard, in thicknesses of 22, 28 and 38 mm thickness, with melamine finish if required.





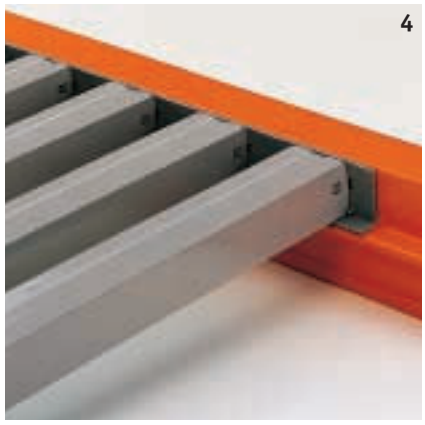
Shelves, perforated

(allow ingress of sprinkler water)

3. Type Omega, in galvanized sheet steel; this design provides considerable strength. *Patents: EP 96.120732.1 and G 296.01819.8*

4. Type KA, in galvanized sheet steel; 50% water-permeable.

Patent: G 295.12116.5



Support consoles

Sufficient space is required under the pallet when containers or pallets with perimeter boarded bottom deck are stored by rack-handling equipment with telescopic forks.

An economical and safe storage solution is provided by welding four support consoles to the beams for each pallet position. The design of these support consoles ensures great stability in both length and depth and can also be fitted with push-through protection.

Patent: EP 98.10.2251.0 pending