



## Single tier and multi-tier shelving and racking

Shelving and racking are mainly used for storage and order picking of non-palletised goods, small parts stored in bins, cartons or other storage units and for bulk storage. A broad range of accessories which can be added later on to this modular system allows efficient storage of almost any imaginable product, part or component.

Additional levels do not only create extra order picking, storage, manufacturing, assembly or office areas – thus „multiplying“ available floor space. Simultaneous picking on several tiers also helps to considerably reduce order throughput times.

Stairs and/or lifts connect the walkways/aisles on different tiers.

# BITO

[www.bito.com](http://www.bito.com)



### Product information

**Frequent application**

- multi-tier order picking facility

**Service options**

- manual replenishment and order picking

**Storage options**

- goods can be stored short or long side facing or standing

**Surface/volume utilisation**

- multiple use of available floor space
- high volume utilisation due to multi-tier construction



### Storage units

**Goods stocked in plastic bins, containers and cartons, individually wrapped single items**

**Stock rotation frequency**

- medium stock rotation frequency (B-items)

**Stock characteristics**

- any product, from standard size packages to bulky or single items with an odd shape



### BITO Bins and containers

As a manufacturer of a broad range of comprehensive bin and container series, BITO is able to supply shelving and racking complete with perfectly matching storage, handling, order picking and distribution containers for your goods.

BITO bins and containers are outstanding as to their functionality, rigidity and stability and have been perfectly adapted to the requirements of industrial shelving and racking.



### Information material

For more information on this product, please contact us on

Tel.: +49 (0) 67 53 / 1 22-1 64

or ask for our DVD

**“Dynamic storage“**

Our **PRODUCT CATALOGUE** provides detailed information on our entire delivery programme.

Ask for your free copy!



### Boltless shelving system

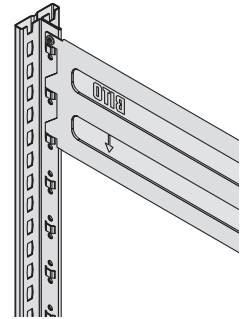
The basic components of boltless shelving are frames, stiffening beams, shelves and cross bracing. These light weight components provide optimum rigidity of the installation and allow to stock high load capacities.

- **shelf loads: from 100 kg to 400 kg**  
(300 kg for a bay width of 1300 mm)
- **bay loads: up to 2400 kg**
- **bay widths: 750, 1000 and 1300 mm**
- **broad range of accessories such as solid or wire-mesh side/back cladding, solid sheet/wire-mesh/wire dividers.**

### ① Frames

Structurally ideal slotting allows to realise shelving heights of up to 8 metres. The frames are completely riveted.

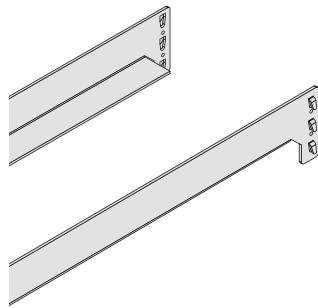
- **high load capacities and great rigidity**
- **uprights are only 50 mm wide**
- **minimum loss of clear shelf length**



### ② Stiffening beams

Each hook connector has 3 solid hooks to ensure reliable force locking of beams and uprights.

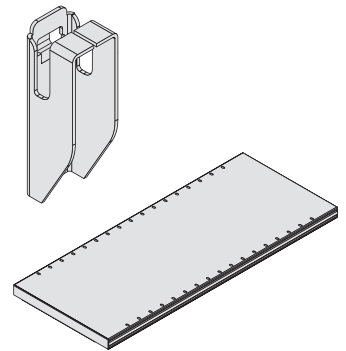
- **excellent lengthwise rigidity**
- **convenient fitting of shelves**
- **levels are height adjustable on a 25 mm pitch**
- **fast and easy push-in assembly**



### ③ Shelves

The shelves are simply placed onto the stiffening beams or onto 4 shelf clips. Both options allow to use the full shelf load capacity.

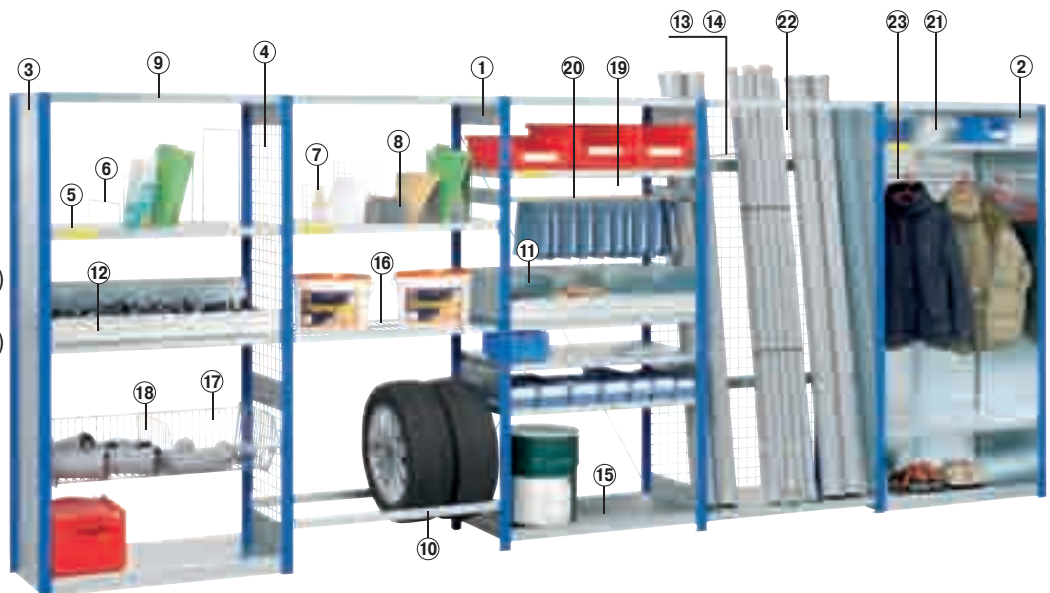
- **high load capacities**
- **height adjustable on a 25 mm pitch**
- **fast and easy fitting**



### Accessories

- |   |                              |
|---|------------------------------|
| 1 Frame   | 21 Solid sheet back cladding |
| 2 Solid sheet side cladding                                       | 22 Wire-mesh back cladding   |
| 3 Perforated side cladding  | 23 Clothes rail set          |
| 4 Wire-mesh side cladding   |                              |
| 5 Shelf with perforations to accept dividers                      |                              |
| 6 Wire divider  |                              |
| 7 Wire-mesh divider   |                              |
| 8 Solid sheet divider   |                              |
| 9 Stiffening beam   |                              |
| 10 Beams for tyre shelving  |                              |
| 11 Bin shelf for loose goods                                      |                              |
| 12 Bin shelf front panel  |                              |
| 13 Support rail for divider bars (vertical storage of long loads) |                              |
| 14 Divider bar (vertical storage of long loads)                   |                              |
| 15 Tray shelf   |                              |
| 16 Wire shelf   |                              |
| 17 Wire basket  |                              |
| 18 Wire divider for wire baskets                                  |                              |
| 19 Cross bracing  |                              |
| 20 Suspension file unit   |                              |

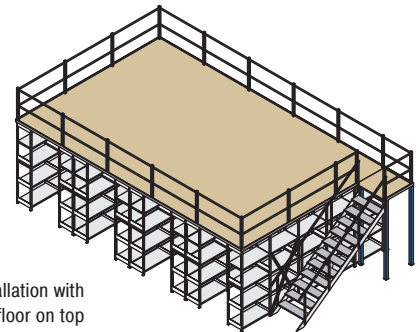
Further accessories upon request



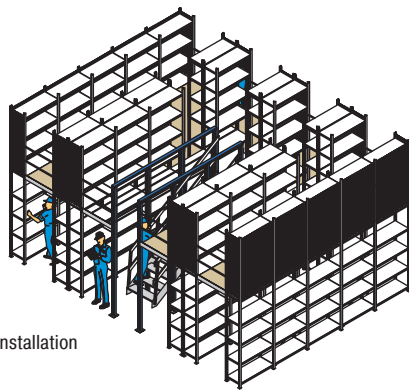


**Options**

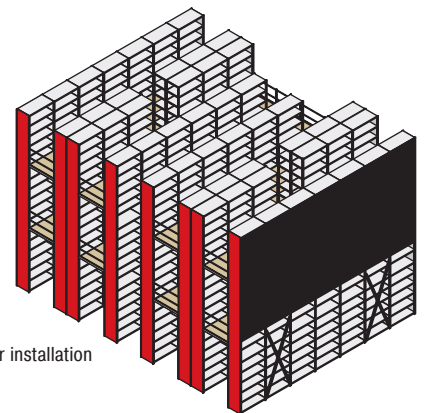
Multi-tier installations can be designed either as single tier shelving or racking with a mezzanine on top or as a multi-tier construction. Additional work areas can be created on the floor level as well as on the tiers on top.



Single tier installation with a mezzanine floor on top



Two tier installation



Three tier installation



# Economic evaluation

## Maximum space utilisation with compact storage on several tiers

Good use of the available warehouse volume with respect to floor surface and building height is crucial for the efficiency of a storage facility.

Multi-tier shelving and racking – whether used as independent solution or as part of a facility combining several storage systems – provide good space utilisation by indirectly multiplying the available surface. Moreover, they are a very economic solution, as the components of the system serve as integral and supporting elements for the tiers on top.

Efficiency can further be boosted by appropriate warehouse management and by integrating suitable conveying equipment, e.g. powered conveyors or lifts.

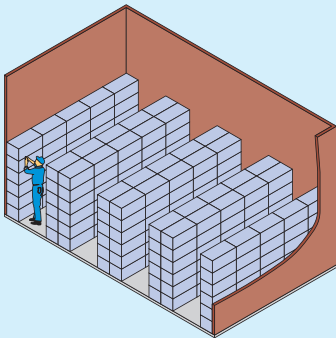
## Comparison between single tier and two tier installations in view of optimum space utilisation

Particularly in the case of smaller shelving installations, determining the right place of the stairway is of paramount importance (compare solution 1 and 2).

### The second tier

- improves surface utilisation and cuts down on occupancy costs
- increases the available storage volume by up to 100%

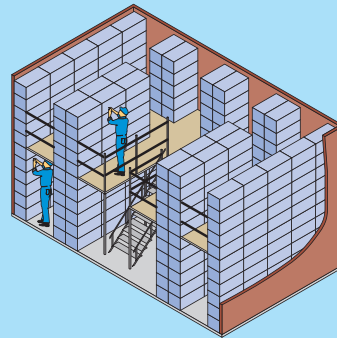
### Single tier shelving



Dimensions of the facility:  
8.60 m x 5.09 m x 2.20 m (W x D x H)

Floor space	43.7 m <sup>2</sup>
Room height	4.5 m
Shelf dimensions	1.0 x 0.5 m
Number of shelves	240 shelves
Storage volume	47.3 m <sup>3</sup>
Volume utilisation (based on gross storage volume)	24.1 %
Surface utilisation (based on total surface)	48.7 %

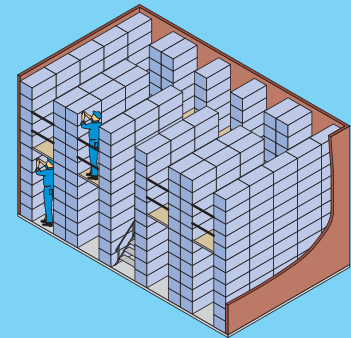
### Two tier shelving Solution 1



Dimensions of the facility:  
8.60 m x 5.09 m x 4.15 m (W x D x H)

Floor space	43.7 m <sup>2</sup>
Room height	4.5 m
Shelf dimensions	1.0 x 0.5 m
Number of shelves	338 shelves
Storage volume	73.6 m <sup>3</sup>
Volume utilisation (based on gross storage volume)	37.4 %
Surface utilisation (based on total surface)	41.5 %

### Two tier shelving Solution 2



Dimensions of the facility:  
8.60 m x 5.09 m x 4.15 m (W x D x H)

Floor space	43.7 m <sup>2</sup>
Room height	4.5 m
Shelf dimensions	1.0 x 0.5 m
Number of shelves	404 shelves
Storage volume	87.9 m <sup>3</sup>
Volume utilisation (based on gross storage volume)	44.7 %
Surface utilisation (based on total surface)	48.7 %

## Advantages of the system

### General advantages of multi-tier shelving and racking

- utilisation of storage volume can be increased by up to 100 %
- high degree of floor space utilisation
- simultaneous order picking on several tiers
- additional floor space is gained for storage and assembly

### Specific advantages of BITO multi-tier shelving and racking

- assembly without bolts of all basic components
- full length frames – no joining plates required
- stiffening beams and additional cross bracing make for a high load capacity and give structural safety to all bays
- boltless system allows flexible shelf spacing
- safe and convenient stairways secured by guard railing
- useful equipment and accessories
- galvanised surface finish  
(epoxy-coating upon request)



- 1 Frame
- 2 Stiffening beam
- 3 Shelves
- 4 Cross bracing
- 5 Platform/walkway decking
- 6 Guard railing
- 7 Stairway
- 8 Pallet access position

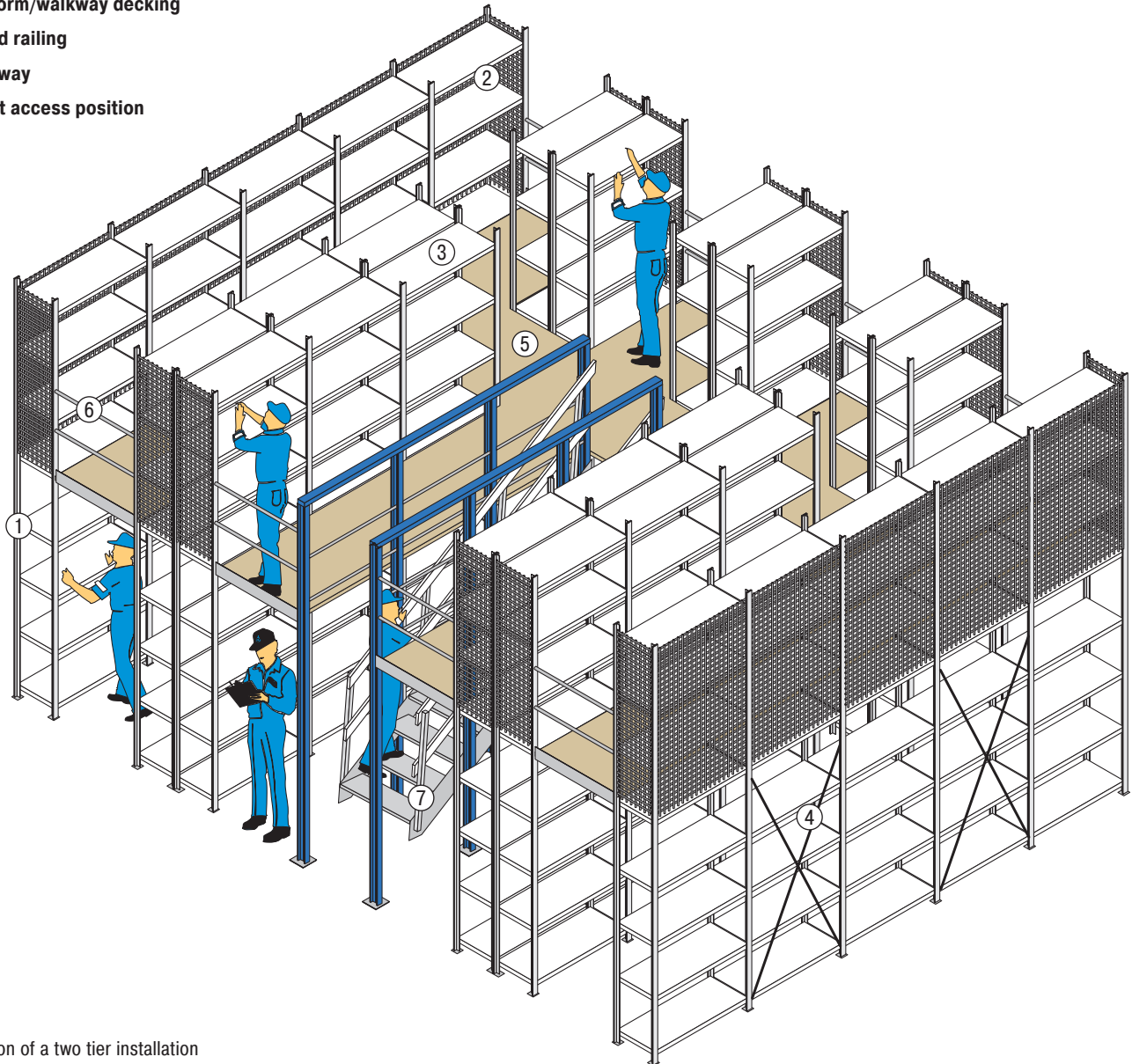


Illustration of a two tier installation with boltless shelving

### Variations of the system

Multi-tier installations can be constructed from different shelving or racking systems:

- boltless shelving
- wide span/heavy duty shelving
- pallet racking

The boltless shelving system is most commonly used for multi-tier installations.

For basic components (frames, stiffening beams and shelves) refer to page 22

## Platform and walkway decking

Platforms and walkways of BITO multi-tier installations are decked with high-quality chipboard panels with tongue and groove or with solid, galvanised mesh decks with a mesh width of 30 x 30 mm or 30 x 10 mm.

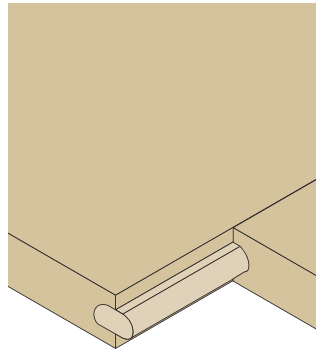
The chipboard panels are available in different options:

- both sides untreated
- with white underside
- with anti-slip upper side
- with white underside and anti-slip upper side
- **high-quality chipboard panels**
- **solid wire-mesh decks**
- **load capacity of walkways 250 kg/m<sup>2</sup>**
- **load capacity of mezzanine floors 500 kg/m<sup>2</sup>**

### 5 Chipboard decking

The chipboard panels are supplied in customer specific dimensions. Tongue and groove fitting forms a solid unit and a smooth, snag-free surface.

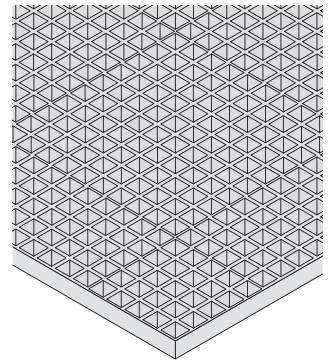
- **tongue and groove fitting**
- **high-quality chipboard panels**



### Mesh decking

Solid mesh deck segments from galvanised steel.

- **mesh width 30 x 30 mm**
- **or 30 x 10 mm**

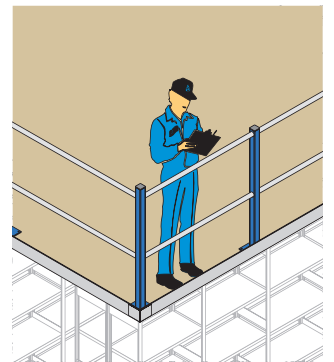


## Guard railing and kickplates

BITO guard railing and kickplates have been designed in accordance with the latest safety regulations. The guard railing consists of solid, tubular hand and knee railing. Our kickplates have been made from bended steel sheet which is fitted around the edges of platform levels and walkways to prevent small parts from dropping to the levels underneath.

### 6 Guard railing around mezzanine floors

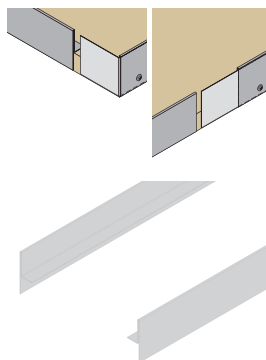
The guard railing consists of hand and knee railing as well as a kickplate. The sturdy square-tubed posts are slotted to accept hand and knee railing.



### Kickplates

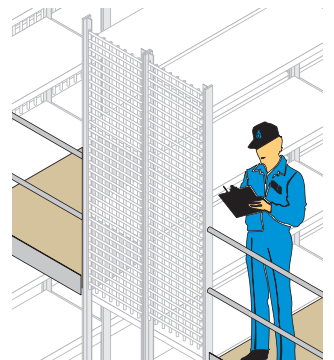
Made from bended steel sheet and fixed around platform levels and walkways to prevent parts and components from falling onto persons working underneath.

- **joining plates for kickplate lengths and angled joining plates for corners provide reinforcement**
- **optimum design protects decking**
- **height 52 mm**



### Guard railing for walkways

Includes hand and knee railing. The round tubes are flat-ended and riveted to the frame uprights at either side of the walkway.



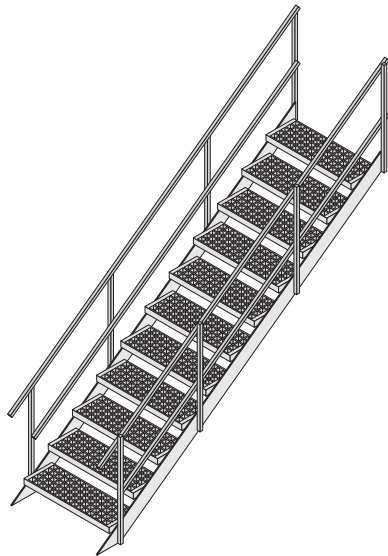
**Stairways**

Decisive for the location of stairways is the type of use of the storage area and the mezzanine floor as well as the position of the walkways within the installation.

**Stairway without landing**

This stairway can be mounted between the racking rows or directly in front of the installation.

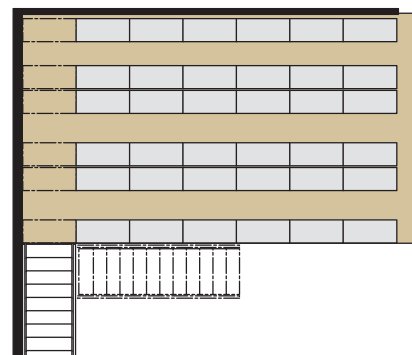
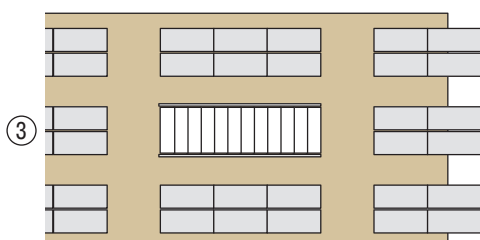
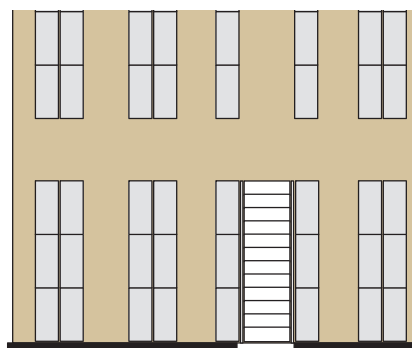
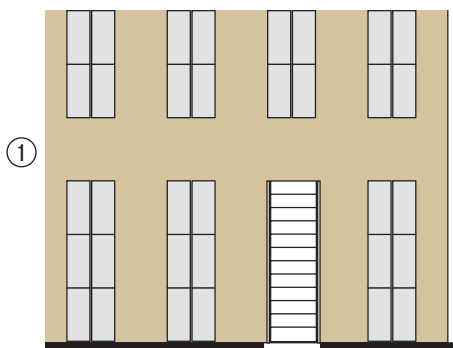
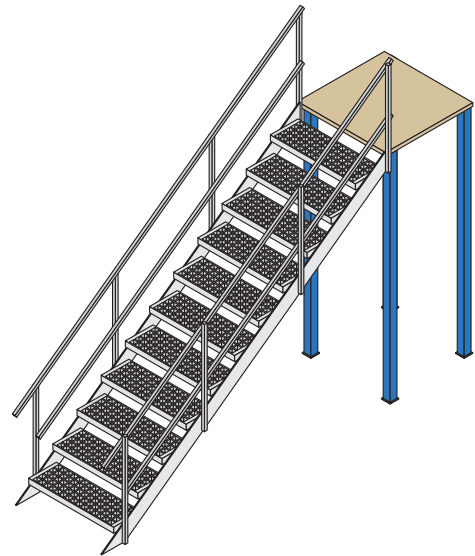
- with hand and knee railing
- mesh tread width 800 or 1000 mm
- tread depth 260 mm



**Stairway with landing**

This type is used if the stairway is to be located outside the installation.

- full use of the mezzanine area
- with hand and knee railing
- mesh tread width 800 or 1000 mm
- tread depth 260 mm



**Stairway configuration**

The illustrations 1-3 show stairway configurations **integrated** into a shelving or racking installation. For most installations, solution 2 fits ideally into the overall construction and therefore offers a cost advantage. Illustration 4 presents an **external** stairway configuration – either built in a 90° angle or parallel to the mezzanine floor.

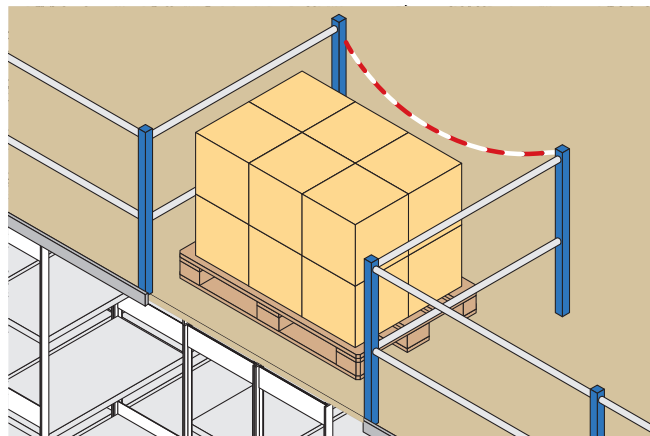
## Pallet access positions

In order to ensure constant material supply, mezzanine floors or walkways are equipped with pallet access positions. Depending on the requirements and the application, there are three variations available.

### Set-back pallet access position

Composed of two posts fitted at a distance of 800 mm from the mezzanine edge, hand and knee railing and a red and white plastic chain which can be unhooked as required.

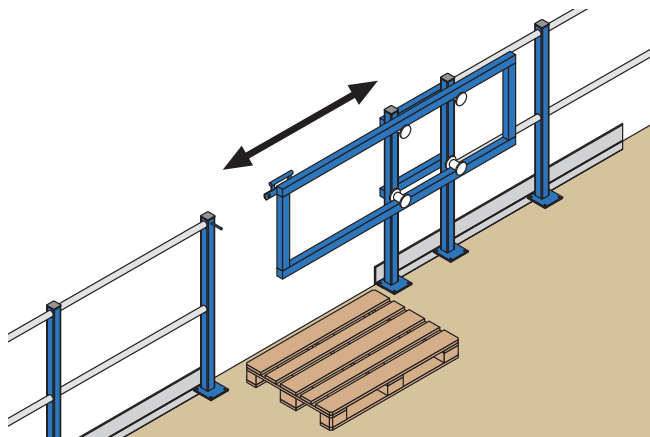
- low cost variation



### Sliding access gate

Sliding access gates are manually operated and consist of a railing segment, guide rails, rollers and a push handle. To protect the chip-board flooring, the gate area comes with an edge protection profile.

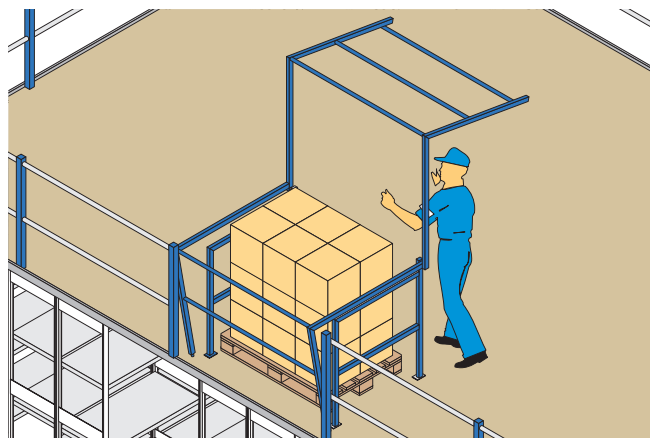
- no loss of mezzanine floor space, as the sliding gate is integrated into the railing



### Swing access gate

Provides optimum operator protection as the gate is always closed – either behind the pallet position when the pallet is deposited onto the mezzanine floor or at the mezzanine's edge in front of the pallet position when the operator removes the goods.

- optimum protection against falls, as one side of the swing gate is always closed
- easy operation



**Anita**<sup>®</sup>  
 UniqueBodyWear  
 since 1886

**Anita Dr. Helbig**  
 Specialist supplier of corsetry



**Features**

- multi-tier shelving
- manual order picking on three tiers

**Function**

Anita Dr. Helbig GmbH in Brannenburg manufacture and distribute corsetry and bathing fashion for mothers-to-be and breast feeding mothers, but also special clothing for woman who have had a breast operation. All goods are manually picked in the specialist supplier's warehouse. The shelving installations feature slightly inclined levels equipped with roller tracks into which the products are fed in from the rear. The goods move gravity-driven to the picking face, from where they can be immediately accessed from the picking aisle. A-items are supplied for picking in live storage installations, B- and C-items are provided in conventional shelving.



**Benefits**

- compact storage, direct access to all product lines
- easy-to-reach product presentation
- efficient storage according to the FIFO-principle
- multi-tier configuration allows optimum utilisation of available warehouse volume
- separate loading and order picking aisles increase operator efficiency





**ASWO GmbH**  
Spare parts provider for  
consumer electronics



**Features**

- storage in smaller size bins in conventional shelving
- operator-to-goods order picking

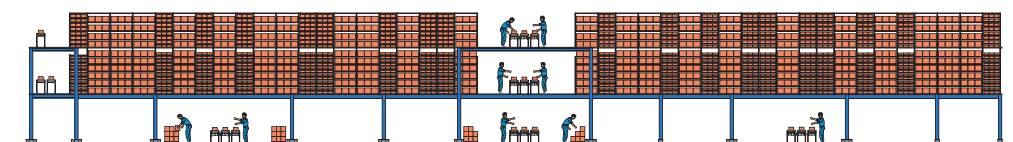
**Function**

ASWO International Service GmbH in Eime supplies spare parts, service and repair workshop demand for electronic appliances. The distribution centre accommodates more than 120 000 references in shelving installations. The company opted for fast-to-assemble boltless shelving which is located on a mezzanine steel construction. The shelves can be adjusted in height on a 25 mm pitch and feature perforations to accept dividers. All orders are dispatched on the same day to customers within Germany. Order picking of A-, B- and C-items is done manually on several tiers according to the operator-to-goods principle.



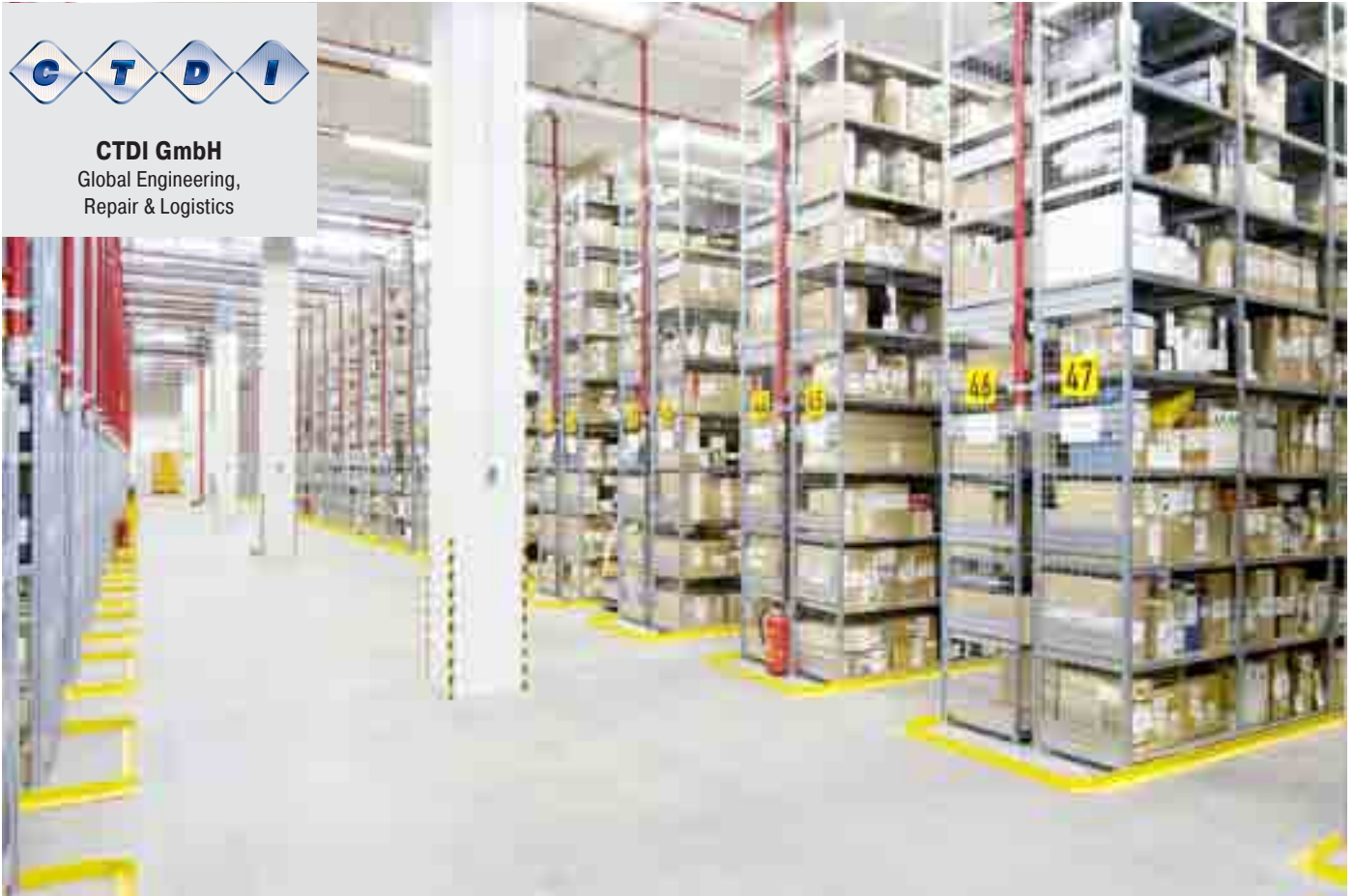
**Benefits**

- high degree of availability of all reference lines
- simultaneous order picking on several tiers
- optimum utilisation of available warehouse space
- shorter travel routes





**CTDI GmbH**  
Global Engineering,  
Repair & Logistics



**Features**

- high-bay shelving
- orders are picked manually
- fast order picking with rail-guided man-up stacker crane

**Function**

CTDI Europe is a non-proprietary partner of companies in the telecommunications industry who provides innovative and cost efficient solutions to operators as well as to independent and contractual manufacturers of telecommunication equipment. More than 75.000 different component groups of various manufacturers are included in CTDI's test, measurement and repair portfolio. After repair, all systems are stocked by model in a pool store for exchange items. Any component or group can be delivered to the customer on call within a few hours. Ensuring fast and direct access to any item on store, the new 4,50 metre high shelving installation provides the basis for a smooth workflow which is additionally supported by a man-up stacker crane.

**Benefits**

- very good utilisation of warehouse height and floor surface
- narrow aisles allow compact storage
- all storage positions are directly accessible
- fast access due to short travel routes
- operators do not need a fork lift truck permit; initial instruction is sufficient





**Schott Music  
GmbH & Co. KG**  
Music publisher



### Features

- multi-tier shelving installation
- high-bay pallet racking
- order picking carts

### Function

In 2004, Schott Music GmbH & Co. KG at Mainz, one of the world's leading music publishers, and music distribution services GmbH (mds) have established a joint logistics and distribution centre to ensure delivery of publications from the Schott range as well as from 60 other publishers around the world.

The multi-tier facility has been designed as two-tier shelving installation topped by a mezzanine floor which accommodates the already existing two-tier BITO boltless shelving facility. The new facility provides 10.500 picking positions for small volume orders. The high-bay racking with 1.300 pallet positions stocks supplies for the shelving area and serves as intermediate storage facility for palletised products. For the in-house transport of some 130.000 music sheets, notebooks, audio and record carriers, BITO has also supplied order picking carts that can be moved from floor to floor with integrated goods lifts.

### Benefits

- optimum space utilisation
- low cost project realisation due to the use of standard components
- easy assembly; the boltless shelving system allows convenient and instant reconfiguration at any time
- fast adaptation to changes in the product range or in stock volumes
- customised installation layout