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## **A Guide to Warehouse Racking and Storage Types - including Location Marking and Identification**



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## Location Marking Specification

Locations Types	Function	Access	Notes inc Pros and Cons
<b>APR Racking</b> <a href="#">Figure1</a>	Storage Type	Reach Truck "Bendy" C/Balance Pallet truck	Front access space for retrieval at random from any location. May be 1 to several meters in width, have various weight limitations but is only one full unit deep. Normally found in Aisles but can also be moveable to allow greater density in storage.
<b>Double Deep</b>	Storage Type	Reach Truck	One pallet is placed behind the another. When the front pallet is removed the operator pulls on a pulley rope and the rear pallet moves forward to the front of the bay pickface. Double Deep pallet racking is another simple way of placing one pallet behind another. Using a double deep lift truck, the operator places the back pallet into the rack first, then places another pallet in front of it. However individual access to the pallet is compromised.
<b>Drive – In</b> <a href="#">Figure 2</a>	Storage Type	Reach Truck	Drive-In Racks allow a lift truck to enter the rack from one side to pick up or pull out pallets. This is done because pallets can slide backwards on a continuous rail. Forklifts drive into the rack to access pallets two or more deep. You are limited in the depth of storage for a particular bay by the size of your facility. Drive-In racks are typically subject to more abuse than selective racks due to the way they are utilized, so rack integrity and strength are important factors. It is ideal rack for cooler or freezer applications. This is a last-in, first-out arrangement for your pallets. Drive-In & Drive-Through Racks offer the ability to store a large amount of similar loads in a smaller area. Selectivity is sacrificed, but storage density is outstanding. Drive In Racking can store up to 75% more pallets in the same space than selective racking -- depending on your application. It requires fewer aisles and is better cubic storage.
<b>Drive Through</b> <a href="#">Figure 3</a>	Storage Type	Reach Truck	Drive-Through Racks allow a lift truck to enter the rack from either side to pick up or pull out pallets. Lift trucks are driven between uprights to reach pallets. This is done because pallets can slide backwards on a continuous rail. It's open at both ends, allowing first-in, first-out storage. Drive-through Racks offer the ability to store a large amount of similar loads in a smaller area. Selectivity is sacrificed, but storage density is enhanced since many pallets are stored and are available through a single pallet position. Requires loads of a similar width.

Locations Types	Function	Access	Notes inc Pros and Cons
<b>Gravity Fed</b> <a href="#">Figure 4</a>	Storage Type	C/Balance Reach Truck	These are shelving units with rollers to allow stock to flow to the front of the rack when an item is picked. Slower moving product that is fairly compact can be warehoused using gravity fed flow racks. These racks allow highly condensed usage of warehouse space. For a pickface, items must be loaded by hand from the back of the rack or fed into the back by truck for full items.
<b>Narrow Aisle</b>	Storage Type	VNA Truck	Narrow Aisles are used for heavy duty and high density storage systems. The aisle width needs only to be slightly larger than the pallet load, therefore utilising maximum warehouse space. Narrow Aisle is highly versatile and is easily installed; it also offers direct accessibility to each individual pallet. Depending on the height available to the trucks, the evenness of the floor may be an issue.
<b>Very Narrow Aisle</b> <a href="#">Figure 5</a> <a href="#">Figure 6</a>	Storage Type	VNA Truck	Very Narrow Aisle (VNA) trucks generally operate in aisles of less than 6' and often use guidance systems (wire, rail, optical) to travel within the aisles. Standardised VNA vehicles consist of man-up order selectors used to manually handle less-than-pallet-load quantities and man-up turret trucks used to handle unit loads
<b>Floor Space – Lanes</b> <a href="#">Figure 7</a>	Storage Type	C/Balance	Warehouse space that is segregated into lanes, these are easy to set up and can be identified by a moveable 'bus stop' location. However FIFO cannot be maintained and stock at the back of the lane may be inaccessible for a period of time.
<b>Floor Space – Block</b> <a href="#">Figure 8</a>	Storage Type	C/Balance	Warehouse space that is segregated into blocks, these are easy to set up and can be identified by a moveable 'bus stop' location. However FIFO cannot be maintained and stock at the bottom of the stack may be inaccessible for a period of time.
<b>Bin</b>	Storage Type	Reach Truck Pallet Truck	A location where products unsuitable for palletising are stored in 'Bins'. These locations are ideal for small component items and are easily replenished, however batch / item level traceability is lost.
<b>Carousel</b>	Storage Type	N/A	Storing of broken-case items, the carousels preposition themselves for the first pick so the needed stock is directly in front of the employee.
<b>Returns Area</b>	Logical		An area set aside for return(s) to supplier / customer.
<b>Ambient</b>	Environment	C/Balance Reach Truck Pallet Truck	These are typically for tinned or boxed products such as baked beans, cereals, soft drinks and paper products. Room temperature.
<b>Frozen</b>	Environment	C/Balance Reach Truck Pallet Truck	This is where products which need to be stored at low Temperatures, such as frozen vegetables, cakes. Temperature approx -25c.
<b>QA</b>	Logical	C/Balance	An area where goods are held for a quality reason

Locations Types	Function	Access	Notes inc Pros and Cons
		Reach Truck Pallet Truck	i.e. Damaged, incubation, batch recall, pallet investigation, etc. This must be constantly maintained to ensure there is no build up of pallets.
<b>Loadings Bays</b>	Transient	C/Balance Pallet Truck	Where the goods are loaded onto vehicles.
<b>Marshalling</b>	Transient	C/Balance Pallet Truck	A location where goods are stored prior to despatch. This provides a point where orders / loads are consolidated prior to despatch.
<b>Pick / Drop (P&amp;D)</b> <a href="#">Figure 9</a>	Transient	VNA Truck Reach Truck C/Balance	A location type where stock is held, prior to putaway and also prior to being picked. Users will fill the P&D locations for a VNA truck to take to the required aisle for putaway.
<b>Trailers</b>	Logical	Pallet Truck	Goods are loaded onto trailers for despatch.
<b>Bulk</b> <a href="#">Figure 10</a>	Logical	C/Balance Reach Truck Pallet Truck	An area for mass storage of product within a location. The advantage of this type of location is that it is easy to set up, but restricts the use of FIFO as the product at the bottom / rear of the location is not accessible
<b>Pick Face</b>	Logical	Reach Truck Pallet Truck	A location where stock is physically picked from. This is where pickers are directed to, to pick product to fulfill orders.
<b>Shelving</b>	Storage Type	N/A	Flat level shelf units allow for simple storage for small items, used for placing totes on to allow picking.
<b>Chill</b>	Environment	C/Balance Reach Truck Pallet Truck	This is where products which need to be stored at low temperatures, such as yoghurts, ready meals, etc. Temperature approx -5c
<b>Goods In</b>	Transient	C/Balance Reach Truck Pallet Truck	The area where items are located when received into the warehouse.
<b>Produce</b>	Environment	C/Balance Reach Truck Pallet Truck	This is where products which need to be stored at a particular temperature, fresh produce, vegetables, fruit, etc. Temperature approx +5c

## Truck Types



Example 1 - Pallet Truck



**Example 2 - Counterbalance**



**Example 3 – VNA Truck**



**Example 4 – Reach Truck**

## Example Naming Structures

### Terminology

**Warehouse** – The warehouse code, eg 03, to identify it is a warehouse 3 location

**Aisle** – An aisle consists of all locations within a set of racking at its widest point, from ground to roof, end to end.

**Row** – A row consists of the vertical locations from ground to roof within an aisle

**Level** - The horizontal locations from end to end on one level within an aisle.

**Tier** – This is the individual horizontal sections of the racking (counting from ground to roof).

**Depth** – Depth is how deep a location is, similar to position, but is behind the first position.

**Position** – It is a specific set out position within a location not just behind the first position.

**See above for location types**

### **APR Racking**

Could Consist of:

Warehouse

Aisle

Row

Level

Check Digits

Example:      Aisle   Row   Level   Position  
                 AC     13     04     04

The scannable section of the barcode would consist of AC130404 and would be relevant to the examples below

### **Double Deep**

Could Consist of:

Warehouse

Aisle

Row

Level

Position

Check Digits

Example:      Aisle   Row   Tier   Depth  
                 AK     08     02     02

This pallet would be at the back of this location in position 2

### **Drive In**

Could Consist of:

Location

Position

Example: Location Depth  
BL08 05

### Drive Through

Example: Location Position  
DT57 03

### Gravity Fed

Example: Aisle Row Level Depth  
BB 01 01 03

### Narrow Aisle

Example: Aisle Row Tier  
CK 13 05

### Very Narrow Aisle

Example: Aisle Row Tier  
DS 26 02

### Floor Space – Lanes

Example: Warehouse Lane Depth  
03 23 07

### Floor Space – Block

Example: Warehouse Block No  
01 36

### Bin

Example: Warehouse Bin Number  
06 012645

### Carousel

Example: Warehouse Bin Number  
06 012645

### Returns

Example: Warehouse Row Level  
WAR11 04 03

### QA

Example: Location  
QA01

### Loading Bays

Example: Location  
LBAY01

### Marshalling

Example: Location

MAR03A

**Pick/Drop (P&D)**

Example:     Aisle   Position  
              AD       06

**Trailers**

Example:     Trailer Number  
              TRA03B6

**Bulk**

Example:     Location  
              BUL056MK

**Pickface**

Could Consist of:

Warehouse

Aisle

Row

Level

Check Digits

Example:     Aisle   Row    Level   Depth  
              AY     11     1       1

**Shelving**

Could Consist of:

Warehouse

Aisle

Row

Level

Check Digits

Example:     Aisle   Row    Level  
              SH     02     3

**Goods In**

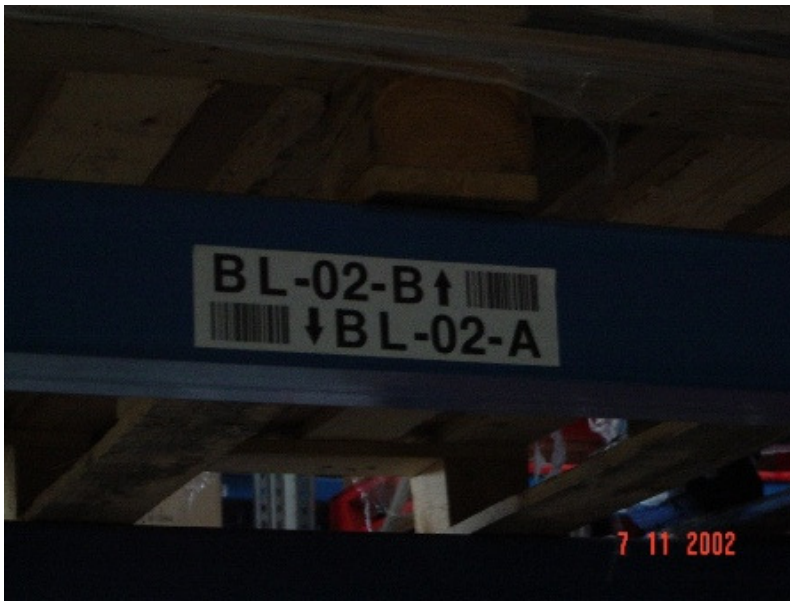
Example:     Location    Check Digit  
              GOODSIN05  27

There can be many variations of the above, however the user should be able to scan the barcode to confirm to eradicate 'typing' in the location before the user gets there and ultimately mis-places the pallet. The above is merely a guide to the set up.

## **Location Label Set up**

When investigating the set up of the location labels you will need to decide the correct information to be contained within them, this will vary considerably between warehouses depending on the specific operations carried out. Each section could be made up of alpha / numeric characters. An example of the information that could be contained within the labels.

### **Example label**



### **Using Location Check Digits:**

Check digits are used to ensure that items are putaway to their correct location. They can be embedded within the barcode or a number(s) printed on the location label that the operator must type in to complete a task. Check digits must not run in sequential order they must be entirely random to ensure the operator is focused on the location position.

## Location Marking: Label Types



**Labels on Placards** - for long distance scanning above the location.



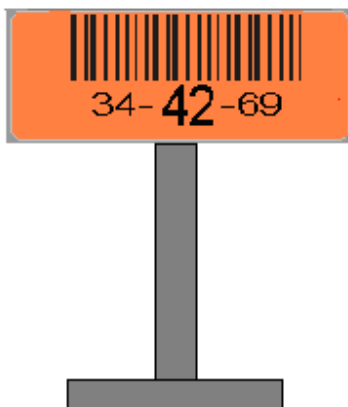
**Location Labels** - for aisles, racks and bins.



**Floor Labels** - Some locations are best marked from below. Locations such as Marshalling Lanes, Goods in, etc.



**Pallet Labels** - When your locations are on the move.



**Bus Stop Location** – Easily moveable that can be applied an to ad hoc location

## Racking Examples



Figure 1 – APR Racking

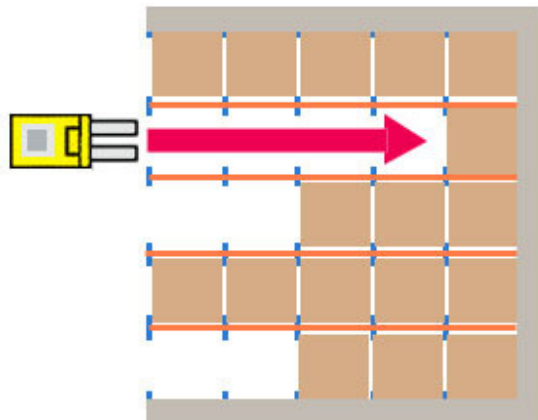


Figure 2 – Drive in racking

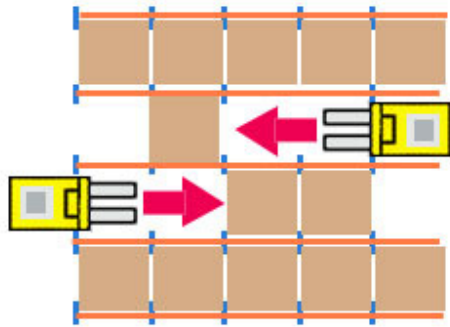


Figure 3 – Drive Through racking



Figure 4 – Gravity Fed Racking



**Figure 5 - VNA**



**Figure 6 – VNA Racking (empty)**



Figure 7 - Lanes



**Figure 8 – Block stack**



**Figure 9 – P & D Locations**



Figure 10 – Bulk Location

## Health & Safety considerations

### 2. What Environmental Elements Need To Be Considered?

(Ref.: Health & Safety in Retail & Wholesale Warehouses 1992)

Can you honestly answer yes to the following questions?

<b><i>Layout of Storage Areas</i></b>	<b>Yes</b>	<b>No</b>
All hazards have been identified and risks assessed		
People and vehicles are segregated as far as possible.		
One way systems are in operation or have been considered.		
Emergency exits are clearly marked, easily opened and readily accessible.		
Lift trucks and vehicles operate on flat and unobstructed surfaces.		
All storage areas and gangways are clearly marked.		
External doorways used by handling equipment are protected from adverse weather conditions.		
Access to all automated areas is strictly controlled.		
All workstations are adequately protected.		
Rack uprights and rack ends are all adequately protected.		
Protective equipment is of the correct duty and is correctly fitted and maintained.		
All loads and stacks are stable.		
<b><i>Floors</i></b>		
All floors are capable of bearing the weight to which they may be subjected for the life of the floor.		
All floors are designed to withstand damage.		
Floors are not slippery.		
All mezzanine floors are marked with safe load-bearing capacities.		
Where personnel are allowed access to mezzanine floors all openings and edges are guarded.		
All floors are flat, level and free from holes.		
Removable guard sections on mezzanine floors for use by lift trucks are prohibited. <small>(BS 5395 Part 3 states that removable guard sections are not permitted and that self-closing gates must be fitted)</small>		

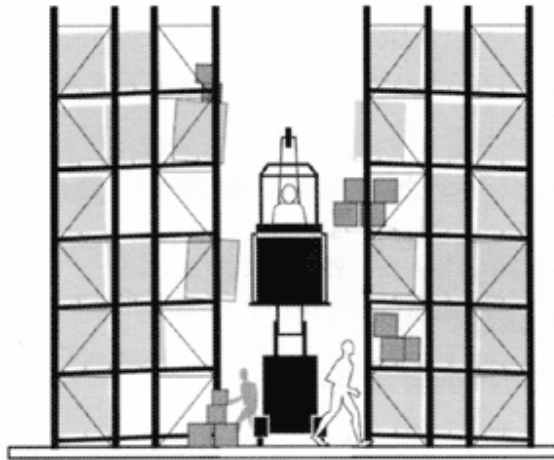


Fig 1. An Unsafe Warehouse

<b>Heating</b>	<b>Yes</b>	<b>No</b>
All storage areas are maintained at reasonable working temperatures (this obviously does not apply to cold stores).		
Where this is not possible there is an area available near-by for employees to warm-up.		
<b>Lighting</b>		
Lighting is sufficient to maintain safe and workable conditions.		
<b>General Housekeeping</b>		
Aisles are always clear.		
Stock does not project from a rack or shelf and does not accumulate in aisles.		
Spillages are immediately cleaned-up.		
If the floor is wet or being washed signs are always deployed.		
Equipment is regularly inspected and maintained.		
The pallets in use are the correct ones for the job.		
All pallets are in good condition.		

The points raised above are by no means a complete list of all possible risks. Reputable storage manufacturers and specialist companies can carry out rack safety surveys on your behalf.

Whilst reputable suppliers of storage equipment will visit the premises to carry out their own appraisal you may find the following checklist useful. (Tick the sections once completed).

<b>Factor</b>	<b>Racking</b>	<b>Shelving</b>
Pallet size		N/A
Pallet type and construction		N/A
Pallet load-carrying capacity		N/A
Unit load weight		
Unit load dimensions		
Unit load security		
Unit load stability		
Type of handling equipment (manual or mechanical)		
Maximum lift-height of handling equipment		
Dimensions of handling equipment		
Storage area dimensions		
Storage floor type (i.e. suspended or ground bearing) and construction		
Floor loading capacity		
Obstructions in the storage area (i.e. emergency exits, stairs etc)		
Floor fixing facilities in the storage area		
Type of goods to be stored		
Frequency of movement and access		
Fire protection requirements		
Specialist equipment or accessories required		
Protective equipment required i.e. anti-collapse system		

Although not an exhaustive list, this will enable the manufacturer and yourself to specify storage systems that meet your requirements **safely**.

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