Pallet Racking Styles, Types, and Applications

cisco-eagle.com/palletracks • 888-877-3861
A guide to rack usage

This is a common sense guide to specification, styles, accessories and usability. You will find quick, useful information on racks and how you can use them more efficiently. If you have questions about specifying your racks correctly, how to use them more effectively, how to make them safer, contact us for fast assistance.

- Pallet Rack Buyers’ Guide
- Pallet Rack Blog: Dozens of Articles
- Selective Rack Estimator

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Pallet Rack Selectivity vs. Storage Density

Selective Rack: 100% access to all pallets—but with lower storage density
Selective rack is easily the most versatile choice—it provides 100% selectivity to every pallet position. Lets you easily change the storage mix. However, selective rack requires an aisle for every row, and has lower storage density than pushback or drive-in racks. It’s the most common pallet storage racking type in the world. Ideal for faster moving product in most warehouse applications.

Drive-In racks: last-n-first-out picking with excellent storage density, lower selectivity
Drive-in racks are “last-in, first-out” systems with reduced selectivity, and excellent product density. Ideal for items that have longer life in storage, and don’t require immediate access. Often used for cold storage applications where every inch of expensive space is critical. Drive-in & drive through systems are ideal for items with a longer life in storage that don’t require immediate access.

Pushback: last-n-first-out with good storage density, medium selectivity, more versatility
When forklifts unload pushback racks, the next pallet rolls to the front of the bay; when loading, pallets are pushed back in a last-in, first-out storage scheme. You can place a different SKU on every level. Pushback systems require angled pitch, which consumes vertical space, and are denser than selective, but not as dense as drive-in systems.

Pallet flow: first-in, first-out; great storage density with less selectivity and reduced handling costs
Pallet flow systems offer the greatest storage density. Depths are limited only by facility size; store a single SKU per lane. Once loaded, product rotation is automatic, as pallets flow to picking aisles. Flow systems offer automatic “first-in, first-out” product rotation. Because only two aisles are necessary, aisle space can be reduced by 75%. Fewer fork lifts, operating fewer hours, and consuming less fuel can accomplish the same handling function.
Impact-Resistant SK2000 Selective Racks

cisco-eagle.com/palletracks

Longer-lasting & impact-resistant
Safer and stronger than conventional pallet rack, SK2000 fully enclosed tubular racks have 44 times more torsional strength than open back racks. Seamless, fully welded structural tubing increases durability, cleanliness, and structural integrity.

Beams: 3-rivet connection & channel rib strength
• Beams are seamlessly welded, high-strength structural steel tubing with no ledges or cracks to catch pallets or trap moisture/debris.
• 1/16" stiffening ribs built into the beam face for strength
• Exclusive safety clip and stiffening rib design resists disengagement from the upright. Engages with an audible snap.
• See Steel King beams

Fully enclosed uprights
The industry’s only 100% tubular rack, with greater resistance to torsional forklift impact than open-back roll formed columns. Utilizes a tapered keyhole connection slot, interchangeable with several other rack systems, and allows 2” vertical beam adjustments.
See Steel King Upright Frames

Thousands of preconfigured pallet racks

cisco-eagle.com/fullracks
We can help you build standard racks, racks with wire decking, safety netting, security cages, and integrated carton flow. Let’s solve your storage problems.
SK3000 Structural Selective Racks

cisco-eagle.com/structural

- Built with hot rolled structural channel steel, for difficult industrial environments.
- Popular in harsh-duty applications like freezers, coolers, and busy distribution facilities.
- C-channel construction makes it easier to clean and wash down than roll form racks.
- Beam connectors constructed of heavy 5-gauge steel plates, featuring a wrap-around design.
- Upright frames are punched on 4” vertical centers. Beam connector clips specially punched allow for vertical adjustablility in 2” increments.

Compare: roll form vs. structural for selective rack applications

<table>
<thead>
<tr>
<th>Factor</th>
<th>Structural Racks</th>
<th>Roll-Form Racks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall strength</td>
<td>Very strong with welded connections, heavier steel and higher capacities.</td>
<td>Excellent for standard warehousing applications.</td>
</tr>
<tr>
<td>Impact resistance</td>
<td>Bulkier construction offers improved resistance, but this depends on foot plate weld strengths.</td>
<td>Fully enclosed tubular uprights are more impact resistance than open back alternatives.</td>
</tr>
<tr>
<td>Washdown capabilities</td>
<td>Because structural has open, c-channel construction, it’s easier to wash down for clean, food and similar operations.</td>
<td>Can be washed, but not as easily as c-channel structural racks.</td>
</tr>
<tr>
<td>Capacity</td>
<td>Higher capacities than roll-form. Beam ties are usually added to increase capacity. Bolted connections add strength to structural systems.</td>
<td>Capacities typically lower than structural racks.</td>
</tr>
<tr>
<td>Cost</td>
<td>Typically more expensive.</td>
<td>Typically less expensive.</td>
</tr>
<tr>
<td>Weight</td>
<td>Heavier than roll-form.</td>
<td>Lighter than structural.</td>
</tr>
<tr>
<td>Shipping costs</td>
<td>More costly to ship due to weight.</td>
<td>Less costly to ship due to lighter weight.</td>
</tr>
<tr>
<td>Outdoor use</td>
<td>Used more often outdoors due to easier galvanized finish.</td>
<td>Can be used outdoors, but is less typical.</td>
</tr>
<tr>
<td>Installation</td>
<td>Due to bolt connections, structural is costlier and slower to install.</td>
<td>Faster installation due to teardrop connections.</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Offers fewer available accessories. More difficult to adjust beam levels. Structural is used for more types of racks (pushback, drive-in, etc).</td>
<td>More flexible due to a range of accessories. Easier beam adjustment.</td>
</tr>
</tbody>
</table>
PALLETT RACK ACCESSORIES

A More Productive, Flexible Pallet Rack System
cisco-eagle.com/rackoptions

Pallet Supports: For pallets not deep enough to fit on standard rack frame depths. Use two per pallet position.

Frame Spacers: Keeps space between rack rows and pallet overhang uniform. Frames up to 120” tall, use 2 per frame; 144” to 216” tall, use 3 spacers

Pallet rack wire decking
cisco-eagle.com/wiredecks
Wire decking provides visibility, easier product handling, pallet stability, and ventilation. Tough wire construction with underlying metal supports is strong and stable. Meets applicable fire safety codes.

Protect rack from falls, pilferage
cisco-eagle.com/rackback

Rack safety netting protects people, product
cisco-eagle.com/racknet
Use wherever people work, drive, pick, or walk. Reduces the chances of from falling inventory from damaging itself, other product or anyone standing beneath. Rack nets are configured by total pallet weight, fall trajectories, impact velocities & weight distribution—they’re meant to withstand a specific impact.

Column Protectors
All uprights should be guarded against forklift collision damage. Steel guards, poly guards, and other types are available. The type needed depend on your application, forklift type and other factors.

Rack safety straps help reduce “push through” damage
cisco-eagle.com/rackstrap
Help reduce pallets & loads from pushing into flue space or falling into work areas. Add as many straps as necessary to each bay for securing your goods. Helps enforce flue space for fire prevention. Installs with simple teardrop connectors and no tools.
How to Configure Selective Racks

Determine pallet & load factors

1. Determine the load depth, load width, load height and weight of the largest load you'll be storing.

2. To determine width and depth, measure the load. If the load is smaller than the pallet in any direction, use the pallet's measurement. If the load is larger, use that measurement.

3. To determine height, add the height of the load and the height of the pallet together for the total.

4. Load weight should include the pallet and reflect the heaviest pallet stored in the rack.

Determine rack depth

5. Determine the front-to-back depth of your uprights: Subtract 6" from your pallet depth. Example: Your pallet is 40"W x 48"L. Subtract 6" from 48". The result: you will need uprights at least 42" deep to accommodate this load.

Determine beam width & capacity

6. To determine the beam width (assumes 2 pallets per beam): Multiply the load width x2 and add 12". Example: Load width is 42". 2 x 42" = 84" + 12" = 96" beam length. If required, round up to the next highest beam length.

7. See standard beam sizes for some of the available beam widths.

Determine upright height

8. Check beam capacity to ensure the beam can carry your load. Beam capacities are listed per pair for evenly-distributed loads.

9. Multiply the number of pallets high stored minus one pallet x 10". Example: if you're storing 4 pallets high, then multiply 3 x 10" = 30"

10. Multiply the number of pallets stored minus one pallet by the overall load height. Include pallet height in the overall load height. Example: Overall load height of 50", 4 pallets high, minus one pallet. 3 x 50" = 150".

11. Add the two numbers (30" + 150"=180" in this case). This number is your minimum upright height. Be certain your ceiling is adequate to store the pallets you need. Clear ceiling height

Notes for upright height design

12. The 10" between pallets allows for beam depth and space to lift and remove the pallet.

13. Make sure you have enough space left between load height of uppermost pallet and sprinkler heads, light fixtures or other overhead obstructions. This is called clear ceiling height, which is measured as the distance from the floor to the bottom of the lowest obstruction minus 10".

cisco-eagle.com/racktool
Estimates for selective rack, including drawings and component lists
About you
Name: _________________________________  
Company: ______________________________  
Phone: __________________________  
Email: __________________________________ 

Pallet & load factors
Length - Pallet: ______  Load: ______ (inches)  
Width - Pallet: ______  Load: ______ (inches)  
Height - Pallet: ______  Load: ______ (inches)  
Total (pallet + load) height: ______  

Weight - pallet + load totals: 
Minimum: _____  Maximum: _____  Average: ______  

Loading direction: □ G or □ H  

Pallet Type:  
□ GMA  □ Block  □ Single  □ 9-Point  □ Slave □ Other  
If other, send drawing or sketch dimensions.  

Facility factors
Building status: circle - New or Existing  

Building dimensions
Width: ______  Length: ______ (feet)  
Clear ceiling height: ______ (feet)  *below lowest obstruction  
Storage temperature: ______  
Storage conditions: □ Dry  □ Cooler  □ Freezer  

Building columns
Outside dimensions: ______ (inches)  
Column centers: ______ (feet)  
Column bumper size: ______ (inches)  
Describe any other obstructions or special conditions, including sloped floors, special machinery, etc:  
______________________________________________  

Rack specifications
Rack type - □ Tubular or □ Structural  
Lowest load - □ Floor or □ Beam  
#Bays: _____  #Pallets/bay: ____  #Pallets high: ______  
Rows: □ Single  □ Double  □ Both  

Rack options
□ Pallet supports  □ Pallet stop beams  
□ Decking: circle wire, solid, other  □ Row spacers  
□ Wall ties  □ Upright protectors  
□ Guard rails at row ends  □ Safety nets
Fill Your Warehouse with Product—Not Aisles

Provides up to 90% more product storage than selective, and 400% more selectivity than drive-in

cisco-eagle.com/pushback

- Store pallets 2 to 5 deep while retaining easy access to a variety of different SKUs. You can store one SKU in each pallet position, which is more selective than drive-in or flow systems
- When a forklift removes the front pallet, the pallets on carts behind it roll gently to the front of the rack
- If you have multiple stored products with more than 5 pallets per SKU, then pushback racks are an excellent storage method that can save space without compromising selectivity
- We implement pushback rack to meet your requirements: weak pallet support, non-standard sizes, special pallets
- Interlocking, color coded carts help prevent dangerous jamming and costly product damage. Also allows easier product identification
- 4-sided, heavy-duty, robotic welded structural cart for smooth rolling and longterm durability

Pay attention to the carts

Carts are the most critical aspect of pushback systems.

Carts are critical because jams are both dangerous and expensive. The best carts are built for longer term performance and require less maintenance.

Pallets are placed by forklift on nested carts riding on inclined rails.

Each pallet is then pushed back by subsequent pallet loading, exposing the next cart. When a pallet is removed at the front position, pallets on carts behind it to roll gently to the front of the rack.
PUSHBACK RACK WORKSHEET

Fax: 972-406-9577 • Email: 24hours@cisco-eagle.com • Call: 888-877-3861

Ignore questions you can’t answer - we’ll walk you through the process and make it easy!

About you
Name: _________________________________
Company: ______________________________
Phone: __________________________
Email: __________________________________

Facility factors
Building status: circle - New or Existing

Building dimensions
Width: ________ (feet) • Length: ________ (feet)
Clear ceiling height: ________ (feet) *below lowest obstruction
Storage temperature: __________
Storage conditions: □ Dry  □ Cooler  □ Freezer

Building columns
Outside dimensions: ________ (inches)
Column centers: ________ (feet)
Column bumper size: ________ (inches)

Describe any other obstructions or special conditions, including sloped floors, special machinery, etc:
________________________________________________________________________
________________________________________________________________________

Rack factors
All dimensions in inches unless noted.
#Bays wide: _____  #Pallets per bay: _______
#Pallets deep: _____  #Pallets high: _______
Bay width: _____  Upright - depth: _____  height: _____
Clear width for outrigger trucks: _______
□ Double front posts  height: _____
Lowest load is on: □ Floor  □ Beam
Is floor load double stacked? □ Yes  □ No

Pallet & load factors

Length - Pallet: ______  Load: ______ (inches)
Width -  Pallet: ______  Load: ______ (inches)
Height - Pallet: ______  Load: ______ (inches)

Total (pallet + load) height: ______

Weight - pallet + load totals:
Minimum: _____  Maximum: _____  Average: _____

Loading direction: □ G or □ H
#Bottom Deck Boards: _______
Deck Board - Width: _____  Thickness: _______

Pallet Type:
□ GMA  □ Block  □ Single  □ 9-Point  □ Slave □ Other
If other, send drawing or sketch dimensions.
Store 75% More Pallets than Selective Racks

When to specify drive-in systems

Drive-In Rack is used to store many pallets of a similar SKU or product. Since it's last-in-first-out, it's suited for items where inventory rotation is less important. It’s ideal for bulk, cold storage applications and other high-density needs. It’s also good for seasonal items that move quickly in and out of your inventory. Use it when you have a large amount of similar items that can be stored in a single pallet position. Because forklifts drive directly into the rack, they are subject to more abuse than any other racks.

Drive-in racks

Drive-in rack systems allow a lift truck to enter the rack from one side to deliver or retrieve pallets in a last-in, first-out operation, as pallets are loaded back to front for maximum storage density.

Drive-through racks

Drive-through racks allow a lift truck to enter the rack from either side. Loads are supported by rails attached to upright frames, and lift trucks are driven between uprights to access pallets. This allows either LIFO or FIFO storage.
**Drive-in/Drive-Through Rack Worksheet**

Ignore questions you can’t answer - we’ll walk you through the process and make it easy!

### About you

Name: _________________________________
Company: ______________________________
Phone: __________________________
Email: __________________________________

### Pallet & load factors

<table>
<thead>
<tr>
<th>Length</th>
<th>Pallet: ______</th>
<th>Load: ______ (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
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</tr>
<tr>
<td>Height</td>
<td>Pallet: ______</td>
<td>Load: ______ (inches)</td>
</tr>
<tr>
<td>Total (pallet + load) height: ______</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>pallet + load totals:</td>
<td></td>
</tr>
<tr>
<td>Minimum: _____</td>
<td>Maximum: _____</td>
<td>Average: ______</td>
</tr>
</tbody>
</table>

**Loading direction:** □ G or □ H

#Bottom Deck Boards: ______

Deck Board - Width: ______ Thickness: ______

**Pallet Type:**
- □ GMA
- □ Block
- □ Single
- □ 9-Point
- □ Slave
- □ Other

If other, send drawing or sketch dimensions.

### Forklift Factors

| Mast width: ______ |
| Guard Height: _____ |
| Overall width: ______ |
| Max. width w/load: ______ |
| Max. lift height: ______ (ft.) |

### Facility factors

#### Dimensions

- Width: ______ (feet) • Length: ______ (feet)
- Clear ceiling height: ______ (feet) *below lowest obstruction
- Temp.:______ Conditions: □ Dry □ Cooler □ Freezer □ New facility □ Existing facility

#### Building columns

Outside dimensions: _______ (inches)
Column centers: _______ (feet)
Column bumper size: _______ (inches)

Describe any obstructions or special conditions: _______

### Rack factors

Dimensions in inches unless noted.

- □ Drive in, single entry □ Drive-in, double entry
- □ Drive-through □ Sanitary design

- #Bays wide: _____ #Pallets per bay: ______
- #Pallets deep: ______ #Pallets high: ______
- Vertical load spacing: _______

- Bay width: _____ Upright - depth: ______ height: ______
- Clear width for outrigger trucks: ______
- □ Double front posts height: ______

- Lowest load is on: □ Floor □ Beam
- Is floor load double stacked? □ Yes □ No
High Density Dynamic Racking Systems

cisco-eagle.com/palletflow

The best solution for high-density applications where product rotation is critical to order fulfillment

Flow racks consist of two elements: a static rack structure and dynamic flow rails. The flow rails are a track/roller system set at a decline along the length of the rack. Flow rails allow loads to move by gravity from the loading end to the unloading end. Each flow lane includes self-energized speed controllers (brakes) to gently control the speed of movement within the flow lanes.

Ideal for raw materials receiving and storage, work-in-process, buffer storage, finished goods, order picking, & cross docking.

As a load is removed, the loads behind it move forward to the unloading position. Rack depth is limited only by the facility size and forklift capability. Flow Storage solutions are used in situations where storage density and inventory rotation are priorities.

Reduced handling, labor & equipment costs

Pallet flow reduces the number of forklifts needed in an operation. Fewer lifts, operating fewer hours, can accomplish more. With only two aisles (loading or unloading), traffic is more orderly, employees are more efficient and overall productivity is better.

Flow rack specification information

- Flow racks allow a single SKU per lane, since only one pallet is accessible. If selectivity is more important, you may need a different type of racking system
- Load type is critical. You must know the size, shape and weight of all loads. These directly affect pitch and roller speed
- Flow rack is frequently used in pick module applications, in conjunction with conveyors, carton flow and mezzanines
- Full roller generally don’t need lubrication. However, in extreme conditions (salt, moisture, corrosives, dust), lubrication may be needed. Note these conditions in your specification request
Pallet Flow Worksheet

About you
Name: _________________________________
Company: ______________________________
Phone: __________________________
Email: __________________________________

Pallet & load factors
Length - Pallet: _____ Load: _____ (inches)
Width - Pallet: _____ Load: _____ (inches)
Height - Pallet: _____ Load: _____ (inches)
Total (pallet + load) height: ______

Weight - pallet + load totals:
Minimum: _____ Maximum: _____ Average: _____

Loading direction: G or H

#Bottom Deck Boards: _______
Deck Board - Width: _____ Thickness: _____

Pallet Type:
☐ GMA ☐ Block ☐ Single ☐ 9-Point ☐ Slave ☐ Other
If other, send drawing or sketch dimensions.

Facility factors
Building status: circle - New or Existing

Building dimensions
Width: ______ (feet) • Length: ______ (feet)
Clear ceiling height: ______ (feet) *below lowest obstruction
Storage temperature: ______
Storage conditions: ☐ Dry ☐ Cooler ☐ Freezer

Building columns
Outside dimensions: _________ (inches)
Column centers: _________ (feet)
Column bumper size: _________ (inches)
Describe any other obstructions or special conditions, including sloped floors, special machinery, etc:

____________________________________________________________________
____________________________________________________________________

Rack factors
All dimensions in inches unless noted.
#Bays wide: _____ #Pallets per bay: _______
#Pallets deep per bay: ______ #Pallets high: _______
Bay width: _____ Upright - depth: _____ height: _____
Clear width for outrigger trucks: ______
☐ Double front posts height: ______
Lowest load is on: ☐ Floor ☐ Beam
Is floor load double stacked? ☐ Yes ☐ No
Carton & Case Gravity Flow Solutions
cisco-eagle.com/cartonflow

Dedicated flow storage
Pallet racks are frequently converted (either in part or wholly) into gravity flow storage. It’s frequently done with lower levels where order pickers can reach into the rack and access pick faces. Upper levels are left for pallet and bulk storage operations. Options can include:

• Gravity skatewheel shelves
• Gravity roller shelves
• Traditional plastic wheel shelves
• Accessories such as knuckle-overs, extended lanes, and more
SPECIALIZED RACK APPLICATIONS

Heavy-Duty Die Racks
Store dies, motors, jigs, fixtures and more

Die racks feature a solid metal shelf design allowing die placement anywhere along the shelf, and can accommodate a variety of die sizes. Shelf design allows dies to slide on or off a shelf for easy access and storage.

Over-Dock-Door Racks
Utilize dead space above your dock doors

Utilizes space above dock doors to store empty pallets & other light loads neatly and safely without occupying valuable floor space.

cisco-eagle.com/emptypallet

Pallet Racks for Any Application

- Narrow aisle & very narrow aisle racks: the space between aisles is minimized in these systems, reducing aisles up to 40%. Side loading trucks are used to load/unload the rack system
- Mobile aisle racks: in these systems, rack sections move on floor mounted rails to open up access aisles. This is a very high-density storage system.
- Specialty storage racks: can be built to store odd sized and specialty loads such as tires, furniture, bar stock odd components, long parts, oddly-balanced loads, vehicles, super-heavy-duty, and more.
Need Rack Help? Contact us Today.

Click to submit inquiry

Name: ___________________________________________   Company: ________________________________
Phone: ___________________________________________   Email: ________________________________

Comments:

Fax: 972-406-9577 • Email: 24hours@cisco-eagle.com
Call: 888-877-3861
Visit: cisco-eagle.com/palletracks