

# RACK SYSTEM PLANNING GUIDE 2019



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# RACK SYSTEM PLANNING GUIDE 2019

The beginning of any storage rack project is an in-depth planning phase. By working closely with your rack supplier, and for more complex systems a material handling specialist, you will achieve your goals for the rack system and facility operation.

The following information is a guide and general checklist of important considerations that will play a role in the development of your rack system. This guide is meant as an overview only, as each facility and jurisdiction have their own unique requirements, and each facility must comply with local building codes.

For additional specifications, RMI (Rack Manufacturers Institute, Inc.) has a wealth of resources available on their website [www.mhi.org/rmi](http://www.mhi.org/rmi).



# Your successful rack project starts here

Selecting warehouse storage rack systems involves careful planning and appropriate system choices to ensure you get the most from your capital expenditures, reduce overhead, and respond quickly to distribution needs.

Whether setting up or replacing storage rack systems, warehouse operators are often confronted with an overwhelming number of choices. That can be daunting, since their selections profoundly affect the “throughput” and the profitability of the operation. On the other hand, they may be offered limited choices because a rack manufacturer or dealer specializes only in certain types of racks, a scenario that is often even more problematic.

Because warehouse storage and material handling have a pivotal impact on a business, manufacturers and distributors often turn to storage rack specialists to ensure that their warehouse systems fit their needs.

Matching business needs with the appropriate rack system is critical and entails asking the right questions, as well as planning for the flexibility you need as your business grows and evolves. That flexibility requires doing business with a supplier who can offer a variety of rack system designs, structural materials, accessories, and in some cases, customized equipment.



Because no two warehouses are identical in every respect, it is important to consider and resolve structural requirements and potential building obstructions.

It could be that a variety of pallet rack systems of varying densities provide the best solution. Often a customized or modified rack system is needed.

Working with suppliers who comply with essential safety and structural standards set forth by the Rack Manufacturers Institute (RMI) is also strongly advised.

It may be worth retaining a Material Handling Specialists to ensure accurate specification requirements and storage rack layout, along with a team of specialists that can help you navigate the increasingly complex process of storage design.



Assemble your team .....	3
Design considerations .....	4
Location / seismic issues.....	6
Structural vs roll-formed steel .....	8
Basic rack design .....	10
Storage utilization factor .....	12
Rack types .....	14
Special applications .....	15
Rack terminology.....	16
FAQs.....	17
Protecting your investment.....	20
Rack accessories .....	22
Comparison checklist.....	23

# Assemble Your Team

Consulting with experts ahead of your project can help you navigate the process and avoid potential pitfalls and setbacks along the way, saving you headaches and money in the long run.

## Project Officials

The Project Official could consist of the building owner, leasing company or Project Manager. They have oversight for the entire project and maintain responsibility to ensure the building and/or rack structure meets current safety, structural, and government-mandated standards, and determine who has responsibility for permitting.

## Engineer-of-Record

This is the design professional responsible for the structural integrity of the project.

## Fire Safety Consultant

Based on the product being stored, the type of pallets being used, and the extent of the racking, this person would advise as to the need and location of in-rack sprinklers and fire baffles along with advice concerning the existing building fire suppression and warning systems.

## Material Handling Consultants

It may be necessary to secure multiple consultants throughout your project to conduct testing prior to the rack installation (capacity of existing floor slab), during the installation process (special inspection), and post installation (follow-up report). These consultants could include:

- Material Handling consultants to determine material flow and storage needs (this usually applies to larger, automated warehouses).
- Professional engineer to review plans
- Certified independent consultant with relevant rack experience
- Building inspector

## Rack Manufacturer or Supplier

Select a Rack Manufacturer who is well known and respected in the industry and:

- Can provide expertise in rack layout and design.
- Can provide rack selection (usually applies to the smaller, non-automated facilities)
- Can supply mill certificates (upon demand) verifying the steel used.
- Is typically an licensed approved fabricator.
- Can provide R-Mark certification
- Can be an industry resource.

## Licensed Contractors / Installer

Most reputable rack manufacturers are in partnerships with several licensed professional rack installers. This partnership ensures that the racks systems are installer properly, punch-list items are promptly handle, and the area tidied before the rack installation is turned over to the client.

# The Basics

In order to determine your ideal storage solution, there are important safety and design considerations.

## **Product and Turnover**

The type of rack as well as the shelf elevations and storage bay width will, to a great degree, be determined by your product and stock rotation requirements. How many different product SKUs will be stored? What type, size, and number of pallets will be used? How often will pallets be accessed? Do you require FIFO (first in, first out) or LIFO (last in, first out)? Will processing / picking operations require the integration of automation into your system?

## **Load Capacity**

Load capacity takes into account maximum pallet load, average pallet load, as well as maximum carton load, average carton load and storage utilization factor. (See page 12)

## **Rack Frame and Beam Material**

The type and configuration of your upright rack frames are determined by both the capacity they need to support and their exposure to potential impact during loading and unloading. Unlike some rack suppliers, Steel King has manufacturing facilities that specialize in both hot-rolled (structural) and roll-formed steel, so it is your racking needs that determine the type of steel that is used. (See page 8)

## **Existing Facility Features**

In addition to the floor space of your facility, take into account all features of your existing structure – ceiling height, sprinkler systems, columns, floor drains. Be sure to account for sloping floors within your facility, as you will be required to ensure that your rack uprights are plumb. Check your slab-on-grade capacity. Can your existing concrete floors accommodate the weight of the system you plan to install? Do they require any special rack anchoring considerations?

You will also need to map out your means-of-egress for both personnel and forklift access to ensure that maximum distances to egress are within code, especially for raised work areas.

## **Production Zones and Work Flow Areas**

Consider the space needed for your production work to safely occur. This is especially important in manufacturing, where you have materials movement around equipment. For a stock and ship operation, adequate space is required for packing, shipping, and receiving areas.

## **Material Handling Equipment**

The material handling equipment to be employed for the movement of the goods will impact rack design factors. Some of the items to be considered are the type, size and number of pallets to be used, as well as the type of fork truck vehicle being used, required aisle width, and the maximum lift height of the truck.

**Temperature**

Build your pallet racking system with temperature considerations in mind and consider the environment where pallet racking will be used. There may be an advantage of using a particular product based on whether the environment will be dry, in a cooler, or freezer environment.

**Code Compliance & Permitting**

Rack systems may be installed only after all applicable building codes have been satisfied and a building permit has been issued for a particular system design, geographic location, and a particular user's application. In most jurisdictions, the applicable building code is the legislatively-adopted edition of the International Building Code (IBC) as developed, updated, and promulgated by the International Codes Council (ICC). Some localities enforce a variant of the IBC. The owner must work with the rack equipment provider to determine which code applies and to assure that their system will be designed, manufactured, and installed to satisfy all applicable requirements.

In addition to local building codes, some industries have specific code compliance requirements, including rack capacity plaques.

**Plan for Long-Term Success**

An integral part of every rack planning project is to recognize the importance of rack inspection and maintenance.

Plan today's system with future expansion in mind.

**Environmental Forces**

Seismic design categories, along with wind and snow loads must be taken into consideration for rack-supported structures.

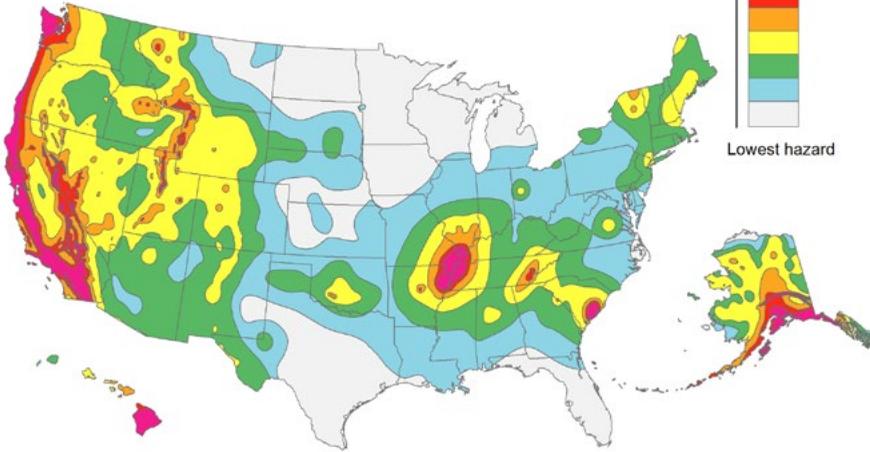
For free standing rack structures, adequate seismic separation must be engineered into your rack system.

According to OSHA, all goods, materials and equipment at work sites must be stacked, stored, and secured in such a way that they do not flow, move, roll, or collapse.

Storage racks are considered "building-like, non-building structures." Therefore, according to the International Building Code, and as reflected in the Rack Manufacturer's Institute (RMI) Standard, racks need to be designed to the local seismic requirements, just like a building.



While all U.S. states have some potential for earthquakes, 42 of the 50 states "have a reasonable chance of experiencing damaging ground shaking from an earthquake in 50 years," which is generally considered the lifetime of a building.



## Why are seismic specifications so critical to pallet rack design?

Seismic zone designations are changing: Seismic zone designations (0 to 4) are no longer in use. Instead, the United States Geological Survey (USGS) uses ground acceleration values, referred to as Seismic Design Categories (SDC) from A to F.

With seismic requirements increasing in many parts of the country and with a better understanding of structural performance during an earthquake event, these standards will continue to evolve, placing more demand on the rack design.

Because the RMI Standard is the recognized U.S. specification for the design, testing, and utilization of industrial steel storage racks, responsible rack users will want to demonstrate that their racks meet this recognized standard for seismic design.

RMI created the R-Mark Certification Program as a way for storage rack users and customers to clearly identify those rack manufacturers whose components and design are in accordance with the RMI Specifications. Steel King is one of 22 rack manufacturers that holds an active R-Mark License.

One of the continuing trends within warehousing includes automation – in the form of both pick modules and automated storage and retrieval systems. Both of these systems raise the stakes of a potential rack collapse – in terms of expensive equipment and the lives of people working within the structure. Rack systems should be designed, manufactured, installed and used in accordance with seismic requirements for maximum safety.

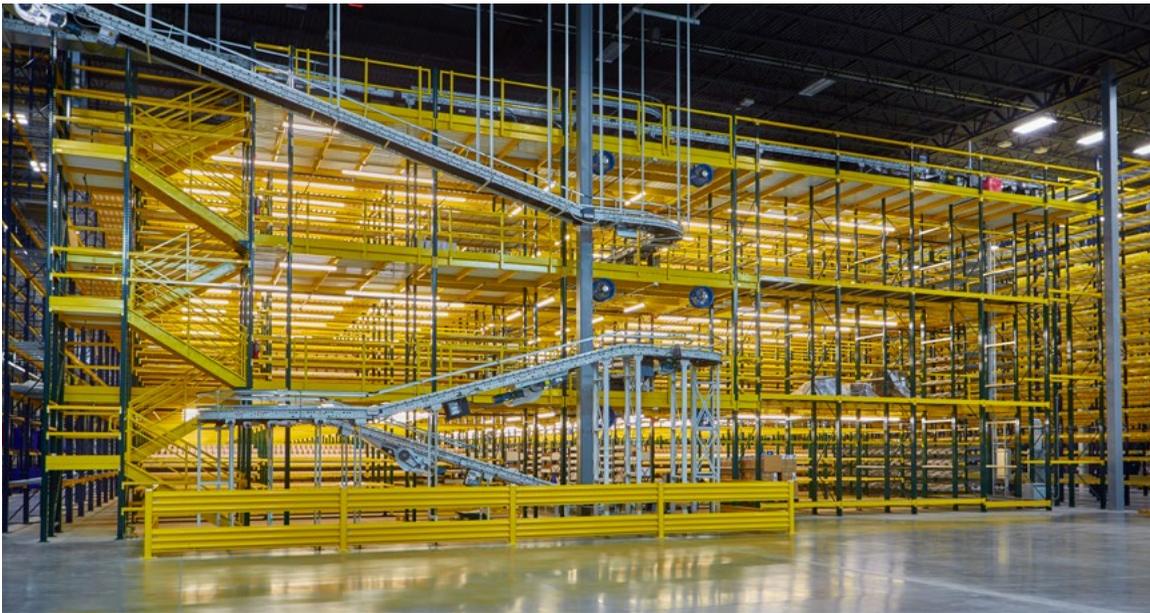
Seismic building code standards are becoming tougher and more pervasive: Most regions of higher seismic activity now require seismic design of storage racks.

### Consider storage density

Choosing the right storage rack system involves a solution process, beginning with the flow of merchandise which will determine your density requirements – how “tightly” that merchandise should be stored.

Warehouses with high-density storage solutions usually have high or even complete turnover of inventories during specific intervals or seasons. During these times, merchandise is often stored en masse in large bays with few access aisles to maximize floor space.

Conversely, lower-density warehousing is appropriate for parts or retail distribution centers where custom orders are picked continuously to fulfill JIT or other time-critical requirements – bulk shipments coming in one set of dock doors and customized packages going out another set of dock doors. Often located near the center of a distribution center are rack-supported pick modules that specialize in this repackaging effort.



# Structural vs Roll-Formed Pallet Racks

One of the most important things to consider when updating your warehouse is whether to use Structural or Roll-Formed Pallet Racks.

Structural Rack is hot-rolled structural steel and Roll-Formed Rack is cold roll-formed steel. Since Roll-formed Pallet Racks are made of lighter gauge steel and often assembled with boltless beam pin connectors, they are less expensive to buy and install. Structural Pallet Racks are made of heavier steel, bolted together, so they are more expensive and take slightly more labor to install, however, they require less maintenance and provide greater longevity.

## Structural Pallet Rack (SK3000®)



Structural Pallet Rack is highly recommended in warehouses that have a fast-paced environment, such as large cold storage facilities, beverage distributors, food handling warehouses, or any high volume storage warehouses, since Structural Racks can endure greater impact from forklift equipment.

Structural Channel Beams provide the ability to store **heavier load capacities**.

**Rigidity:** Fully bolted connections on Structural Rack yield a strong, rigid system.

**Versatility:** A wide range of sizes, designs and load capacities. Common configurations include selective, drive-in, pushback, or pallet-flow applications.



## Roll-Formed Pallet Rack (SK2000<sup>®</sup>)

Roll-Formed Pallet Rack is generally recommended for retail, commercial, and industrial warehouses storing lighter weight products, as it generally offers less capacity in the event of over loading or impact. Roll-formed Pallet Racking is a good choice for facilities storing many different product SKUs with varying sizes, as it provides great adaptability to deal with any beam reconfigurations necessary to handle any new product and/or pallet sizes. Consult a material handling expert before altering any rack system to obtain engineering approval.

**Cost-effective:** Cold Roll-Formed Rack is less expensive than Structural Steel Rack, and this lower cost provides a more up-front return on investment, while still providing the strength necessary for most applications.



**Boltless:** Roll-Formed Beams can be installed faster than structural beams, and there is nothing to forget or misplace, as no bolts or loose parts are required.

**Adaptable:** Easy to assemble Roll-Formed Rack can adapt to reconfigurations that may arise to accommodate varying product or pallet dimensions.

**Quick Ship:** Most common roll-formed sizes are stocked for immediate shipment.

## The Reliable Roll-Form

While Roll-Form Rack is made of a lighter gauge of steel than structural, it can be engineered for maximum strength and impact resistance. Independent engineering tests have confirmed that fully enclosed tubular columns, like Steel King's SK2000 boltless tubular rack provide:

- 250% more frontal impact resistance than a comparable open-back column.
- 44 times more torsional strength (resistance to twisting)
- 68% more side impact resistance
- Three-rievet connection with 26% greater strength than two rivets
- High strength closed tubes for frame braces and step beams

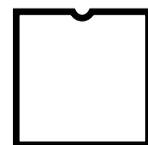


See the video comparison between open- and closed-back rack at [www.steelking.com/SK2000](http://www.steelking.com/SK2000)

### Cross Section of Frame Column



Open Back Column



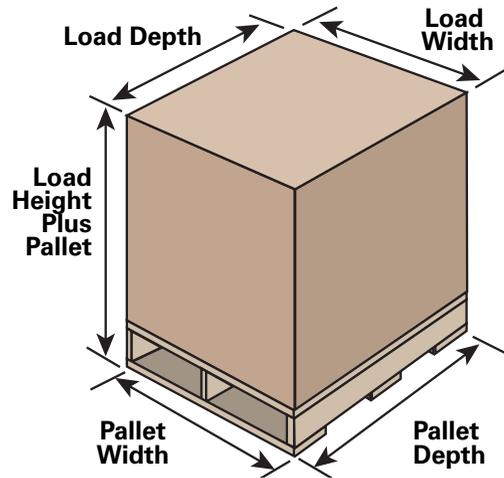
SK2000<sup>®</sup> Closed Column

# Six-Step Pallet Rack Design

## To determine pallet rack configurations:

1. Find the depth and width of your pallet.
2. Determine the load depth, load width, load height and weight of your largest load. For the overall height, add the height of the load and the height of the pallet together.
3. To determine front-to-back depth of your uprights, subtract 6" from your pallet depth.

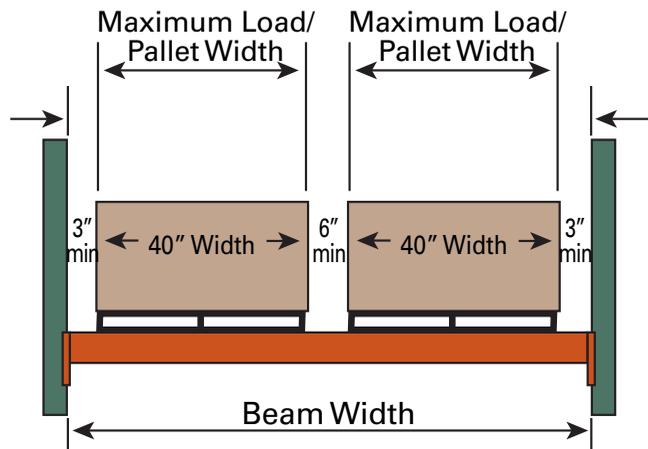
**Example: Your pallet is 40" Wide x 48" Long (Depth).  
 Subtract (48" - 6") = 42" Uprights**



4. Determine the beam width (assumes 2 pallets per beam):  
 Multiply the load width x 2 and add 12".

**Example: Your load width is 42":  $2 \times 42" = 84" + 12" = 96"$  beam length.  
 If required, round the length up to the next highest beam length.**

5. Check the beam capacity to ensure the specified beams will carry the planned load. Do not exceed beam capacity.



6. Calculate your upright height (for a system using 4" beams):

(A) Multiply the number of pallets high stored minus one pallet x 10".

**Example: If storing 4 pallets high:**

**4 pallets high minus one pallet is 3, then multiply 3 pallets x 10" = 30"**

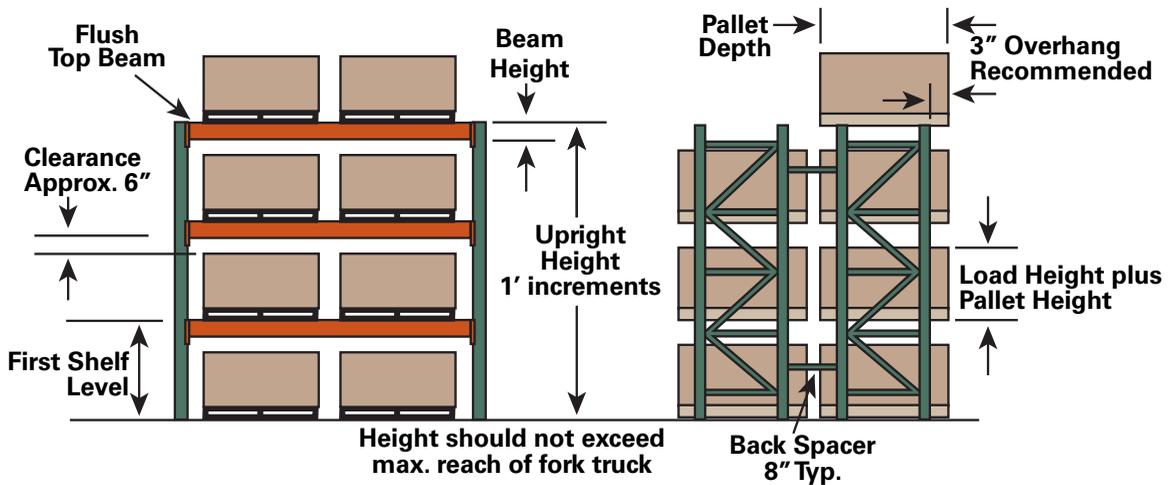
(B) Multiply the number of pallets high stored minus one pallet by the overall load height. Include the pallet height in the overall load height.

**Example: If storing 4 pallets high, with an overall load height of 50":**

**4 pallets high minus one pallet is 3, then multiply 3 pallets x 50" = 150".**

(C) Add the two numbers you solved for together (30" + 150" = 180" in this case).

This number is your upright height. See table for standard upright sizes.



### Notes on Upright Height

- The vertical space between pallets allows for the beam height, and also vertical clearance to lift and remove the pallet.
- Be certain there is adequate space left between load height of uppermost pallet and sprinkler heads, light fixtures, and other obstructions that may exist overhead.

If you have special requirements or questions, please contact your nearest dealer or call Steel King at (800) 826-0203.

# Storage Utilization Factor

Cube utilization is an industry term that refers to the amount of the total available space that is actually utilized, expressed as a percentage. When a space is completely filled with product, the cube utilization is 100 percent. This term is often used to describe a trailer when no more product can fit in it.

However, the reality is that as your utilization nears 100 percent, productivity within that space begins to fall – there is no room to effectively move and arrange product. The goal is to determine the optimal Storage Utilization Factor (SUF) that can provide for both fluctuations in inventory balances and honeycombing. Each type of storage – bulk, select rack, double-deep rack – has a different SUF that must be accounted for in the design of a storage system.

“Effective Utilization” is the level of storage that can be maintained as a percent of total capacity without degrading productivity and throughput.

## **Extra Spaces for Inventory**

Part of the SUF allowance is to provide extra storage spaces above the normal or planned inventory levels. A distribution center cannot operate efficiently if 100% of the pallet storage slots are occupied. Lift truck operators lose productivity when they must search for an available slot or consolidate partial pallets of the same stock-keeping unit (SKU) to create an empty storage slot. “Effective Utilization” is the level of storage that can be maintained as a percent of total capacity without degrading productivity and throughput.

## **Extra Spaces for Honeycombing**

The second part of SUF is providing empty spaces for “honeycombing,” the term for partially filled pallet slots. For example, if there is one carton left on a pallet in a particular storage location, that location is not readily available to store other pallet.

And while pallets can be consolidated, this takes extra time and reduces productivity. For this reason, leaving a certain percentage of empty positions actually increases efficiency.

**Recommended Utilization Factors**

For single-deep pallet rack storage, Steel King recommends planning for no more than 90% utilization at peak inventory levels. However, the storage utilization factor varies from one type of rack to another. The SUF for the most common types of storage is in the chart below.

**Storage Utilization Recommendation**

For Every 100 Pallets of Inventory	Storage Utilization Factor (Average – Peak)	Pallet Positions Needed per 100 Pallets*
Single Deep Rack	85 - 90%	111 - 117
Double Deep Rack	70 - 80%	125 - 143
Bulk: < 3 Deep, 3 High	70 - 75%	133 - 143
Bulk: > 3 Deep, 3 High	60 - 70%	143 - 167

*\* Note: to calculate the full number of extra spaces for each storage type, divide the number of pallets of inventory by the utilization factor.*



Full SUF guidelines for a storage system are published by The Warehousing Education and Research Council (WERC) in "The Pallet Storage System Selection Process," by S. M. Bhardwaj, CMC.

# Selecting the Appropriate Rack System

Depending on your density requirements, a specific pallet rack system – or combination of systems – may best serve the warehousing and shipping needs of your business.

## Selective Rack

The most popular type of rack is **Selective Rack**, so called because it allows easy selection, normally by service (truck) aisles. Selective Rack does not make the most complete use of floor space due to the aisles required, but may be the ideal solution for many companies. These systems can increase storage density with the integration of gravity-flow tracks, pushback carts, or double-reach application, allowing for deeper storage and less aisle space.

Selective pallet racking is a popular and effective storage method in warehouses, manufacturing facilities and distribution centers due in large part to its ease of design and implementation.



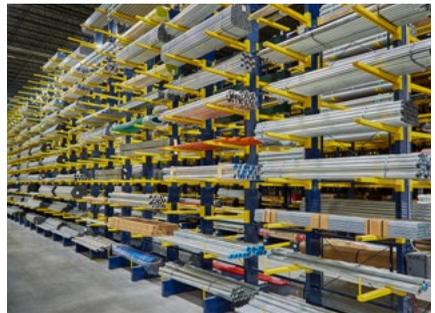
## Drive-In Rack

A **Drive-In Rack**, on the other hand, increases density and is often utilized where group pallet selection is more likely than individual pallet selection. With Drive-in Rack, loading and unloading within a bay must be done from the same aisle. A similar system called Drive-Thru Rack permits loading and unloading from both ends of a bay.



## Cantilever Rack

**Cantilever Rack** is primarily utilized to store bulk items such as building materials (lumber, pipe, drywall, etc.) and furniture. It is commonly found in home centers and furniture warehouses. Cantilever Rack is easily identified by the arms protruding from the face of the columns.



# Special Applications

## Overdock Storage Rack

Empty pallets cluttered around loading docks are a common warehouse problem, which can lead to operational inefficiency and safety issues. Steel King's Overdock Storage Rack helps solve these problems by storing your empty pallets in racking, above your loading docks. Steel King's standard SK2000 or SK3000 racking can be designed and configured to fit around your loading dock doors.



## Die Rack

Steel King die storage racks are perfect for storing dies, motors, jigs, fixtures, and other heavy material. Standard Steel King 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 be slid on or off a shelf for easy access and storage. For optimal storage flexibility, shelves on Steel King's SK4000 tubular structural rack can be designed so that they are removable from the uprights and the heights adjustable in 3" increments across the entire vertical height of the upright.



## High Capacity Wire Reel Rack

High capacity, wire reel racks are custom designed with the flexibility to accommodate the size and capacity of your spools and axle brackets.



## A-Frame Vertical Storage Racks

Steel King A-Frame storage racks are ideal for storing hand loaded, long slender shaped material, such as moldings, trims, lumber, ladders and gutters. These racks incorporate a unique framework, utilizing our SK2000 boltless pallet rack columns. Columns are angled back to create a framework that supports your material evenly and frequently all along its length.



## Stair, Ladder and Guarding

Steel King offers stairs that are RMI or IBC compliant. Also consider ladders and guarding options for elevated work walking surfaces.





# Rack Terminology

**Upright – vertical member that beams attach to (upright columns or upright frames)**

**Load Beams (step beams or channel beams), available in both**

- Roll-formed
- Structural channel

**Pallet Support Bars**

(also known as Cross bars or Beam ties)



**Upright Frame components**

- Upright column
- Diagonal brace
- Horizontal brace (lacing, struts)
- Footplate (footpad or baseplate)



**Load Beam components**

- Beam
- Safety lock  
Safety clip
- Connector plate  
End plate
- Pins, rivets, studs



# Frequently Asked Questions

## **Should I tie single rows of rack to the wall?**

It is generally not a good idea to tie racks to the wall, because forces from the building can be transferred to the racks, and forces from the racks can be transferred to the building, although wall ties are sometimes used in low seismic areas.

If wall ties are used, there must be proper coordination between the building engineer and the rack engineer to ensure that the ties and any transmitted forces will not damage the rack or the building structures. The connection to the wall must be capable of transferring the required forces, and the connectors must be compatible with the wall material.

The seismic analysis of the rack and the building being tied together is extremely complex, and the connection is best avoided. If the height to depth ratio is such that a single row needs extra stability, heavy-duty anchor patterns with larger base plates or cross aisle tie configurations should be used rather than wall ties.\*\*

## **Should rack components from different manufacturers be mixed and connected together in the same installation?**

Most rack manufacturers produce unique and proprietary components. Column shapes and hole punching patterns along with the mating beam end connectors are designed to interface specifically with each other. While some different manufacturer's products may seem somewhat compatible, they are not interchangeable. Mixing these products may cause fit and/or function issues and may void the original equipment warranty.

The beam-to-column connection properties are of vital importance in the proper structural analysis of the rack system. It cannot be assumed that products from different manufacturers can be connected together without any adverse effects.\*\*

## **What about buying used rack?**

Installing used rack is not recommended. Used rack may be structurally compromised prior to or during the removal, shipping and/or re-installation process. In addition, the new use of the racking may not be the purpose for which the racking was originally designed. When moving rack, there may be seismic zone differences to consider.\*\*

\*\* Source: Rack Manufacturer's Institute, [www.mhi.org/rmi/faq](http://www.mhi.org/rmi/faq)

## Frequently Asked Questions (cont.)

### **Do all the holes in the baseplate require anchors?**

Not necessarily. Racks must always be anchored to the floor as shown on the Load Application and Rack Configuration drawings. The RMI Specification requires at least one anchor per column. The rack manufacturer will often provide extra holes in the base plate as alternate holes that can be used in case floor reinforcing interference is encountered when drilling the floor.\*\*

### **What type of pallet racks are there?**

Steel King offers a complete line of pallet rack in structural and closed tube roll-form configurations. Talk with one of our professionals to determine which is best for your storage solution. With an in-house engineering staff, we can create a system customized to your storage needs.

### **How would I know if I need a building permit for my rack system?**

Rack structural systems, not unlike building structures, are often subject to the building code review and permitting process. The pertinent building code is usually required by a municipality, county, or state. Most building codes which have been adopted and are being enforced include rack structures – e.g., the International Building Code, the NFPA, and the earlier UBC, BOCA, and SBC model codes. Those provisions often include the requirement of a local building permit.

Occasionally, local requirements may differ slightly from the more generally-applied national and international building codes. The user should determine from local authorities which building code is applied and should report that information to the rack manufacturer.\*\*

## Where can I find additional resources for rack specifications?

When purchasing storage rack, be sure to specify in your order that the racks must be designed in accordance with the latest edition of the *RMI Specification and Commentary*.

The 2012 ANSI/RMI Specification has been included by reference in the 2015 International Building Code and is required by the ICC for the 2015 IBC for the design of storage racks.

The RMI Specification is the best source for design information specifically pertaining to storage rack and includes the product load in the loading combinations to be considered.

## Does Steel King have pallet rack in stock for quick shipment?

Yes. Steel King stocks most of its most popular sizes of roll-form (SK2000) and structural channel (SK3000) rack in its 48 Hour Quick Ship inventory.

Steel King also stocks many popular rack accessories, including wire decking, pallet supports and row spacers.

With Quick Ship, you receive all your rack components in one shipment – with only one invoice to follow. Plus, you can save an extra 4% if you let Steel King handle the shipping. Steel King, using its national purchasing power, has negotiated extremely favorable LTL rates from both our New London, WI, and Rome, GA, Quick Ship Facilities.

Many other products are available through our Quick Ship program including Steel Guard, Hold 'N Fold Containers and "Stac-King" portable racks and steel industrial containers.

## **48 HOUR » QUICK SHIP**

**800.826.0203**

[www.steelking.com/quickship](http://www.steelking.com/quickship)

# Protecting Your Investment

Pallet rack is not only a substantial investment in itself, but it also serves to keep your business running efficiently and your inventory safe. When investing in a system, there are many things you can do to ensure the maximum useful life of your rack system.

## Powder coat finish

Steel King rack products are powder coated to provide better resistance to water and corrosion, better gloss, hardness, and adhesion.

- High quality powder coat finish means less maintenance
- Hard, glossy surface that resists corrosion
- 60% greater resistance to solvents
- 74% greater resistance to salt spray
- 94% greater impact resistance
- 13 standard colors – 4 basic and 9 premium colors



## Reinforce areas most exposed to impact

Roughly one in ten forklifts are involved in accidents every year, and many are never reported by drivers. This exposes your company to liability and costly losses if undiscovered rack damage compromises the integrity of your rack.

Reinforce your frame uprights where they need it most – at the base – where forklift contact is most likely.

Products shown are available in a variety of heights.



*Double reinforced post and heavy horizontal bracing*

**COLUMN CORE**



*Column Core®*

*Welded column protectors*



## Add-on crash protection

Angled for maximum deflection, Steel King manufactures replaceable guard components for additional crash protection.

Steel King's rub rails are designed to protect vulnerable surfaces in narrow aisles and high traffic areas. They are often installed as protection for the end of rack aisles, in-plant offices, and exposed equipment.

Rails easily bolt on and can be installed at multiple levels for greater protection.



## Aisle and work area protection

Whether you need to protect aisle ends or to keep foot and vehicle areas separate, Steel King has a solution.



## Load protection

Steel King's pallet load stop beams not only protect inventory from being pushed off the back of your rack, they also help you maintain flue space for optimal fire suppression.

Learn more at [www.steelking.com/safety](http://www.steelking.com/safety)



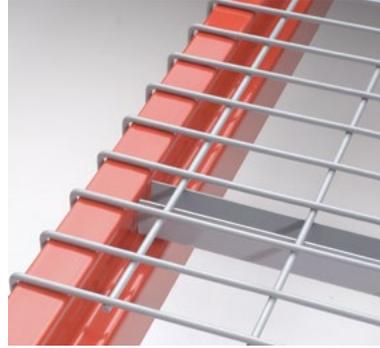
# Rack Accessories

Adding wire mesh or pallet supports can help support weak or damaged pallets. These are preferred to plywood or solid steel decking by fire inspectors since they allow sprinklers to spray through to lower levels.

## Wire mesh decking

Wire mesh decking is an upgrade over pallet supports and can be used successfully in almost any selective pallet rack application. Wire decking consists of two components: support channels, which rest on the load beam and provide structural support much like a pallet support would, and wire mesh, typically in a 2" x 4" or similar pattern, which provides additional coverage to create a complete shelf between beams.

In addition to providing more uniform support than pallet supports for potentially weak or damaged pallets, it also provides the versatility to store cases that are not palletized. Wire mesh decking is typically more expensive than pallet support crossbars but creates a safer and more versatile storage surface.



## Pallet supports

Pallet supports are made of durable galvanized steel for long lasting dependability and sturdily support pallet racks. Supports are available in hat-shaped or waterfall styles.

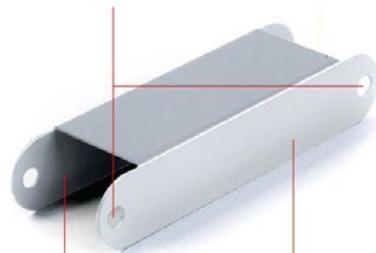
Hat-shaped support



Waterfall style



Back to back connection for stability



Galvanized finish provides corrosion resistance

Steel construction provides strength and durability

# Compare Before You Buy

When it's time to purchase new pallet racking for your warehouse, there are a number of factors you'll want to consider.

Take time to research the features and benefits head-to-head before you make a commitment to buy. We've listed out some of the features that you'll want to consider.

Rack Supplier #1

**Steel King Industries**

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Rack Supplier #2

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Rack Supplier #3

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Roll-form Rack	SK	#2	#3
Footpad with multiple offset anchor holes	■		
Flush footpad	■		
Footpad ridge	■		
Heavy horizontal (1" x 2" closed tube)	■		
Two 2" brace to column welds	■		
4" total weld per horizontal brace	■		
Closed-tubular upright / formed column ridge	■		
55,000 PSI minimum yield steel	■		
Holes on column face (not corner)	■		
Boltless 3- or 4-rivet connection	■		
Interchangeable connection	■		
Seamlessly welded step beams	■		
Auto-engaging safety locks	■		
Replaceable safety locks	■		

Quality of Products	SK	#2	#3
Manufactured in house, not 'jobbed out'	■		
Delivered by enclosed Tautliner and tarped flatbed	■		
Protective packaging helps reduce freight damage	■		
Easy Installation, highest tolerances	■		
Powder coat finish	■		
13 Standard colors	■		

Structural Rack	SK	#2	#3
Heavy duty 7-gauge footpad	■		
Multiple offset anchor holes	■		
Heavy horizontal	■		
Factory welded frame for increased impact resistance	■		
Structural angle bracing	■		
50,000 PSI minimum yield steel	■		
Preliminary seismic calculations done	■		
Beams welded with precision robotics	■		
Grade 5 bolts with serrated whiz nuts	■		
Beams welded to heavy 7-gauge wrap-around connector plate	■		

All Steel King products are R-Mark Certified by RMI (Rack Manufacturers Institute) standards. In addition, our welders are trained and qualified to American Welding Society (AWS). Our rack capacity charts are RMI-certified, and our fabricator licenses are approved for the City of Los Angeles and the City of Phoenix.

## A word about engineering...

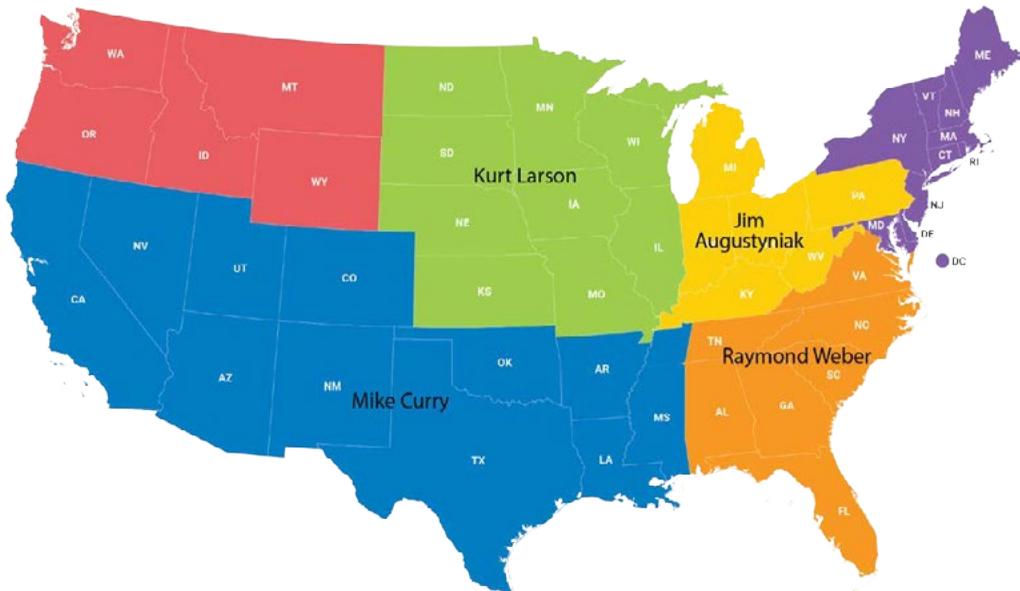
Our on-staff registered professional engineers design Steel King pallet racks to the specifications of the Rack Manufacturers Institute (RMI), of which we are a long time active member. Calculated capacities are then verified by testing at independent engineering laboratories. You can be confident of reliability with Steel King racks. Steel King is widely known for offering the industry's most durable line of industrial storage racks.

Company Strength	SK	#2	#3
RMI 2012 Certified	■		
AWS Certified Welders	■		
4A1 Dun & Bradstreet Financial Rating	■		
LA & Phoenix City Certified Manufacturer	■		
Licensed On-staff Professional Engineer	■		

# Questions?

Contact us.

## Steel King Industries, Inc. Sales Territories & Regional Sales Managers



Code	Region	Regional Sales Manager	Phone	Inside Sales	Back Up
KL	Central	Kurt Larson	847-697-9847	Dan Wierzba	Erin Rychter
JA	Midwest	James Augustyniak	419-708-0570	Jill Damrau	Dan Wierzba
RW	Northeast / Southeast	Raymond Weber	678-761-5873	Bobby Balliew	Erin Rychter
MC	Southwest/West Coast	Mike Curry	210-862-7225	Drake Miller	Bobby Balliew
<b>Canadian Sales</b>		James Augustyniak	419-708-0570	Jill Damrau	
<b>International Sales</b>		Don Heemstra	715-254-1424	Katie Ekstrand	
<b>Push Back &amp; Pallet Flow Sales</b>		Ryan Wachsmuth	715-254-1412	Tracy Trybull	
<b>Major Project Sales Managers</b>		Kevin Curry	770-517-0979	Dawayne Edwards	
		Dave McLain	678-880-0103	Robert Lyon	
<b>Container Design &amp; Sales</b>		Craig Heil	715-254-1442	Mike Wanta, Jr	

For nearly 50 years, Steel King Industries has been designing and manufacturing high-quality, competitively priced material handling solutions.

- AS/RS Storage Systems
- Rack Supported Buildings
- Multi-level Pick Modules
- Flow and Pushback Racking Systems
- Pallet Racks
- Drive-In / Drive-Thru Racks
- Cantilever Racks
- Portable and Custom Shipping Racks
- Mezzanines /Work Platforms
- Industrial Containers
- Industrial Guard Rails

**[WWW.STEELKING.COM](http://WWW.STEELKING.COM)**



2700 Chamber St.  
Stevens Point, WI 54481

(800) 826-0203  
(715) 341-3120  
(715) 341-8792 (fax)