

A

Retail Rack Dictionary

*A comprehensive guide to understanding
retail rack fixtures and components*

Adjustable VPD: *Vertical divider within a bay that can be cut to any height on site. The cap is inserted over the cut VPD and then tek screwed into the beam at the top and bottom.*
(See also Vertical Posts, VPD and L-rails)

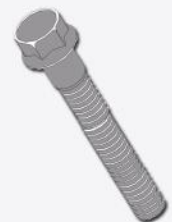
AISI Standards: *American Iron and Steel Institute. Authoritative guidelines on design of cold formed steel members and connections.*

Aisle: *Area between upright runs used for common traffic of customers and forklifts.*

Anchor Bolts: *Special bolts used to fasten uprights to the floor.*
Different bolt sizes are required in different areas of the country based on local building codes or seismic design needs.

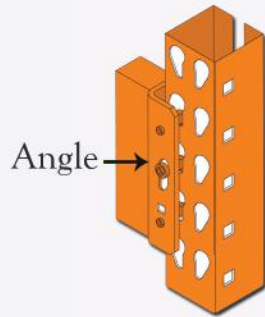


Adjustable Post



Anchor Bolt

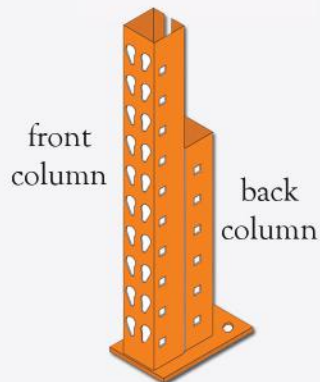
A



Angle: (beam connection, beam clip, end angle) The end clamp on a beam which fastens it to the upright.

6" angle: 3" beams

8" angle: 5.5" and 6" beams



ARU Upright

ARU: Abuse Resistant Upright - An upright with a secondary column to resist impact from forklifts or pallets. Abuse resistant uprights are used in high traffic areas where damage could occur. The front and rear posts have an extra column up to 96".

Back Stop Bracket: Bracket which attaches over the beam to secure column for pallet back stop. Helps keep product from being pushed into the aisle behind.

Back To Back: Uprights that are placed directly behind each other with only a flue area separating.

Barrel Bolt: A special bolt with a rounded cap which can secure accessories (i.e. column protectors) without protruding into the bay where product is stored. This helps keep product from being damaged.

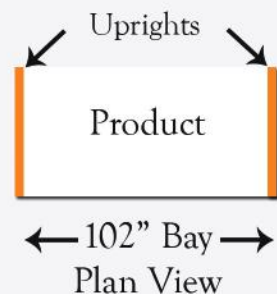
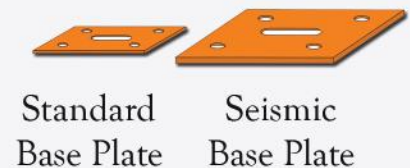
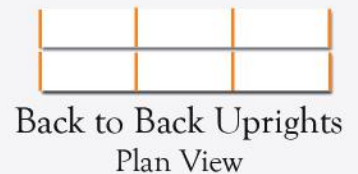
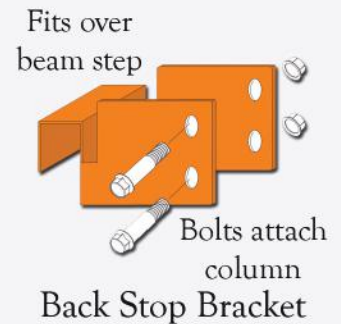
Base plate: (foot plate) Metal plate at the base of an upright used to support upright and attach it to the floor. Different sizes of base plates are required in different seismic areas of the country or for different size columns.

Bay: Product storage and display area between two uprights.

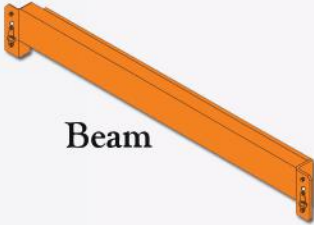
ex. A 102" bay is the distance between two uprights that product may be displayed in.

i.e. the length of the beams.

B



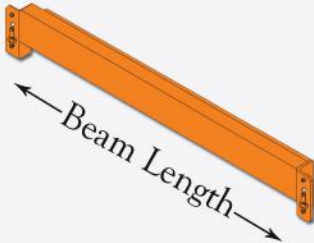
B



Beam



Beam Connection
to upright



Step

Beam: A horizontal member of the rack system. Two beams are placed at the same level, front and rear, to make a shelf. Wood or wire decking is placed on top of the beams to create a product display platform.

Beam Connection: (angle, beam clip) End clamp on a beam that fastens it to the upright. Comprised of various locking devices and a number of studs which rest in the keyholes.

Beam Length: Measurement from inside of angle to inside of opposite end angle which correlates to the distance between two uprights and the bay length.

Beam Spread: Occurs when excess weight in the center of the shelf causes beams to bow outward. Excessive beam spread can cause the decking to fall through and the merchandise to fall to the floor or shelf below.

Beam Step: Ledge of beam which the wood decking or wire decking rest upon.

B

Board Rack: Special upright used to display wooden boards or specialty lumber. Angled backward for better product display and customer access.

Bolts: Hardware used to attach accessories, beams and uprights.

M-Divider: $\frac{3}{8}$ " x $3\frac{3}{4}$ " Whiz

Tool Holder: $\frac{3}{8}$ " x $3\frac{3}{4}$ " Whiz

Row Spacer: $\frac{3}{8}$ " x $3\frac{3}{4}$ " Whiz

Column Protector: Barrel Bolt

Upright Extensions: $\frac{1}{2}$ " x $3\frac{3}{4}$ " Whiz

Safety Column: $\frac{3}{8}$ " x $3\frac{3}{4}$ " Whiz

Bracing: Horizontally and diagonally welded steel channels that tie columns together to form an upright.

Bundles: Stack of beams or uprights banded together for shipping.

Approximate Bundle Sizes:

3" beams: 80

3.5" beams: 64

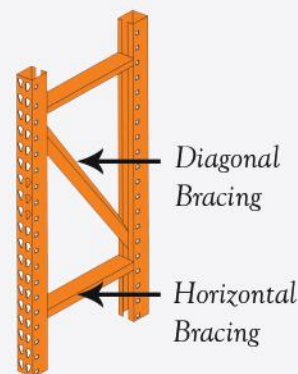
5.5" beams: 56

6" beams: 48

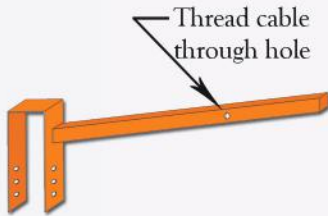
Uprights: 15



Board Rack



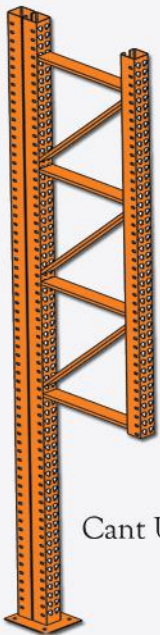
C



Cable Beam Holder

C-Weld: Additional welding required for seismic conditions which welds top, front and bottom of beam.

Cable Beam Holder: Tool holder with a special hole for stringing a cable through to keep lumber and other tall items from falling forward into the aisle.



Cant Upright

Camber: (beam camber) Inward curve in the middle of a beam.

Cant Upright: Special upright used for light storage above overhead doors in receiving. Very light capacity. Only used for empty boxes or empty pallets.

Carbon Content: Amount of carbon in chemical makeup of steel which provides hardness.



Carriage Bolt

Carriage Bolt: A round headed bolt with an enlarged square neck at the top.

C

Codes: Local and national system to insure safety of structures and installation of racks.

BOCA: Building Officials and Code Administrators

IBC: International Building Code

UBC: Uniform Building Code

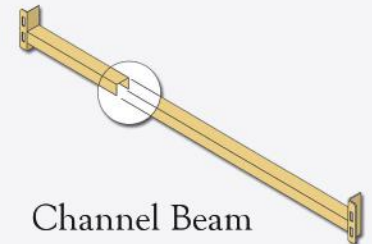
Southern: Southern Building Code

Coil: Roll of steel threaded through production mills for a continuous run to produce rack parts. Each coil weighs 10,000 - 15,000 lbs. (5 - 7.5 tons)

Channel Beam: (fan beam) A special beam that attaches on an angle in the fan area and houses a lighting track that is necessary to electrify the fans and light fixtures for display.

Column: Roll formed post section with punched key holes used to make an upright.

Column Back Stop: (safety column, pallet back stop) Post used vertically to stop pallets from falling or being pushed into aisles behind. Attached to rack system with column back stop brackets.



Channel Beam



Column

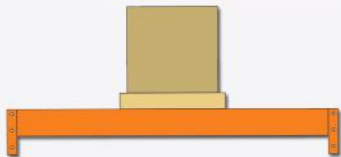


Bracket

Column Back Stop



Column
Protector



Concentrated Load

Column Protector: Steel accessory attached to the upright to take abuse so the column is not damaged by forklifts or pallets being moved.

Concentrated Load: (point load) A load which bears on a small area of the beam rather than being distributed throughout the pair of beams.
ex. A pallet loaded in the center of a bay can cause a decrease in the capacity of the beams.

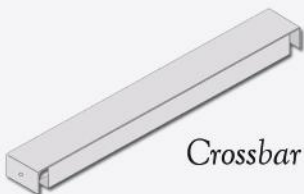
Core Carrier: List provided by customer of specific freight companies they prefer to use.

Coupon: Bone-shaped piece of steel used for a tensile test to determine its properties.



Cross Section

Cross Section: A piece of a column that is cut in the cross direction to provide a sample for testing.



Crossbar

Crossbar: Lateral tie which supports pallet loads and keeps beams from spreading.



Customer: Always right.

D

Decimal Thickness: The measure of the thickness of steel in inches.

ex. Upright Decimal Thickness = 0.120

i.e. the thickness of the upright is 0.120 of an inch (a little less than 1/8" thick)

Decking: Wood or metal material used to span two beams and create a shelf.

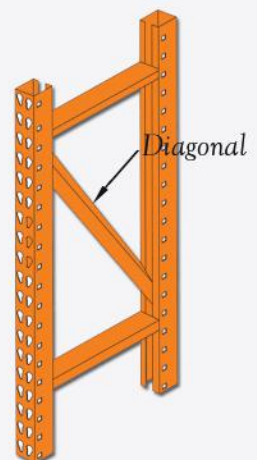
Dedicated Truck: A truck that leaves the manufacturer and drives directly to the store with product and does not combine it with any other product that may be going to the same area or to the same store.

Deflection: The downward distortion (sag) of a beam caused by load or force. The allowable deflection of a beam is determined by dividing the length of the beam by 180.

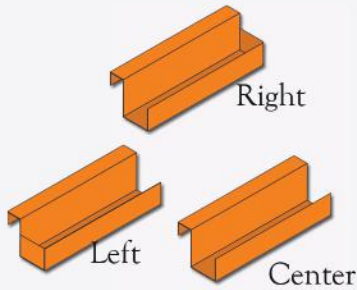
ex. Beam Length = 102" $102/180 = .566$

Allowable Deflection = approx. 1/2" sag at the center of the beam.

Diagonals: Bracing in an upright that runs in the diagonal direction.



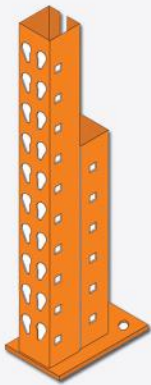
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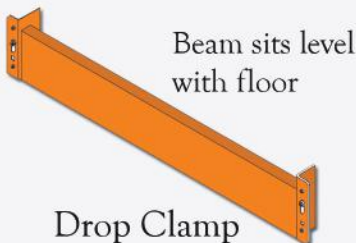
Grid Dividers



Divider Arm



Double Column



Beam sits level
with floor

Drop Clamp
(Floor Beam)

Divider: (grid divider) A series of trays which hang over the beam to hold ceiling grid or other long pieces of merchandise displayed horizontally.

Divider Arm: (tool holder) A bracket with a single arm made of square tubing, which divides or separates product.

Double Column: (ARU) An upright with a secondary column to resist impact from forklifts or pallets.

Drop Clamp: Method of welding a beam flush with the bottom of the connector (floor beam).

E

Earthquake Zone: (High Seismic Zone) An area or region with a history of earthquake occurrence. These zones will require specially designed racking and calculations.

ex. Zone 1 - Less Severe

Zone 4 - Most Severe

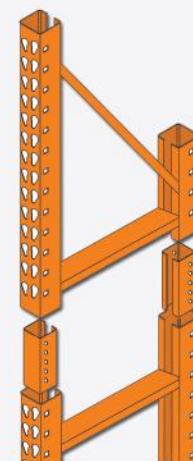
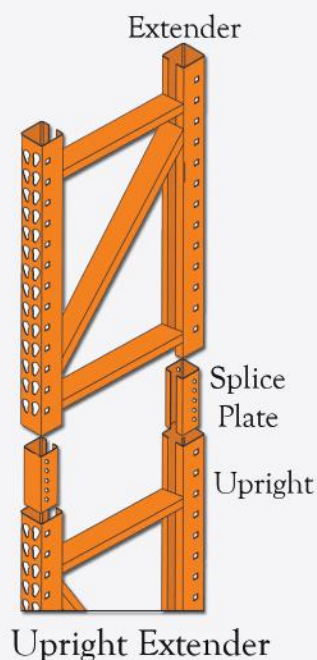
EDI: Electronic Data Interchange. The paperless exchange of data including purchase orders and payment information between customer and vendor.

Embedment: The depth that an anchor is fixed into the concrete slab.

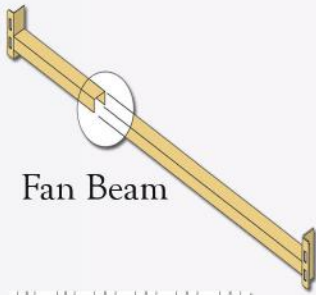
Engineering: Department on staff to perform calculations to approximate what rack members will hold and how they should be designed.

Extenders: (extensions) A short upright frame with no base plate that is attached with a splice plate to the top of an existing upright to make it taller.

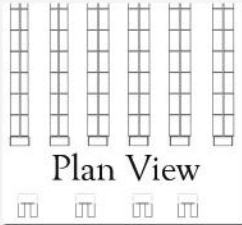
Extender Sloped: (sloped extensions) A special extender that has a short front post and a taller rear post designed to insure that pallets remain in their designated bay.



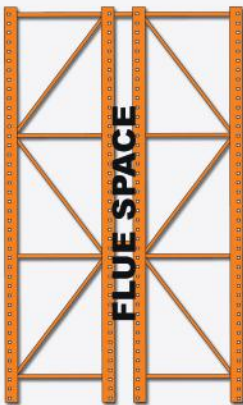
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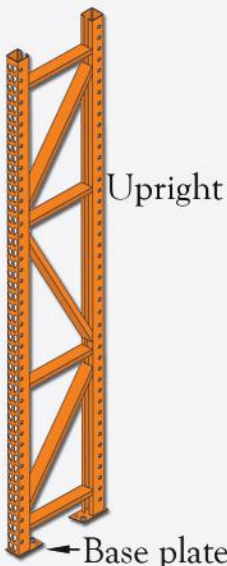
Fan Beam



Plan View



Base Plate



Upright

Base plate

Fan Beam: (channel beam) A special beam that attaches on an angle in the fan area and houses the lighting track that is necessary to electrify the fans and light fixtures for display.

Fan Cloud: A truss and beam system used to display lighting and fan fixtures overhead.

Floor Plan: (plan view) A drawing of the store as if looking down on it.

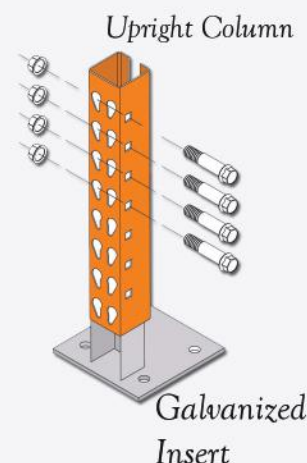
Flue: Space between uprights that are installed back to back. Flue space must be maintained for fire safety. Typically the distance between frames in a retail store is 6" minimum.

Foot Plate: (base plate) Metal plate at the base of an upright used to attach it to the floor. Different sizes of base plates are required for different seismic areas of the country or for ARU uprights.

Frame: (upright) The vertical member of the rack system which beams lock into. Consists of two columns and welded bracing.

G

Galvanized Insert: A special accessory which is inserted and bolted into the bottom of an upright to act as the base plate. It can raise the upright 1" - 6" off the ground and away from water and chemicals which flow along the concrete of outdoor lawn and garden areas. The special galvanized finish helps prolong the life of the upright and can be replaced without having to replace the entire upright.



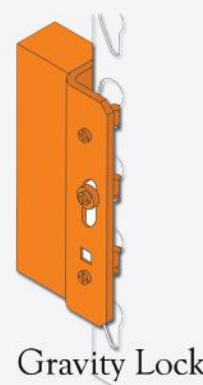
Galvanizing: (galv) A process of taking unpainted rack parts and dipping them into a tank of hot zinc (over 800 degrees) to provide a durable zinc coating. Galvanized racking is used in the garden centers and outdoor storage areas because it is weather resistant.

Gauge Standards

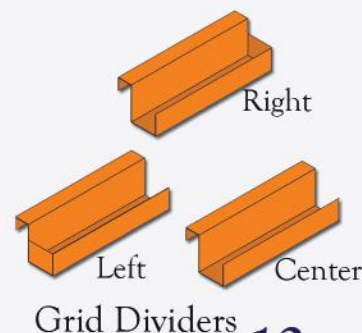
7 gauge:	0.1793
9 gauge:	0.1495
10 gauge:	0.1345
11 gauge:	0.1196
12 gauge:	0.1046
13 gauge:	0.0897
14 gauge:	0.0757
16 gauge:	0.0598

Gauge: The standard measurement for steel thickness associated with different decimal equivalents.

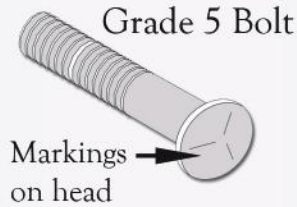
Gravity Lock: A patented Unarco locking device which uses a floating pin to secure beams to uprights. When the beam is lifted, the pin stays in the locked position and cannot be dislodged (a result of gravity).



Grid Dividers: (dividers) A series of three trays which hang over the beam to display ceiling grid and other long pieces of merchandise displayed horizontally.



G



Grade 5 Bolt: A special rating system for hardware. Grade 5 signifies a higher steel hardness than Grade 1.

Gutless Upright: An upright with fewer bracing panels to allow displays or pods to run through the upright opening.

Note: Gutless uprights have capacities that are considerably less than standard uprights.

ex. Heavy-Duty Frame Capacity = 37,500 lbs.

Gutless Frame Capacity = 5,000 lbs.

H

Hammer Holder: A bracket which has two round tubular arms welded to the front to hold hammers. One arm is shorter than the other to allow a slot to slide hammers on for display.

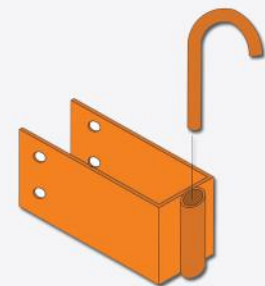


Hammer Holder

Hardware: Nuts and bolts needed for installation of a beam, upright or accessory.

Heavy Duty Frame: Frame consisting of heavy gauge steel columns that are 3" x 3".

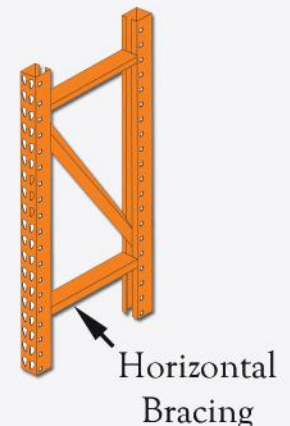
Hook and Saddle: An accessory that attaches to the column protector to hold a 2x8 board that keeps bagged goods from spilling into the aisle.



Hook and Saddle Bracket

Horizontals: The bracing of an upright that runs from front to back.

Hot Dipped Galvanized: (galvanized, galv) A process of taking unpainted rack parts and dipping them into a tank of hot zinc (over 800 degrees) to provide a durable zinc coating. Galvanized racking is used in the garden center and outdoor storage area because it is weather resistant.



Horizontal Bracing

I



Interchangeable
Rack

IBC: *International Building Code. A newer building code which is being adopted throughout the country to help standardize the safety regulations for the construction industry. IBC in some areas has more stringent guidelines on rack design.*

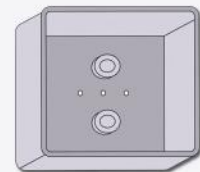
Interchangeable Rack: *Style of racking with a typical keyhole pattern that will allow multiple manufacturers to install beams and uprights interchangeably.*

J-Hook: A metal locking device shaped in the form of a “J”, placed in holes which align on both the upright and beam. A large head on the end keeps the J-Hook from falling into the upright.

Junction Box: (phone box) An electrical box that has studs attached to the rear so that it can be easily hung on the uprights for placement of phone units and electrical components that must be run throughout the racking.



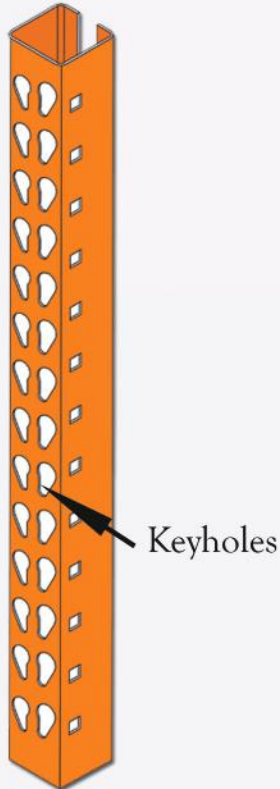
Insert J-hook in front of connector or through the side holes



Junction Box

4x4

K



K-Factor: A standard set by the Rack Manufacturer's Institute for calculating column design and column slenderness.

KSI: A reading of pressure or stress in the testing of steel. PSI rated in 1,000 lbs. per square inch.
ex. KSI for most rack components is between 50 and 55 KSI. i.e. 50,000 lbs. per square inch.

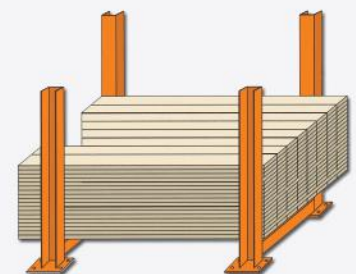
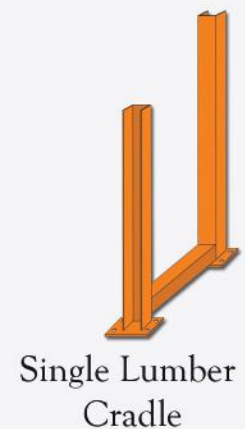
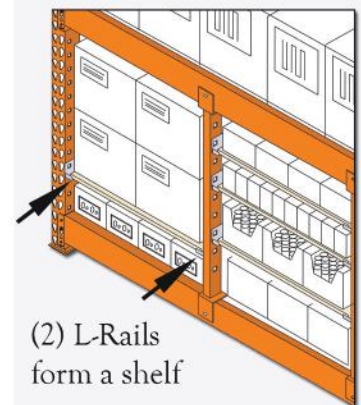
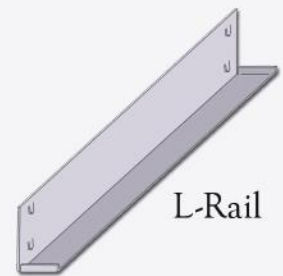
Keyhole: The teardrop shaped holes that are punched on the face of interchangeable uprights for beams to attach to.

L-Rail: (*versa rail, add-a-shelf*) A metal bracket in the shape of an “L”, which attaches to an upright and an intermediate post (VPD) to segregate a bay with different size shelves. L-rails attach with two tabs at either end and require no hardware. Decking is placed on the L-rails to make a shelf.

Lumber Cradle: Structural steel channels welded in the shape of a large “U” to hold loose boards and other items that are broken bundles. Two lumber cradles are required at either end of the lumber.

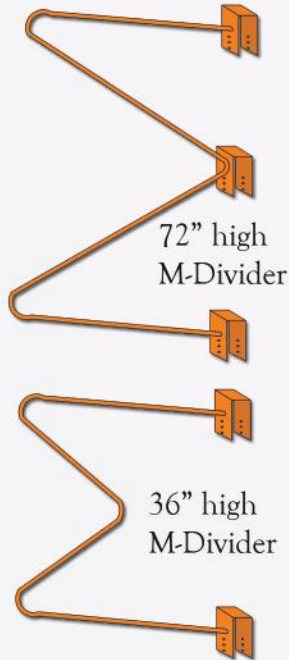
LTL: *Less than Truck Load.* A less expensive method of trucking which combines many orders on one truck and takes product to a terminal for distribution onto another truck.

L



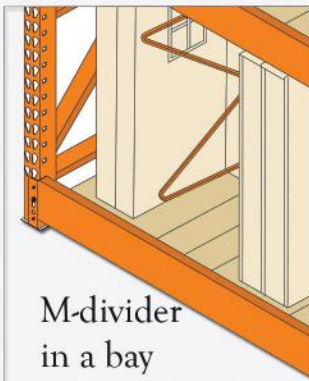
(2) Lumber Cradles used to store lumber

M



M-Divider: (*m-bar, m-rod*) An accessory that has tubing formed into the shape of an “M” with brackets that attach to rear beams. M-Dividers are used to separate large product such as windows, doors, moulding, etc.

Mill Line: A set up of machinery in a manufacturing plant which forms and produces parts from coils of steel.
ex. Beam mill is a continuous run of rolls which form a beam into its final shape.



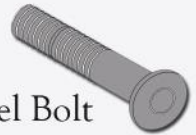
Nuts and Bolts: *Hardware needed for installation of beams, uprights and accessories.*

Nominal Dimension: *General expression which is used to describe a part that is not precise. For example, a part that is 2.95" may be called by a nominal dimension of 3".*

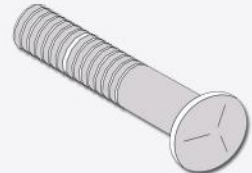
N



Anchor Bolt



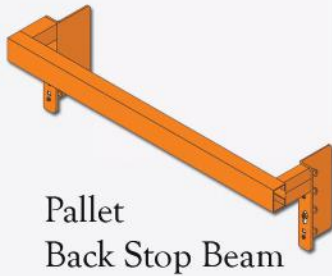
Barrel Bolt



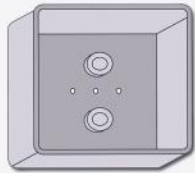
Grade 5 Bolt

P

Paint Line: A conveyor system which runs through a manufacturing plant that rack product hangs on to be washed, sprayed and baked for a final paint finish.

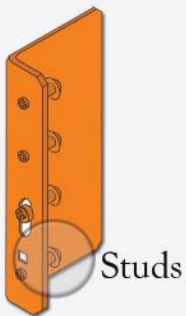


Pallet Back Stop Beam: A special offset beam which sits behind the bay in the flue space to stop pallets from being pushed into the bay behind.

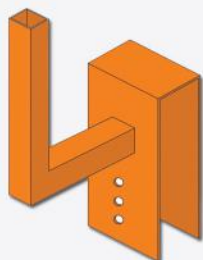


Junction Box

Phone Junction Box: An electrical box that has studs attached to the rear to hang on uprights for placement of phone units and electrical components that run through the racking.



Pins: (studs) Metal studs on the ends of the beam clips that insert in the upright keyholes to secure the beam.



Pipe Holder

Pipe Holder: An accessory that attaches to an upright to hold pipe, conduit or other long, light weight product that stands vertically.

P

Plumbness: The closeness of an upright or column to being vertical. Uprights should not be out more than 1/2" per 10'-0" of vertical height.

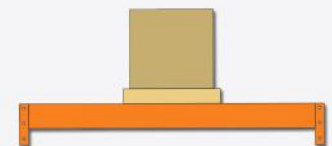
Point Load: (concentrated load) A load which bears on a small area of a beam rather than being distributed throughout the pair of beams.
ex. A pallet loaded in the center of a bay can cause a decrease in the capacity of beams.

Post: (column) Roll formed post section with key holes used to make an upright.

Post Cap: (adjustable post cap) The removable top of the adjustable VPD which attaches the cut post to the beam above.

Post Extension: A single post that attaches to the front column of an existing upright with a splice plate to allow for signage display or accessory attachment.

Pre-galvanized: Steel that has been pre-treated chemically with zinc for weather resistance.



Point Load



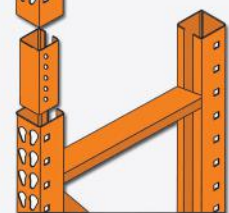
Post
(column)



Post Cap



Post
Extension

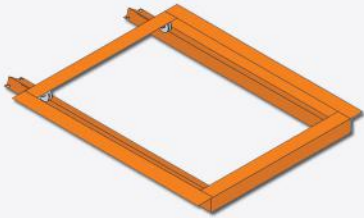


P

Powder Coat: *A paint application method which sprays paint in the form of powder on the rack parts. Parts then run through an oven which melts the powder, turning it to a liquid and the heat then bonds the paint to the upright. A durable finish.*

PSI: *A reading of pressure or stress in the testing of steel. Pounds per Square Inch.*

Push Back: *A special racking system with nesting carts. As a pallet is loaded from the front, it pushes the pallet behind it back one position. To unload, the front pallet is removed and the rear pallets come forward to the picking position, automatically.*

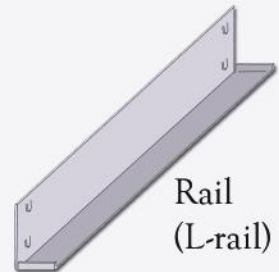


Push Back Cart
Rides on rails that lay
across beams in a bay.
Pallet is placed on
top of cart

R

Rack: A system of beams and uprights which form heavy duty shelving for pallets and other product.

Rail: (l-rail) A metal bracket in the shape of an “L” which attaches to an upright and an intermediate post (VPD) to segregate a bay with different size shelves. L-rails attach with two tabs at either end and require no hardware. Decking is placed on the L-rails to make a shelf.



Retainer Brackets: (fence retainer) An accessory which attaches over a beam and provides a stop for long length product that is stored horizontally on the shelf.

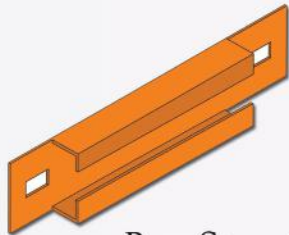


Retainer Bracket

RMI: Rack Manufacturer's Institute. Membership assumes compliance with manufacturing and design to a strict set of standards. A set of standards is published and may be obtained by contacting the RMI. (find address and contact information page 37).

Rockwell Readings: A value determined by testing that rates the hardness of metals. A higher rockwell number indicates a higher surface hardness.

R



Row Spacer

Row Spacer: *(rigid row spacer)* A lateral tie from upright to upright in a back to back rack set up.

Run: A row of rack. Multiple bays in a line.

Saddle Bracket: (hook and saddle) An accessory that attaches to the column protector to hold a 2x10 board that keeps bagged goods from spilling into the aisles.

Safety Back Stop: (safety column, pallet back stop) A post used vertically to stop pallets from falling or being pushed into aisles behind. Attached to the rack with brackets.

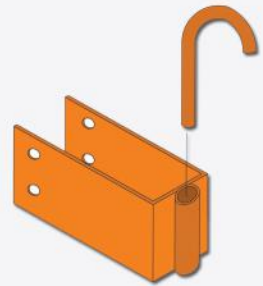
Seismic Base Plate: A base plate that is required to be larger in certain areas of the country which have a history of earthquakes.

Seismic Calcs: A set of documents which illustrate how the racking system conforms to special conditions imposed on areas of the country which have a history of earthquakes.

Shear: Tendency to deform or fracture as two members slide against each other.

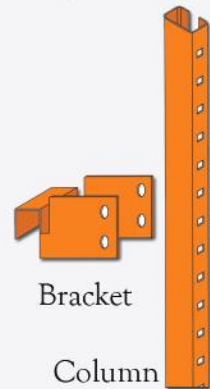
Shims: (shim plates) Metal plates which nest together to slide under the base plates on uprights to level the rack due to uneven floors.

S



Saddle Bracket

Safety Back Stop



Bracket

Column

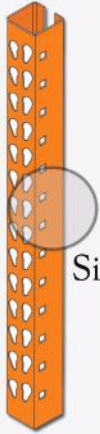


Seismic Base Plate



Shims

S



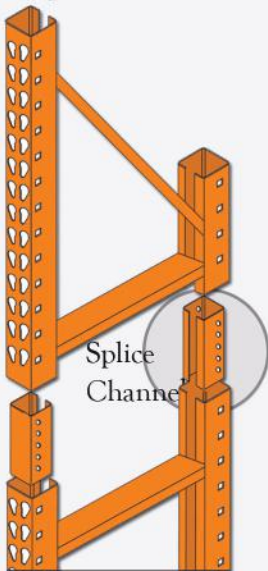
Side Holes

Side Holes: (side punching) The square holes on the sides of the upright columns to bolt beams and accessories through.

Simply Supported Span: A span which neglects end restraint offered by the connectors. A capacity calculation that does not take end fixity into account.

Skid: Steel or wood, movable unit - Load.

Sloped Extender



Sloped Extender: A special extender that has a short front post and a taller rear post designed to insure that pallets remain in their designated bay and do not rest on an upright.

Splice Channel: (splice kit) A channel that fits inside the upright and an extender or post that is attached on top. Splice channels must be bolted above and below splice.

Spray Paint: (touch up paint) 12 cans to a case.

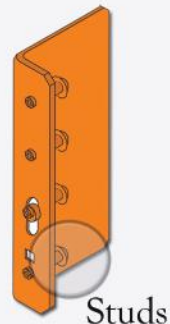
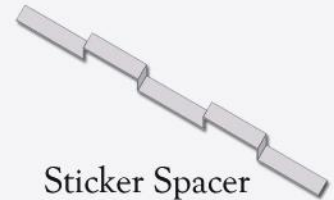
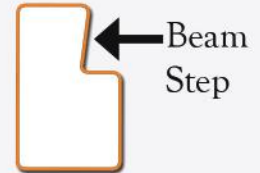
Step: Area of a beam which the wood stickers or wire decking rest upon (ledge).

Stickers: Wooden board that is placed on the beam steps to form a shelf.

Sticker Spacers: (wooden sticker spacer strips) A metal band with relief areas for wood to nest to separate wooden decking. Spaces wood so that water can flow through in the event of a fire.

Studs: (pins) Metal rivets that hang inside the keyholes to align the beam in the upright and stay secure.

S

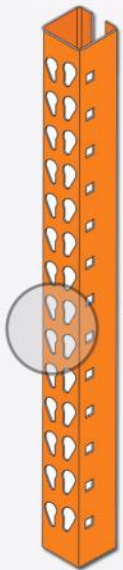


T



T-bolt

T-bolt: A bolt that has a long end which inserts into the upright front hole and rotates 90 degrees to lock a beam or row spacer to the upright. A t-bolt installation does not require reaching into the column.



Teardrop
Punching

Teardrop: (keyhole) The punched holes in the shape of a teardrop that are on the face of interchangeable uprights for beams to attach to. Each pair of holes is 2" on vertical center.

Tek Screw: A screw that is drilled into the rack to secure accessories. A tek screw should not replace a connection that requires a bolt.

Tensile Strength: A value determined through destructive testing at which a material will fail when being pulled from each end. Tensile Strength is an important property considered when ordering steel.

Thickness of Steel: A decimal measurement of steel taken with a Micrometer.

Tolerance: *Fractional variation allowed during manufacturing and installation processes.*

Ton: *Unit of weight measurement equal to 2,000 pounds.*

Tool Holder: *A bracket which has two square tubular arms welded to the front, angled upward to hold tools with long handles. One arm is shorter than the other to allow a slot to slide the tools on.*

T

2000
Lbs.

Ton



Tool Holder

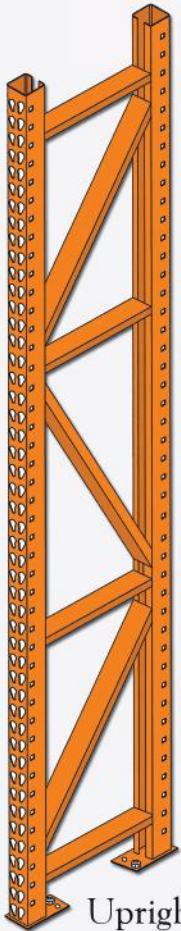
U



Uniform Load

Uniform Load: A load on a pair of beams supported by all, or nearly all of the beam surface.

Unsupported Length: Measurement of the distance between the floor and the top of the first beam or the maximum spacing between beams - whichever is greater.



Upright

Uprights: (frames) The vertical member of the rack system which beams lock into. Consists of two columns and welded bracing.

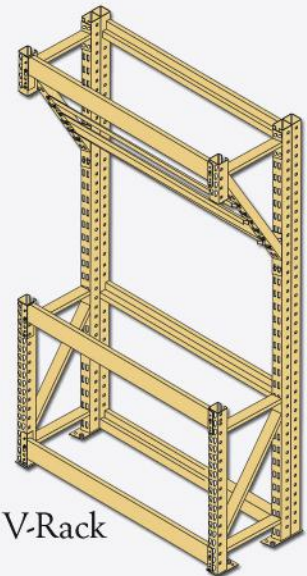
V-Divider: *Tubing in the shape of a “V” that has a bracket on either end that attaches to a pair of beams. The “V” hangs below the beams to separate large merchandise such as windows.*

V-Rack: *(fan rack) A special upright with a tall, double post in the rear and a shorter post in the front. A special top section attaches to hold channel beams which support fans and light fixtures.*

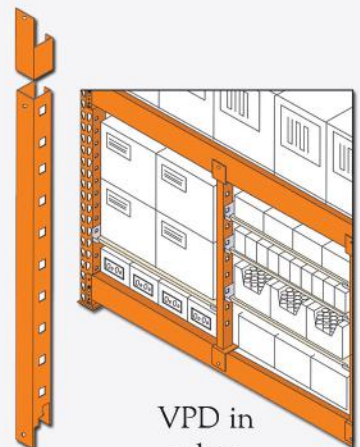
VPD: *(Vertical Post Divider) The vertical member used to segregate different size product within a bay without adding beam levels. Post attaches to beam above and rests on beam below. L-rails are installed in the side punching of the VPD to create shelves.*



V-Divider



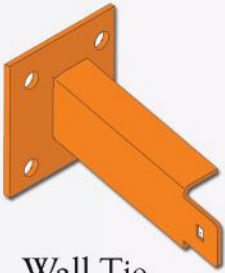
V-Rack



VPD in
a bay

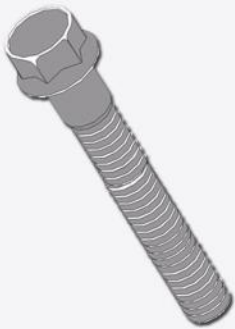
VPD

W



Wall Tie

Wall Tie: *A rigid metal strip with a plate on one end which attaches racking which is prone to over-turning to a concrete wall unit. Before adding wall ties to a system, an engineer should be consulted.*



Wedge Anchor
Bolt

Wedge Anchor: *A special, removable bolt used to fasten uprights to the floor.*

Weed Wacker Holder: *A square tube with a bracket on one end that attaches over the beam. The opposite end of the tube has a bent wire piece which can cradle a weed eater for display.*

Weld: *The application of heat and gases to fuse two pieces of metal together.*

Whiz Bolt: *(whiz nut) A bolt or nut with a serrated flat section that grips the surface it is being attached to.*



Whiz Bolt

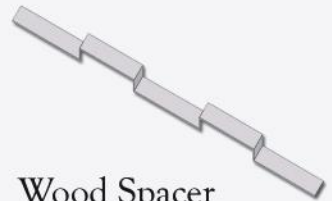
Wind Load: *Added force on a rack system caused by wind.*

W

Wire Decking: *Grids of wire welded together that rest on the steps of the beams to form a shelf.*

Wood Decking: *(stickers) Wooden boards which rest on a pair of beams and form a shelf.*

Wood Spacer Strips: *(sticker spacers) A metal band with relief areas for wood to nest into for separation of wooden decking. Spaces stickers so that water can flow through in the event of fire.*



Wood Spacer
Strips

Y-Z

Yield: *The point at which a piece of steel is stretched and will not return to its original size.
The point at which an overloaded component will take a permanent set.*

Zinc: *Metallic coating applied to racking components to add weather resistance. (galvanizing)*

Zones: *(seismic, earthquake zones) A reference to certain areas of the country with different seismic activity.*

ex. Zone 1 - Least amount of seismic activity

Zone 4: Greatest amount of seismic activity