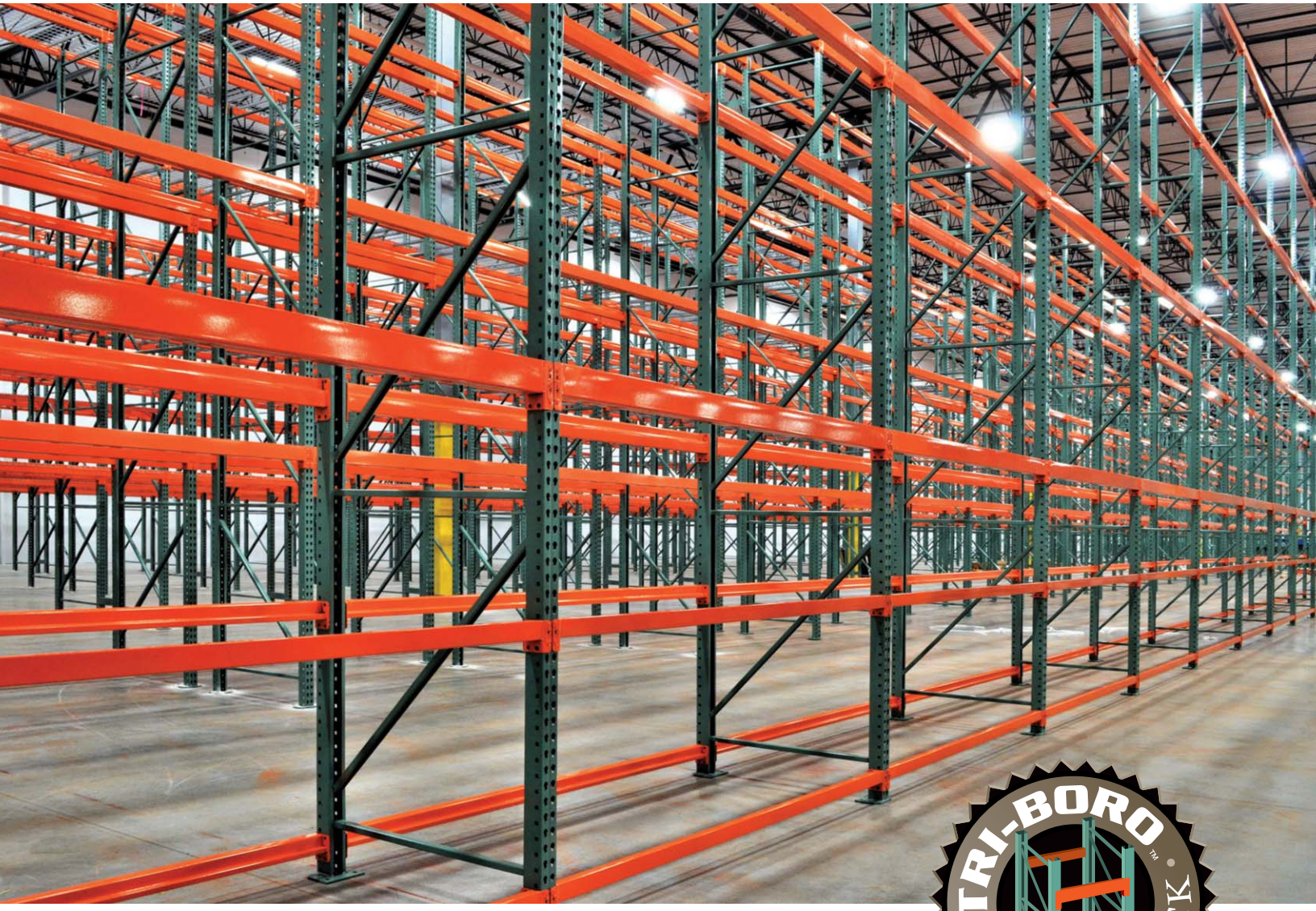
HOW TO ORDER



ROLL-FORMED
PALLET RACK

RACK MANUFACTURERS INSTITUTE
EXECUTIVE

Important Information

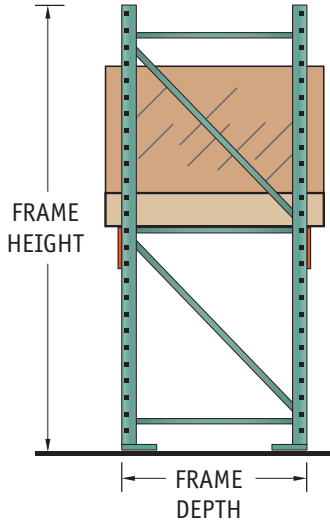
Tri-Boro Storage Products (manufacturer of pallet rack) is a member of the Rack Manufacturers Institute of the USA.

Tri-Boro Storage Products fully endorses the 'Specification for Design, Testing, and Utilization of Industrial Steel Storage Racks - ANSI MHI 16.3 2016'. Tri-Boro Storage Products requires all of its equipment be used within the parameters of the above stated specification.
It is the responsibility of any user of this document to ensure that their unique and specific design application corresponds in the first instance to this Specification, then also to any other local or national codes and/or regulations that may be applicable.
The descriptive guidelines offered at various points in this document are just that, guidelines; and are only offered as a starting point for general education of any user of this document.
Any user applying these guidelines without reference to both the Specification and full knowledge of the individual application, national/local codes, and all applicable regulations, do so at their own risk.

RACK MANUFACTURERS INSTITUTE EXECUTIVE

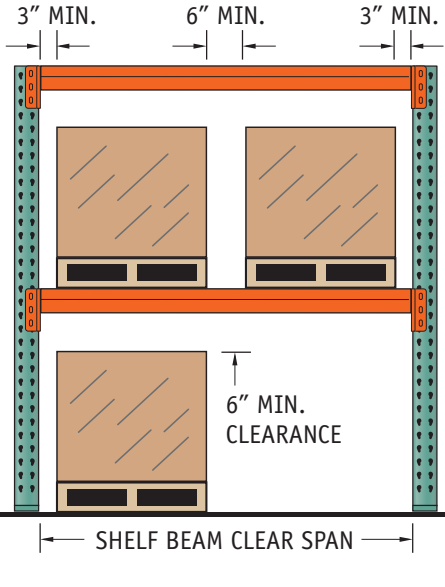
THE BASICS: HOW TO ORDER

UPRIGHT FRAME



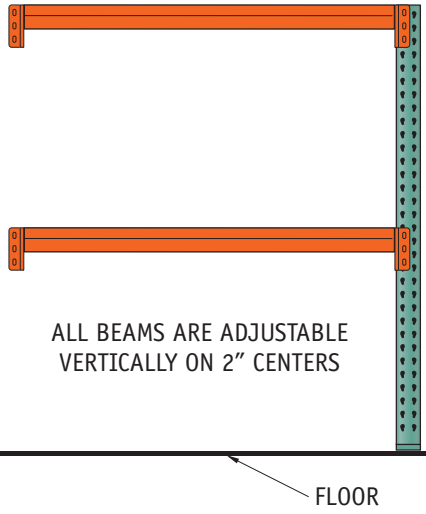
Recommended frame depth is 6" less than pallet for ledge loading on beams.

STARTER BAY

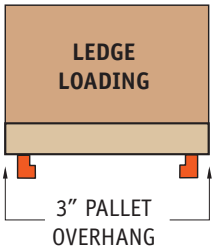


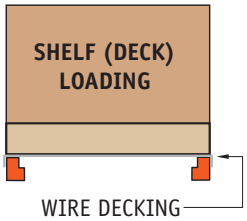
Starter Bay consists of two frames and number of levels desired (two beams per level - minimum 4)

ADD-ON BAY



Add-On Bay consists of one frame and number of levels desired (two beams per level - minimum 4)





BEAM LENGTH: SHELF LENGTH EQUALS THE DISTANCE BETWEEN UPRIGHTS. IT IS DETERMINED BY ADDING THE WIDTHS OF PALLET LOADS PLUS A 3" SIDE CLEARANCE BETWEEN UPRIGHT AND PALLET AND 6" BETWEEN PALLET LOADS. SHELF BEAM CAPACITIES ARE BASED ON A PAIR OF BEAMS SUPPORTING AN EVENLY DISTRIBUTED LOAD.

RACK HEIGHT: ADD THE FOLLOWING FIGURES:

HEIGHT OF PALLET LOADS (INCLUDING PALLET)
+ HEIGHT OF SHELF BEAM
+ 6" MINIMUM VERTICAL CLEARANCE FOR EACH PALLET LOAD

SUM OF ABOVE DIMENSIONS = RACK HEIGHT

FOR UPPERMOST LOAD LEVEL, LOCATION OF SHELF BEAM SHOULD BE 6" LESS THAN FORK TRUCK'S MAXIMUM LIFT HEIGHT. TOP OF BEAMS NEED TO BE AT 2" INCREMENTS.

FRAME CAPACITIES (LBS.)

MAXIMUM VERTICAL BEAM SPACING	F14 * 14g. 3" x 1 5/8" COL.	F20 14g. 3" x 2 1/2" COL.	F24 13g. 3" x 2 1/2" COL.	F25 14g. 3" x 3" COL.	F30 13g. 3" x 3" COL.	F35 12g. 3" x 3" COL.
36"	17437	23906	28005	27798	31162	38909
42"	16400	22610	26364	26020	29481	36692
48"	15220	21149	24530	23200	27594	34218
54"	13937	19559	22557	21040	25549	31556
60"	12594	17884	20502	19163	23398	28775
66"	11232	16167	18420	17145	21194	25948
72"	9870	14426	16332	15147	18965	23101
78"	8683	12794	14406	13030	16842	20448
84"	7679	11396	12771	11916	15019	18183
90"	6827	10195	11379	10529	13449	16243
96"	6101	9160	10188	9533	12095	14577

Notes:
1. Based on RMI 2011 Specification for the Design, Testing and Utilization of Industrial Steel Storage Racks.
2. "Spacing" is distance from floor to top of first beam level. If maximum opening is not floor level, "Spacing" is distance from top of beam to top of beam + 1".
3. Applicable for non-seismic use only. Building codes may require otherwise.
4. Capacities are for frame components only. Overall rack system configuration is the responsibility of others.
5. Contact your Tri-Boro representative for design assistance or for applications not covered by above.
6. Where the bottom portion of frames are exposed to potential minor impacts from forklift trucks or moving equipment, consideration should be given to purchasing one of the optional impact protection devices. Ask your Tri-Boro representative for a recommendation.
7. *F14 Frame capacity: 4,000 lbs. max per beam level.

SPECIAL ORDER ITEMS - MINIMUM RUN REQUIREMENTS APPLY. Please contact your Tri-Boro representative for more information.

ROLL-FORMED FRAME PART NUMBER

(EXAMPLE: 3" x 2 1/2" x 42" x 192")

F 20 42 192

- F — ROLL-FORMED FRAME
- 20 — CAPACITY MODEL
- 42 — DEPTH IN INCHES
- 192 — HEIGHT IN INCHES

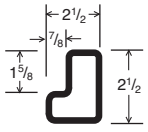
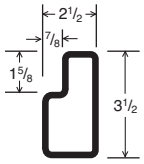
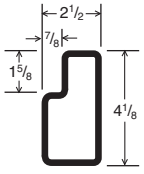
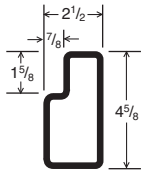
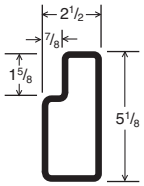
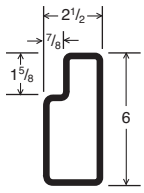
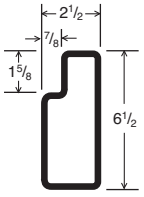
ROLL-FORMED STEP BEAM PART NUMBER

(EXAMPLE: 4 1/8" x 96")

SB 4125 96

- SB — ROLL-FORMED STEP BEAM
- 4125 — HEIGHT IN INCHES
- 96 — LENGTH IN INCHES

ROLL-FORMED STEP BEAM CAPACITIES (LBS. PER PAIR)

BEAM LENGTH (INCHES)	BEAM PROFILE							
	MODEL NO.	SB2500 4" CONNECTOR (2 STUD)	SB3500 6" CONNECTOR (3 STUD)	SB4125 6" CONNECTOR (3 STUD)	SB4625 6" CONNECTOR (3 STUD)	SB5125 6" CONNECTOR (3 STUD)	SB6000 6" CONNECTOR (3 STUD)	SB6500 8" CONNECTOR (4 STUD)
48"		4066	6910	8775	10597	12000	12000	12000
72"		2762	4743	5975	7186	9029	12000	12000
84"		2252	4485	5734	6883	8632	12000	12000
96"		1735	3483	5028	6067	7596	10583	12000
102"		1540	3106	4476	5731	7168	9975	11825
108"		1376	2788	4011	5309	6788	9434	11206
120"		1115	2283	3276	4330	5887	8512	10152
144"				2303	3038	4120	6511	8482

Notes:
1. Based on MHIA/RMI 2011 Specification for the Design, Testing and Utilization of Industrial Steel Storage Racks.
2. Load Capacities are based on uniformly distributed product load per pair of beams.
3. Deflection is based on product load only, and is limited to L(span)/180.
4. Spans from 48" to 80" designed for 25% impact from placing 1 load per shelf.
5. Spans from 82" to 120" designed for 25% impact from placing 1 of 2 loads per shelf.
6. Spans from 122" to 144" designed for 25% impact from placing 1 of 3 loads per shelf.
7. Applicable for non-seismic use only. Building codes may require otherwise.
8. Capacities are for beam components only. Overall rack system configuration is the responsibility of others.
9. Contact your Tri-Boro representative for design assistance or for applications not covered by above.

SPECIFYING A PALLET RACK INSTALLATION

**Please First see "Important Information" on first page.*

Step 1. Find out everything there is to know about the item you are handling/storing. Find out the three-dimensional size and weight of every load and pallet. Remember, the pallet may not be exactly the same size as the load, there may be overhang one way or the other. Also, be careful to ask about the quality of the bottom of the pallets and whether or not they are capable of resting on beams alone. If they are broken or rotted, they might require wire decking to safely support them.

Step 2. Find out everything there is to know about the area that the rack is going to be installed. Start with the physical dimensions of the available space. Next the floor condition, its load bearing capacity, and any slope. Find out about the available clear headroom and the presence of any overhead or other obstructions. Find out if there are any access ways that the rack must not obstruct. Column centerlines and size are also important for flue space specifications and layout information.

Step 3. Find out the method to be used for storing and retrieving loads in the rack (most often a fork truck). Can it carry the proposed load? What is its width and right angle turn dimension? What is its maximum lift height? Remember, you must subtract from this number, usually 6", for most pallets to be lifted clear of the beam. Take note of anything else that might impede on its safe interaction with the rack.

Step 4. At this point, it is recommended that a sketch be made of each individual bay, no matter how small the job.

Step 5. Select the beam. First decide how many loads should be on each beam level. The length of the beam can be determined by adding three inches to either side of the pallet (or load, whichever is largest) and multiplying by all the loads on the beam. For example, a load/pallet of 42" width, two to a beam = 42" + 3" + 3", multiply by 2 and this comes to a 96" beam. The 3" additions are to give adequate side clearance for loading and unloading. The model of beam should then be selected from the 'Beam Capacity Chart', making sure that the loads do not exceed the maximum capacity. If the beams are longer than 120", they should be tied across the middle to prevent beam spread. If loose decking is to be used, any pair of beams over 90" in length should be tied across the middle for the same reason.

Step 6. Figure out how many beam levels you will have in any bay. Are the first pallets/loads going to sit on the floor or on a set of beams? To calculate the number of levels, add together the pallet and load height plus 6" for clearance. Add the face/height of the beam you just selected for the overall total. Fit as many levels as possible in the height available remembering to make sure the fork truck is able to lift the pallet off the top beam with its maximum fork height capabilities. It usually needs an additional 6 – 8" of lift height over the top beam. Finally, make sure there is enough clearance for any sprinkler requirements.

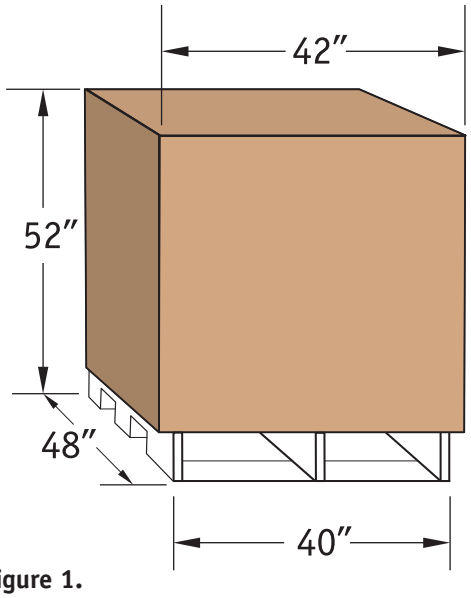


Figure 1.

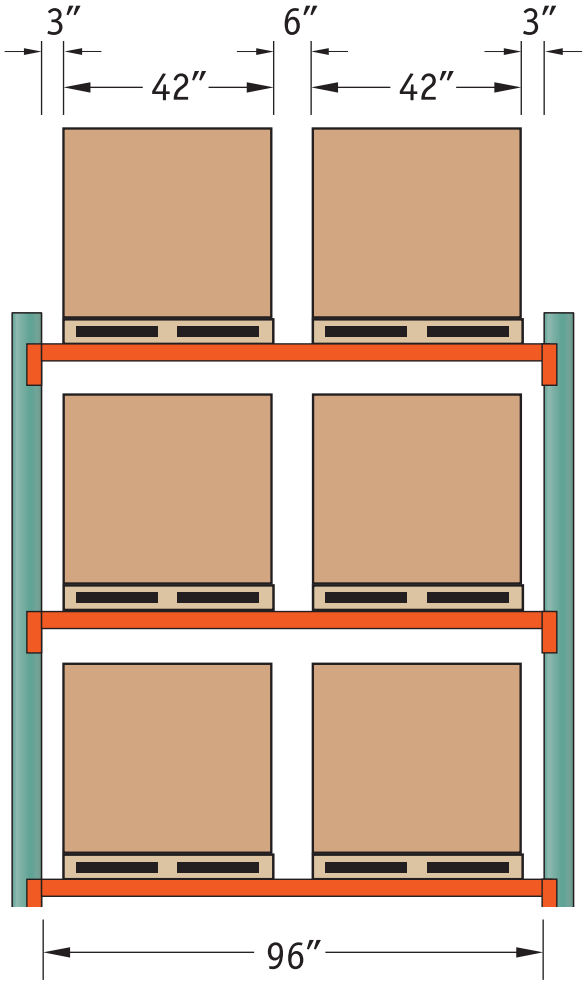


Figure 2.

Step 7.

- Determine the frame capacity necessary. Total the weight of all pallet loads that will affect one frame. This will be all pallet loads on either side of the frame, up to the center points of the beams (See figure 3 below). Determine the height of the largest pallet opening in the system (usually floor to first beam, but occasionally beam-to-beam above that). Now, using the Frame Capacity Chart, select the appropriate fame model.
- Figure out the height of frame needed. This is the measurement from the floor to the top of the top beam. (see figure 4 below). In most applications, you should then add between 6" and 18" (up to the next standard frame size) to allow for flexibility in installation. If the customer wants the frame flush with the top of the top beam, be very sure to check the load dimensions again very carefully and check the floor for the possibility of slope in both the 'cross-aisle' and 'down-aisle' directions.
- Figure out the depth of frame needed. The dimension of the pallet determines this. In most applications where pallet loads are ledge loaded, an overhang of 3" on either side of the pallet is desirable (if the pallet is 48" deep, the frame should be 42"). If the application demands that the pallets be flush with the front and back faces of the rack bay, cross supports from beam to beam MUST be used. The cross supports may be safety bars or wire deck.

Step 8. Now, put together your final sketch showing all the bays that go together to make up a row and count up all the beams and frames you need for the system. All beams need to be used as pairs, however when ordering, the total amount of beams (not pairs) should be ordered.

Step 9. Is your system a single row? Or will it be installed 'back-to-back' with another row of rack? If it is back-to-back, it should be tied across the 'flue space' in the middle with row spacers. You should always use a minimum of two row spacers no matter the height. You should also ensure there is not a gap greater than 10' in height between row spacers, adding a third or fourth one, if necessary.

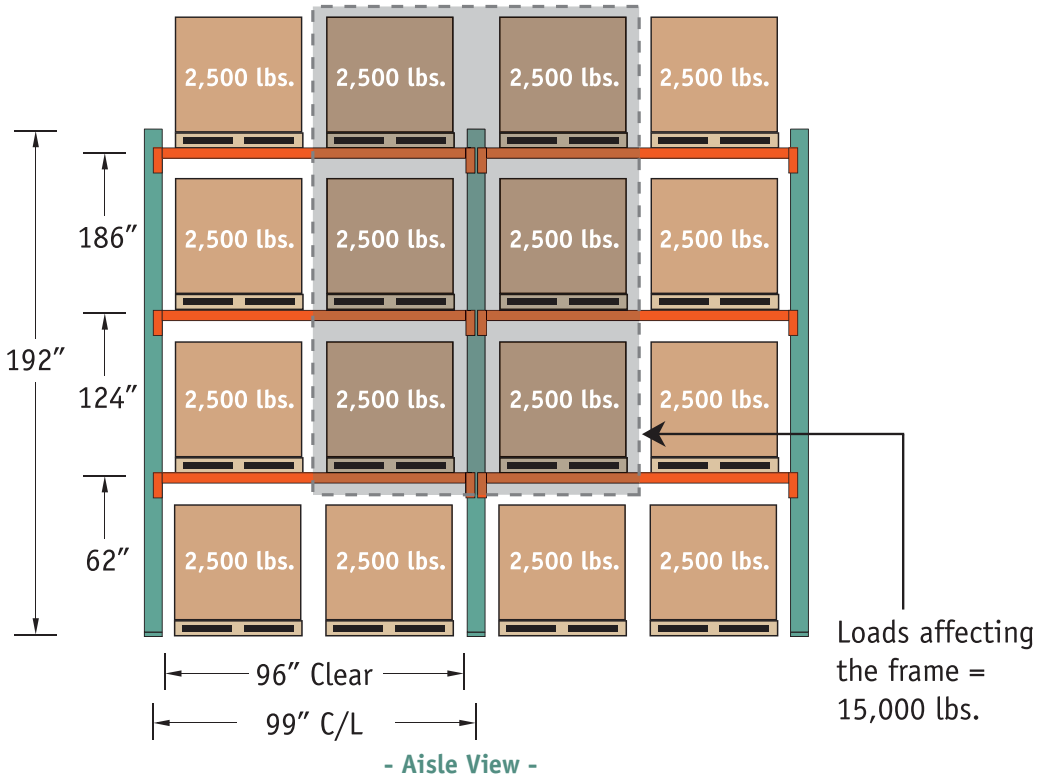


Figure 3.

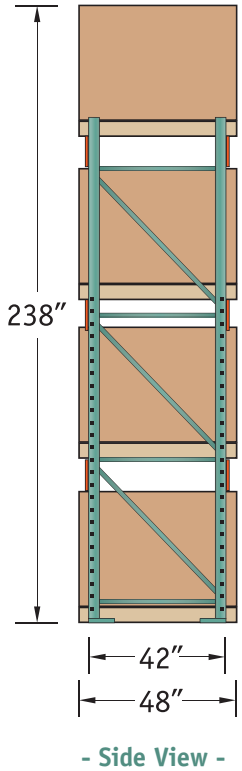


Figure 4.

SPECIFYING A PALLET RACK INSTALLATION *continued*

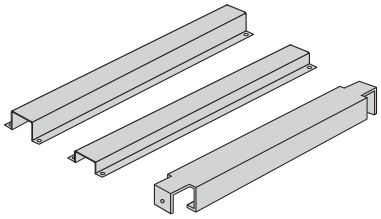
Step 10. You must now determine whether any single rows require addtitional stabilization. First, check the height compared to the depth for overturning stability. To do this, find the height from the floor to the top of the very topmost beam. Now, divide that figure by either the depth of the frame (if this is a single row) or the depth of both frames plus the row spacers (if this is a back-to-back row). Is the answer to your division sum larger than 6.0? If so, you will need to call your Tri-Boro representative for assistance, as the system is unstable.

Second, check for rotational stability. Do you have only a single beam level between frames in a bay anywhere? If so, you will need to call your Tri-Boro representative for assistance, as this system also is unstable.

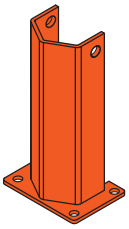
Generally, Pallet rack installations are structurally engineered systems that carry heavy loads. The steps above give a guideline for the safe specification of components for simple cases where conditions are perfect. They are written with regard to RMI 2016 which is the guiding industry specification at time of publication. If, in the future, this specification is revised or overridden or, if you have any doubt or confusion whatsoever about any of the steps above, please contact your Tri-Boro representative for assistance.

Finally, please remember that your system should be shimmed level and anchored to the floor (one anchor per leg).

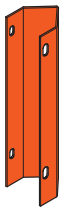
PALLET RACK ACCESSORIES



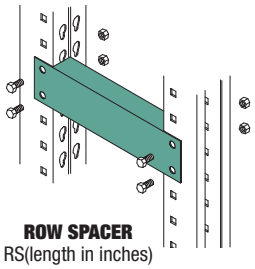
SAFETY BARS
Unflanged Safety Bar
USB(length in inches) example: USB24
Low Profile: USB42LP
Flanged Safety Bar
FSB(length in inches) example: FSB42



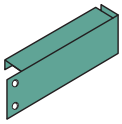
COLUMN PROTECTOR
PART NO.: CP18



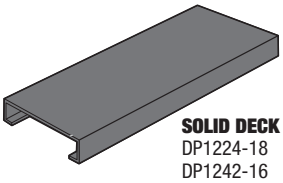
BOLT-ON COLUMN PROTECTOR
CPB(height in inches)
example: CPB018



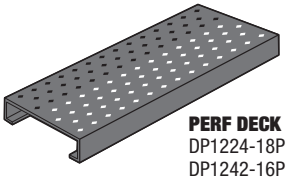
ROW SPACER
RS(length in inches)
example: RS6



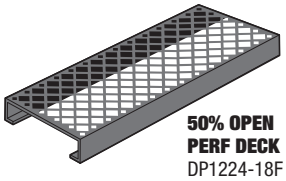
WALL SPACER
WS(length in inches)
example: WS6



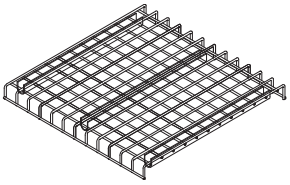
SOLID DECK
DP1224-18
DP1242-16



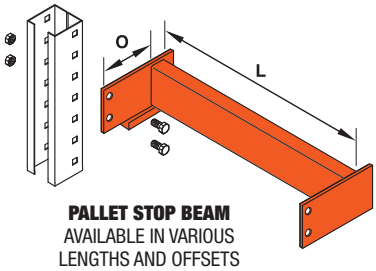
PERF DECK
DP1224-18P
DP1242-16P



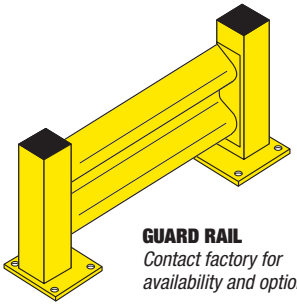
50% OPEN PERF DECK
DP1224-18F
DP1242-16F



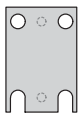
WIRE DECK
WD(length/width in inches)
example: WD4246 (for pallet rack)



PALLET STOP BEAM
AVAILABLE IN VARIOUS
LENGTHS AND OFFSETS

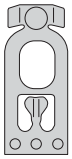


GUARD RAIL
Contact factory for availability and options.

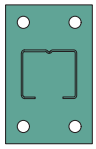


SHIM
PART NO.: SHM

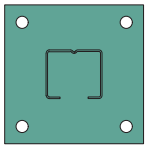
WEDGE TYPE ANCHOR BOLT
PART NO.: WAB



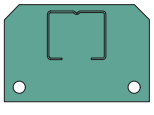
SAFETY LOCK
PART NO.: SNPLK



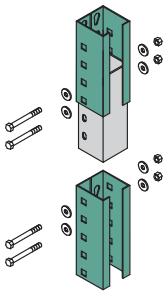
5x8 FOOTPLATE



8x8 FOOTPLATE



SEISMIC FOOTPLATE
PART NO.: FP57

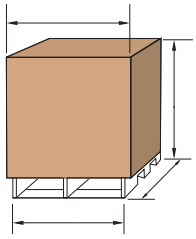


FRAME SPLICE
SPLF14
SPLF20
SPLF25

Hardware:
HD383.5X

PALLET RACK SPECIFICATION WORKSHEET

Pallet & Load



Height Width _____ Depth _____

Weight _____

Same size Pallet and Load? ❑ Yes ❑ No Overhang (in)_____

Loading Equipment

Does the customer have a lift truck?
If not, how will loads be placed up into the racks?

Lift Capacity _____

Max Lift Height _____

Turning Circle _____

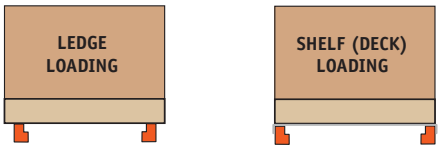
Building or Space

Length_____ Width _____

Clear Height_____ *Look for obstructions! Look for Sprinklers!*

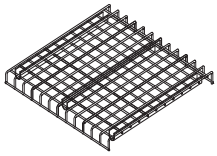
Loading

❑ Ledge Loading or ❑ Shelf Loading?



Wire Decking?

❑ Yes ❑ No



Layout

1. Number of levels _____ Number of Bays _____

Number of Rows _____ Back to Back Rows? _____ Flue Space _____

2. Number of levels _____ Number of Bays _____

Number of Rows _____ Back to Back Rows? _____ Flue Space _____

***OR:* Please make a detailed sketch on next page.**

SKETCH AREA 1/4" Scale