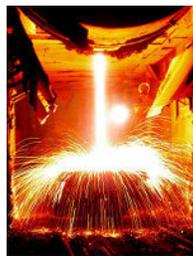
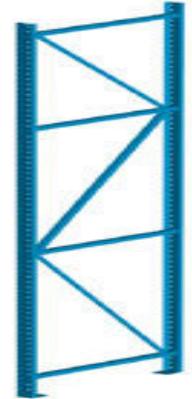


## The Art of Uprights

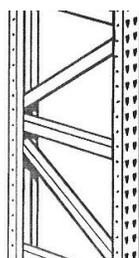
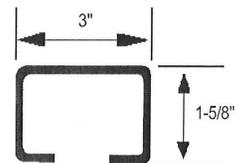
When aiming to optimize storage and get material off the floor of the warehouse or distribution center, we all know that our material handling solution starts with the upright frame.

Uprights seem like a simple part of the plan—they provide the framework for the beam levels of our storage solution. However, understanding frames and how they help support our material is more complicated than simply being a place to hang our beams.



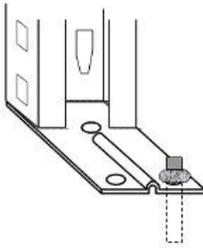
**THE STEEL:** There are two types of steel used in the manufacture of racking, cold roll-form steel and hot rolled structural steel. Roll form uprights are the most common with structural rack being selected for use in high abuse facilities and the food industry where cleanliness dictates frequent washing as well as resistance to cold temperatures.

**THE COLUMNS:** These are the vertical members of the upright, most often seen in an open “C” configuration as shown to the right, although closed or “box” columns as well as other styles are available. Common dimensions are 3” x 1<sup>5</sup>/<sub>8</sub>”, 3” x 3” and 4” x 3”, although again, other sizes are available. The column dimension is dictated by the desired capacity of the upright.



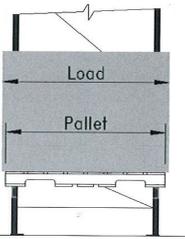
**THE BRACING:** These members of the upright do exactly what the name suggests and brace the frame. The horizontal braces help support the axial (vertical) load while the diagonal bracing restricts the columns from twisting or moving under load. Braces also contribute to the capacity, so you may see something other than the usual “K” pattern shown to the left.

(Continued from page 1)



**THE FOOTPLATES:** Used to bolt the upright to the floor, these baseplates at the bottom of each column are sized based on the seismic zone of the warehouse and the slenderness-to-height ratio. Two anchor holes are provided in each footplate though only one is necessary for each column in nonseismic applications. The second is available if there is an obstruction preventing the use of the first.

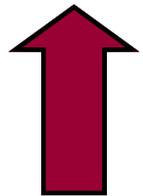
**THE CAPACITY:** When purchasing uprights, the weight capacity is provided, however this can be misleading because this capacity is based upon the reinforcement provided by the beams in the rack and is calculated on a minimum distance between beam levels and from the floor. At least two beam levels are required as well and the capacity shown is always nonseismic.



**THE DEPTH:** Deciding how deep your uprights need to be from front to back is directly related to the size of the load. As shown in the illustration to the right, pallets may overhang the depth of the upright by as much as 3" front and back. With the most common pallet being 48" deep, 42" deep frames are the most frequently used.

**When choosing uprights for selective rack, it's important to always start with the size and weight of the material you'll be storing**

**THE HEIGHT:** Uprights only need to be as high as the top beam level needed, however, other elements come into play. For example, the maximum height is dictated by the overhead clearance. The upright height can be calculated by taking the clear ceiling height less 18", and then less the uppermost load height. Fire suppression regulations and insurance carrier restrictions also must be considered.



**THE BEAM ENDPLATE:** While there are literally dozens of variations, the most common beam endplate style today is teardrop, with slotted and bolted also retaining popularity. The one common element is safety locking the beam to the upright, preventing it from being knocked out. Because beam locks vary by manufacturer, it's good practice to ensure your beams match your uprights.



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