


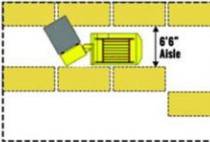
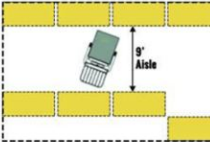
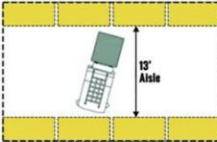

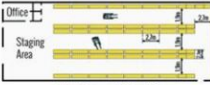
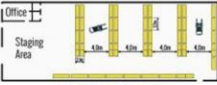


Staging and Anchoring Warehouse Racks

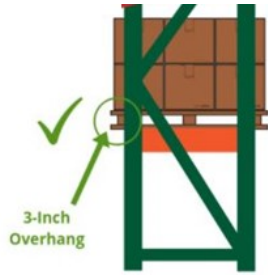
All warehouse pallet racks are required to be anchored for stability and security.

Before bolting racks down, confirm that the rack layout plan is designed to allow for adequate aisle spacing. This means that the forklifts that will be used should have space to back all the way out of the rack with a load, stop and lower the load without turning the truck, then is able to turn (sharply) and back away –without hitting a pallet in the rack or a rack upright. (Note that standup-reach lifts normally allow much tighter rack spacing compared to standard sit-down forklifts. A sit-down fork with forks longer than 48 inches may require a wider aisle. (Assume there will be a 3 inch overhang on the front side of racks on each side of the aisle for 42 inch racks). Typically companies align a row of racks just against any rows of repeating structural support columns in the warehouse, sometimes between a pair of racks (otherwise, the columns end up in our aisles).

	Very Narrow Aisle	Narrow Aisle	Standard Aisle
FORKLIFT TYPE	Bendi Forklift 6'6" Aisle 	Reach Truck 9' Aisle 	Cushion Tire Forklift 13' Aisle 
MINIMUM AISLE WIDTH			
RACK LAYOUT	 <p>Warehouse laid out for a Bendi Forklift</p>	 <p>Warehouse laid out for a Reach Truck</p>	 <p>Warehouse laid out for a Cushion Tire Forklift</p>

Different lift trucks have different minimum required aisle widths.

Most companies buy racks that are 42 inch deep (the perfect size for 40x48 pallets, loaded with 3 inch overhang front and back). If you currently have smaller depth rack and want to load them with 40x48 pallets, consider upgrading your racks (or moving the small depth racks to an area where small skids are stored). If your site will likely need to go to taller racks in the future, you might want to get a quote for the taller uprights now (because the hassle and expense of swapping-out uprights will increase after the racks are bolted).



Example of 48 inch pallet on a rack that is 42 inches deep.

Other than at walls, we typically put 2 rack rows in parallel next to each other. In this situation, before bolting the racks, we attach spacers to add another layer of stability (and reduce the chance of an item being pushed over the edge onto someone on the backside – Backside netting should be used otherwise). Normally we use a 12 inch spacer between 42 inch racks (but only a 6 inch spacer with racks that are 48 inches deep). If forks are longer than 48 inches, a wall spacer likely will need to be a foot or longer.



Spacers between rack rows reduce the likelihood of tipping. Wall spacers also help protect the wall from fork damage.

We need to ensure all of the racks are level before installing any anchors. A laser beam with a level helps with this task. A change in the base elevation for the uprights that is less than $\frac{1}{4}$ inch in 8 ft is considered level enough. Otherwise, we will need to use shims to improve the leveling. We also want the racks to be in a straight line (You can eyeball the edge down the aisle to check for linear alignment).



If several shims are needed for leveling, they should be welded together.

Shims taller than six times the anchor diameter are not allowed. In this case a moderate shim could be used and the shelving could be attached one teardrop up or down compared to the other side.

Each column of the rack frame should be anchored. This requires to an adequate and stable concrete floor under each leg and will require some anchoring hardware. When selecting anchor type to use check for any recommendation from the rack manufacturer - otherwise use personal preference (between a wedge anchor or a concrete strike anchor).



Wedge Anchor



Concrete Strike Anchor

Normally a ½" diameter anchor is used. They come in different lengths. Typical lengths used are 3 ¾ -4 ¼ inches. Holes are drilled through a hole in the rack base (usually only one hole per upright) using a concrete bit (with a carbide tip) with an impact drill.



The hole for the anchor bolt is drilled through the baseplate of the assembled, spotted, and leveled rack.

There are contractors that can help level and anchor racks properly, but the manufacturer, warehousing firm, or distributor will need to mark where the racks belong first. It's considered safer to use a racking contractor to assemble or take down racks. Some of them have equipment that allows moving racks without disassembly.



Contractors may have (or rent) equipment to move assembled racks.

Most companies find it's wise to install protective bumpers to protect uprights on the ends of aisles (to minimize the likelihood of damage from forklifts).



Example upright protector.

OSHA and Bolting Down Racks

The reference document that OSHA uses in conjunction with paragraph (5)(a)(1) of the OSH Act of 1970 (also known as the General Duty Clause) to cite employers for pallet racks and other types of industrial steel shelving (like pipe racks, bin storage racks, and parts shelves) that are not adequately secured from falling over. And that document is ***ANSI/RMI MH16.1 – Specification for the Design, Testing and Utilization of Industrial Steel Storage Racks.***

The ANSI document contains recommendations for securing storage racks of various types and heights to increase their stability and decrease the chance they will be accidentally pushed or pulled over. This is typically achieved by two means; first is to insert anchor bolts into the floor through holes in the base plates provided by the steel storage rack manufactures. And second is to secure the racks to either the wall (if a single row is positioned along a wall) or to each other (if positioned back-to-back) to provide additional stability (see examples in the photos).