Pallet Rack Installation Instructions July 2023

UNARCO STORAGE RACKS SHALL BE ASSEMBLED ONLY BY TRAINED PERSONNEL EXPERIENCED IN THE PROPER ASSEMBLY OF RACKS. SUCH PERSONNEL MUST BE THOROUGHLY FAMILIAR WITH THESE INSTALLATION INSTRUCTIONS.

Prior to the start of installation, the installer should:

- Make sure all members of the installation crew are trained with regard to the installation procedures and any safety procedures necessary to establish a safe working environment.

- Review and count all rack materials and compare them with the project documents to make sure that the proper materials have been received. Notify the shipper immediately if any shortages exist with respect to the bill of lading. Inspect the materials and make sure they are undamaged. Stage all materials in an organized manner so they can be quickly located.

- Verify the proper location of the racks with the owner or site contact person. Unarco racks are to be installed on a concrete floor. The floor slab must be designed to support the load from the columns after the racks are fully loaded and to accept the installation of the anchors. A six-inch thick slab (f'c = 3000psi) is suggested for normal duty pallet racks, but the customer's building engineer should verify that the floor is adequate. The floor should be level so that a plumb installation of the rack can be achieved.

- Completely inspect the area verifying building column locations and checking for any other types of obstructions such as piping, electrical panels, ducts, lights, doorways, etc. Any such obstructions should be flagged with tape and called to the attention of the site contact person, and plans should be made to avoid or remove the obstruction. Building column locations should be noted, and if there are any places where aisle widths are compromised, the installer should notify the site contact person. If it becomes necessary to modify the configuration of the racks in any way, prior approval must be obtained from Unarco.

- Determine a starting line and snap chalk lines to layout the floor. Make sure adequate aisle widths are established. Down-aisle chalk lines should be made at the front face of the rack columns from the start line.

Installation of the first Rack Bay (Starter Bay):

- Erect the first rack bay making sure that the beam elevations are correct. If possible, have the site contact person verify that the configuration of this bay is correct. If the site contact person requests a different configuration than the design configuration, prior approval of this altered configuration must be obtained from Unarco.

- To achieve a good installation, the starter bay must be plumb in both the down-aisle and the cross-aisle directions. Shims may be needed to achieve cross-aisle plumbness. When shimming the racks, back-to-back rows should not be allowed to lean towards the flue space (towards each other). Thinner shims should be considered for installation of frames with high aspect ratios, (frame height divided by the frame depth). The rack should

be installed plumb to within ¼" per 10 feet of height. Square the rack bay (in plan view) by comparing opposing diagonal dimensions of the shelf. Once the rack is plumb, all bolts should be tightened and all locking mechanisms checked.

For Unarco T-bolt racks, the installer should determine the correct number of T-bolts that go in each connector before installation begins. Some connectors require only (1) T-bolt because there is a tab that goes in the lower connection hole. Other connectors will have (2), (3) or (4) T-bolt slots. These connectors will always require at least (2) t-bolts per connector but may or may not require any more than (2) T-bolts per connector depending on the design. For example, the connector that has (3) T-bolt slots may either need (2) T-bolts (installed in the top and bottom holes with the center hole as a drift pin hole) or (3) T-bolts (one in each hole). Failure to determine the correct number of bolts per connector may result in a bolt shortage part way through the project or the installer may have go back and re-install beams with the corrected number of bolts.

All T-bolts should be installed with the T head on the inside of the column. The Wiz nuts can be pre-assembled on the T-bolts, then, holding the nut, the T-bolt head is inserted through the T-bolt slot in the connector and through the T-bolt slot in the column. The T-bolt is then turned 90 degrees clockwise so the slot in the end of the bolt is horizontal, indicating that the T head is in its proper orientation. The Wiz nut should then be tightened to at least 90 ft-lbs. If the beam connectors are infinitely adjustable with long slots where the elevation of the beam is held by the clamping action of the bolts, the bolt torque should be at least 110 ft-lbs. **Failure to properly tighten the T-bolts can result in a loss of lateral stiffness of the rack assembly and possible collapse of the rack.**

For structural doubled channel columns long bolts may cause the channel webs to deform under 90 ft-lbs. of torque. Where this could occur the torque should be reduced to 60 ft-lbs.

- For Unarco Sturdi-bilt racks, the wedge locks must be properly installed from the inside through the corner slots of the columns and the corner slots of the connectors. The beams should be seated. If there is a P-magnet or a spring clip device, these must be properly installed.

- For teardrop style racks, the installer must make sure that all of the connector pins are properly engaged in the column and that the safety locks that prevent the beams from becoming dislodged are working properly. The entire head of the pins must be inside the column thickness.

Rack Anchoring:

- Many projects require special anchoring details that will be shown on the Unarco erection drawings. These anchoring details are to be followed by the installer. In absence of such details, for standard pallet racks, Unarco recommends the use of (1) anchor bolt per column and that the anchor be ½" diameter and provide 2-1/2" of nominal embedment into the floor. Nominal embedment is defined as the amount of the anchor that is beneath the surface of the floor before tightening. If the base plate is a larger base plate with four holes, at least (2) anchors per column shall be used and installed in opposite corners of the base plates whenever possible.

- When installing the anchor bolts, the erector should refer to the anchor bolt instructions from the anchor bolt manufacturer to obtain the torque values for the anchors.

- The anchor bolt torque is less than the torque of other bolted connections because over-tightening the anchor bolt will fail the holding device and possibly pull the anchor out of the floor.

- The anchor bolt length should be long enough to achieve the required embedment considering the baseplate thickness (including expected shim thickness) plus one diameter of the anchor above the

base plate. The nominal embedment shown on the drawings is the embedment before tightening for mechanical anchors. The final embedment (for ½" anchors may be about ½" less).

- Though we recommend always anchoring, some codes suggest that anchors may be omitted for short (8 ft. in ht. or less) racks that are manually loaded and unloaded in low seismic areas.

Installation of the Remaining Bays:

- Remaining bays can then be installed making sure that the rows are straight on the chalk line and that the subsequent frames remain plumb (within 1/4" per 10 feet of height) in both the down-aisle and the cross-aisle directions. The rest of the rack row can be set up prior to anchoring. All footplates of the remaining bays should be anchored as the starter bays (refer to installation of the starter bay). Never attempt to pull a rack into plumb after fasteners have been tightened or use excessive force to plumb a rack. This could bend or otherwise damage the rack members. Periodically check plumb as the rack installation proceeds. It can be very difficult to plumb multiple bays of rack that have been installed out-of- plumb.

Accessories:

- Back connectors should be installed loosely and tightened once the entire rack row is completely installed, plumbed and tightened. The tightening torque for the back-connector bolts is 90 ft. pounds. When possible, the back connectors should be installed at a level that is near the elevation of the frame horizontal brace. The top back connector should be installed near the horizontal that is just above the topmost diagonal. The bottom back connector should be installed near the horizontal that is above the bottom diagonal. If more than two back connectors are used, the remaining ones can be uniformly spaced; but it is still a good idea to have them at or near a frame horizontal brace. These are only guidelines for back connector placement. The installer should install the back connectors as shown on the drawings.

- The installation of the column protectors should be considered prior to anchoring of the racks because some column protector styles require a common anchor bolt with the rack. Other types of column protectors can be installed independently after the rack installation is complete.

- Shelf accessories, such as crossbars or wire decking, should be installed after the rack row frame and beam installation is complete, all the bolts are tightened and the rack has been anchored. Any wire decks that are non- waterfall must be tek-screwed in place so they cannot fall between the beams. Installers should not step on wire decks or crossbars.

Inspection:

- Throughout the installation process, the rack installer should inspect the racks to ensure that proper installation procedures have been followed.

Notes:

- These installation instructions are guidelines for the proper installation of standard pallet racks. The proper installation of the racks is the responsibility of the purchaser and is not covered by any warranty of Unarco. For more information on storage racks, the user should refer to the, "Specification for the Design, Testing, and Utilization of Industrial Steel Storage Racks – 2023 Edition," that is published by the Rack Manufacturer's Institute, 8720 Red Oak Blvd., Suite 201, Charlotte, NC 28217-3992. Unarco has no responsibility or warranty obligations regarding materials not manufactured by Unarco that are used in connection with Unarco racks.

- These installation instructions are only for standard frame-beam style racking.

- The rack installer and the rack user should refer to the Unarco web site for the Unarco Rack User's Manual. Copies of this manual can be viewed online or downloaded from **www.unarcorack.com**.

- If questions still exist, contact Unarco for technical support at 615-384-3531.