

## Teardrop Pallet Racking Systems: How HEDA Shelves Meets North and South American Storage Standards



**Guangzhou, Guangdong Oct 26, 2026 ([IssueWire.com](https://www.IssueWire.com))** - Industrial storage facilities across North and South America rely extensively on [teardrop pallet racking systems](#) due to their universal modularity, toolless beam adjustment, and dependable structural integrity. Standardized on a 50.8 mm (2-inch) vertical pitch, the inverted teardrop punch pattern provides a tapered slide-and-lock geometry that secures beam end connectors under downward gravitational loads. Sourcing high-bay and standard

racking for American logistics hubs requires stringent mechanical alignment with dimensional interchangeability, continuous steel yield strength, and seismic resistance standards. Guangzhou [HEDA Shelves](#) Co., Ltd., established in 2001 with over two decades of structural steel fabrication heritage, manufactures standardized teardrop storage systems engineered specifically to satisfy strict regional engineering protocols and high-throughput distribution demands.

### **Precision CNC Cold Punching and Modular Interchangeability**

The functional core of the teardrop profile lies in the precision of the tapered aperture. Each teardrop punch features a wider circular entry at the top that transitions smoothly into a narrower vertical locking slot at the bottom. When the conical pins or heavy-duty rivets of a step beam connector slide into this channel, gravitational weight pulls the connection into a wedged mechanical lock. Maintaining interchangeability across diverse warehouse expansions and retrofits requires exact punching tolerances. HEDA Shelves deploys automated multi-station CNC continuous cold-punching equipment, holding center-to-center pitch tolerances within plus or minus 0.1 mm across the entire height of the column. This dimensional control allows beam levels to seat uniformly without forced distortion, enabling direct interchangeability with standard American teardrop upright frames while maintaining uniform load transfer across every shelf level. This compatibility facilitates facility expansions and storage bay retrofits, enabling engineering teams to cross-reference legacy punch drawings or customer samples to maintain precise mechanical interlocking with existing warehouse infrastructure.

### **Continuous Roll-Forming Mechanics and Column Section Rigidity**

Structural performance in multi-tier pallet storage depends fundamentally on cold-formed steel section geometry and material properties. Upright columns must absorb combined axial compression and lateral bending forces caused by dynamic forklift movements and multi-ton pallet loads. Fabricated from certified Q235B high-tensile structural steel, upright profiles are shaped through a continuous 12-stage precision cold roll-forming process. This multi-pass forming creates an engineered open C-channel column with multiple return stiffening ribs along the profile flanges. These cold-worked contours substantially increase the cross-sectional moment of inertia and torsional stiffness without adding dead weight. Upright cross sections, configurable in depths of 800 mm to 1,200 mm and steel sheet thicknesses from 1.5 mm to 2.5 mm, deliver stable vertical load ratings supporting up to 5,000 kg per storage level.

Horizontal load distribution is handled by roll-formed step beams and boxed step profiles designed specifically to support standard wire mesh decking, structural steel safety bars, and wood pallet supports. Fabricated by locking and continuous seam processing of double-folded steel channels, these beams provide rigid horizontal stability under distributed pallet weights ranging from 800 kg to 5,000 kg per pair. Deflection limits are mechanically restricted to less than  $L/250$  under full working capacity, preserving horizontal clearances and preventing uneven floor slab loading.

### **Automated Robotic Full Welding and Protective Surface Integrity**

Joint integrity at the intersection of the horizontal beam and the vertical connector plate governs the structural stability of the entire rack structure. Manual welding variations can introduce micro-cracking, porosity, or localized stress concentrations. HEDA Shelves standardizes beam connector assembly through multi-axis robotic welding workstations. Automated continuous penetration welds bond the structural steel connectors to the roll-formed step beams with uniform bead profiles, smooth transitions, and complete root penetration. This automated process creates joint connections that withstand sustained cyclic loading, vibrational resonance from high-speed reach trucks, and accidental pallet

impacts.

Surface protection across all upright columns, bracing members, and load beams utilizes a comprehensive industrial finishing line. Fabricated steel components undergo chemical degreasing, multi-stage acid pickling, rust removal, and electrocoating bath treatment before entering an automated electrostatic powder coating booth. The thermosetting polyester powder coating is cured at high baking temperatures, forming a durable, abrasion-resistant barrier with coating thickness between 60 and 80 microns. This protective layer maintains corrosion resistance, surface hardness, and mechanical adhesion across humid Latin American distribution centers and climate-controlled North American ambient logistics facilities. For extreme cold-chain operations operating down to  $-40^{\circ}\text{C}$  or high-condensation environments, HEDA provides optional hot-dip galvanization across all uprights and beam assemblies, safeguarding against sub-zero brittle fracture while preventing coating delamination under prolonged freezing cycles.

### **Structural Engineering, Seismic Calculation, and ANSI MH16.1 Alignment**

Warehousing hubs situated in active seismic zones, including the west coast of North America and Andean South American regions such as Chile, Peru, and Colombia, demand validated structural analysis. Teardrop rack designs must comply with ANSI MH16.1 specifications (Specification for the Design, Testing and Utilization of Industrial Steel Storage Racks) and Rack Manufacturers Institute (RMI) engineering criteria. Structural modeling utilizes finite element analysis (FEA) to verify column buckling limits, rotational spring constants of the beam-to-column connections, and overall structural ductility under dynamic seismic wave acceleration.

To transfer vertical loads and seismic overturning moments securely into concrete foundations, teardrop upright frames are equipped with heavy-duty structural footplates. Formed from solid steel plates measuring 6 mm to 10 mm in thickness, these baseplates feature multi-hole anchoring configurations that accommodate dual mechanical wedge expansion anchors. Heavy-duty horizontal and diagonal C-channel bracing assemblies, bolted securely to the front and rear columns at calibrated triangular angles, transfer lateral shear loads efficiently down to the floor slab. Before shipment, structural batches undergo mechanical load testing in certified testing rigs, validating maximum designed compressive capacity and deflection tolerances under operational factory control certified under ISO 9001:2015.

### **Direct Sourcing Advantages and Engineering Consultation**

Procuring teardrop pallet racking directly from an experienced manufacturer streamlines project execution for international distributors, warehouse integrators, and logistics facility managers. Direct factory engagement removes intermediary markups, delivers verifiable mill test certificates (MTC) for all structural steel batches, and secures precision packaging with protective corner wrapping and steel strapping for containerized ocean transport. Engineering consultation teams provide complimentary AutoCAD warehouse layout schematics and 3D spatial elevations, coordinating bay clear heights, frame depths, beam step elevations, and forklift aisle widths with client material handling equipment specifications.

To evaluate technical drawings, request load calculation documentation, or specify custom teardrop upright frames and step beams for upcoming warehouse construction projects, connect directly with the engineering department of HEDA Shelves through the official international portal at <https://www.hedarackstorage.com/>.



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