

Loading Dock Systems

Setting new standards in loading dock safety, quality and reliability





The Pentalift Formula for Success:

Our competitors wonder how we have achieved our tremendous growth and success; our customers do not.

It is quite simple.

We are committed to the 100% satisfaction of our customers.

This commitment is reflected in every aspect of Pentalift.

Our engineering department's design philosophy is "*Simplicity is the Ultimate Sophistication*". The Pentalift team of engineers are dedicated loading dock professionals utilizing modern computer engineering tools to design sophisticated but simple, safe, and reliable loading dock equipment. The products highlighted in this brochure reflect the achievement of this goal. We confidently invite their comparison with that of any and all others.

Loading dock environments are generally harsh and abusive to all types of equipment. Periodic maintenance in these areas is generally the exception rather than the rule. The simple but rugged sophistication of our loading dock products enable them to function reliably and safely in these conditions.

Our designs are continually proven and verified by actual feedback from satisfied customers utilizing Pentalift loading dock equipment.

Our manufacturing people have and utilize the tools, equipment, skills and production techniques required to produce the world's best loading dock products.

Our sales engineers and distributors' representatives are loading dock experts. They work to develop safe, effective systems for our customers' loading dock areas. The fact that Pentalift manufactures one of the broadest line of loading dock equipment in the industry enables them to select the most suitable solution.

Our customers recognize that the quality, reliability, and safety of Pentalift products and our dedication to service reflect a total commitment to complete customer satisfaction.

Selecting Pentalift as your loading dock company assures you of the same commitment.

PENTALIFT EQUIPMENT CORPORATION

Paul Pedersen, President

Pentalift – Setting New Standards in Loading Dock Safety, Quality and Reliability

By utilizing Pentalift Loading Dock Equipment you are assured of superior loading dock safety, the efficient transfer of freight between your loading dock and trucks and the lowest lifetime ownership cost.

Extensive, Dedicated Manufacturing Facilities

Pentalift's manufacturing operations are conducted at our modern facilities. The plants have been designed and equipped for the construction of our loading dock products. Here we make everything we sell. Each unit and every part is subject to stringent quality control to meet Pentalift's strict standards of excellence.



Fig. 1



Fig. 2

Advanced Engineering Capabilities Developed Safe, Reliable Designs

To accomplish Pentalift's objectives, the company has invested heavily in the latest, state-of-the-art, computer-aided design engineering hardware and software. In the hands of our highly skilled staff of professional loading dock engineers, this technology has benefitted both us and our customers.

The use of advanced solid modeling, finite element analysis systems and computer drafting software has allowed us to refine our loading dock products to be safe, dependable and rugged, achieving our corporate goal of "*Simplicity is the Ultimate Sophistication*".

Our computer drafting system allows us to generate precision drawings of equipment and take it through its full range of motion, assuring optimal performance. Through the use of finite element analysis software we also subject our levelers to years of simulated, high cycle, heavy loading conditions to assure design integrity.

Years of in-field, real world use confirmed what our computers predicted, Pentalift dock levelers are extremely safe and reliable.



Fig. 3

Fig. 3. 160,000 lb. capacity Hydraulic Dock Leveler featuring $\frac{1}{2}$ " thick deck plate, $1\frac{1}{2}$ " thick lip plate, 1" thick x 10" high headboard, 10" deep deck beams, $2\frac{1}{4}$ " diameter lip hinge pin, $4\frac{1}{2}$ " diameter gusseted hinge spools.

A Complete Loading Dock Equipment Line

In addition to the dock levelers presented on the following pages, Pentalift produces other loading dock products, including vertical storing dock levelers, vehicle restraints, safety barriers, elevating docks, both conventional and inflatable dock seals and shelters. Unlike other manufacturers, who are limited in what they can offer because of the narrow product line, our commitment to offering the optimal solution for loading dock applications has established the Pentalift equipment product line as one of the most complete in the industry.



Fig. 4 Pentalift's computer-aided design department.

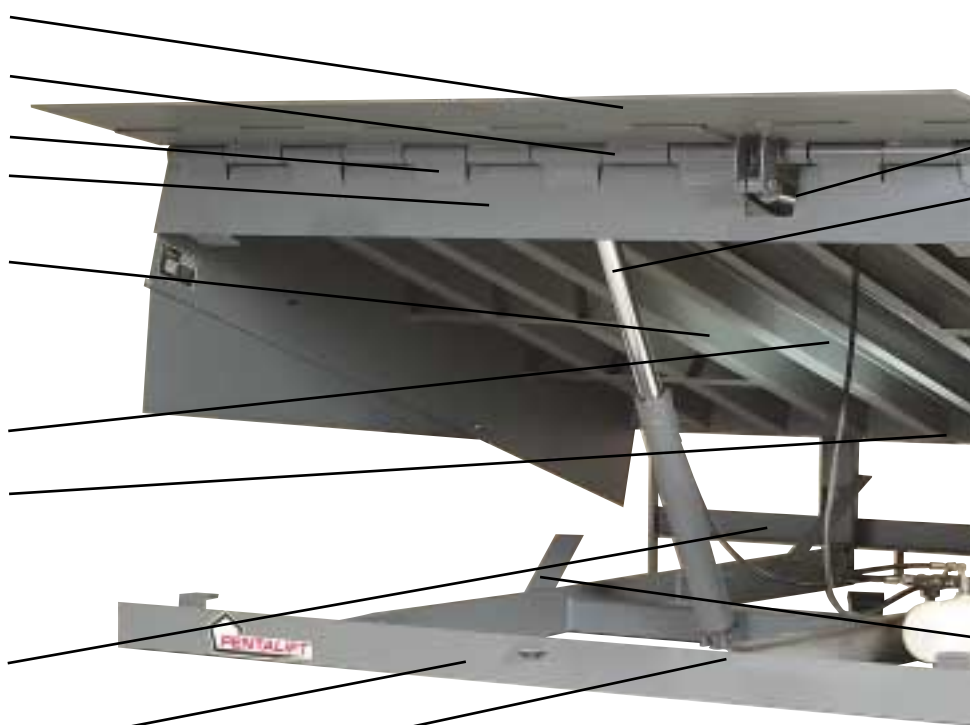
Series HD Hydraulic Dock Leveler

Structural Features*

- High-strength, 4-way safety tread plate deck and lip assembly; 55,000 psi yield.
- Full-width, self-cleaning, heavy-wall hinge tube; 70,000 psi yield.
- Gussets on lip and headboard hinge maximize support.
- Deep, 8" high, one-piece headboard with bridged gaps; radii on all inside corners for maximum strength; 50,000 psi yield.
- Structural, precision-formed "C" beams; 65,000 psi yield. Specially designed beams allow Pentalift to create and build the deck support with optimal strength-to-weight ratio for a dock leveler. Utilizing 10 beams assures an even load distribution and maximum deck support.
- Central deck beam for added support of three-wheeled vehicles.
- Full-width, structural channel tailboard and one-piece, full-width rear hinge complete with heavy steel gussets. Pentalift's unique, welded assembly provides a box section (Fig. 5) for superior support.
- Rear frame assembly features five vertical structural members with eight points of even support for the full-width rear hinge.
- Heavy-duty front frame provides full-width, cross-traffic support and superior building aesthetics.
- Night lock prevents unauthorized entry when overhead door is locked on top of dock leveler.



Fig. 5



*Model HD6835

Lift Cylinder Placement

Fallsafe is a situation in which a hydraulic velocity fuse locks the cylinder and deck in position should a truck prematurely depart while a forklift is still positioned on the leveler.

Master Control Panels

Master Control Panels are available to suit various applications and combinations of dock equipment. Master control panels are used to simplify and harmonize the operation of the loading dock equipment, increase safety, reduce field-wiring costs and conserve wall space at the loading dock. The dock equipment that is typically interlocked is any combination of: hydraulic dock leveler, vehicle restraint and safety light system, overhead door and/or inflatable dock shelter.



Fig. 7



Fig. 8

Other Manufacturers

Other manufacturers position their lift cylinder as illustrated above (Fig. 8). During a fallsafe condition, with the front tires of the forklift past the upper cylinder support point, a dangerous "teeter-totter" situation occurs. The back of the deck is forced upwards and out of the rear frame. In addition, the positioning creates a mechanical disadvantage during fallsafe (1" stroke = 4" deck drop).

Other cylinders, with the chrome plated piston facing downward, are prone to surface damage and chipping, leading to hydraulic seal failure.



Fig. 9

Pentalift

For most effective support, Pentalift's lift cylinder is securely positioned at the junction of the deck and the structural headboard (Fig. 9). The base of the cylinder is connected to a structural cross member. During a hydraulic fallsafe situation (incorporating non-adjustable velocity fuse) the forklift will be completely supported between the cylinder position and the rear frame. All generated forces are downward, in the manner all dock levelers are designed to accept load forces.

The Pentalift lift cylinder is positioned correctly, away from debris found in the pit. Its position provides a superior mechanical advantage when raising the deck.

Operating Features

- Self-retracting, hydraulic lip cylinder is standard on all models for fully hydraulic operation.
- Top-fed, forward-positioned hydraulic lift cylinder.
- Telescopic toe protection assures total dock attendant safety. Lower section features a “bend relief” to maximize strength.
- Fixed rear hinge remains flush with the rear of the pit to eliminate potential pinch points and surface obstructions. Design allows 4” of lateral deck compensation to accommodate canted truck/trailer beds.
- Hydraulic power unit incorporates internal filtration system and 1 1/2 hp TENV motor.
- Integral, posi-lock maintenance strut supports both deck and lip assembly during maintenance and service.

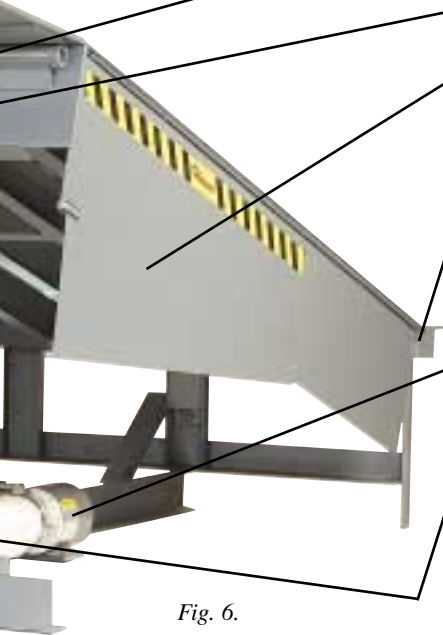


Fig. 6.

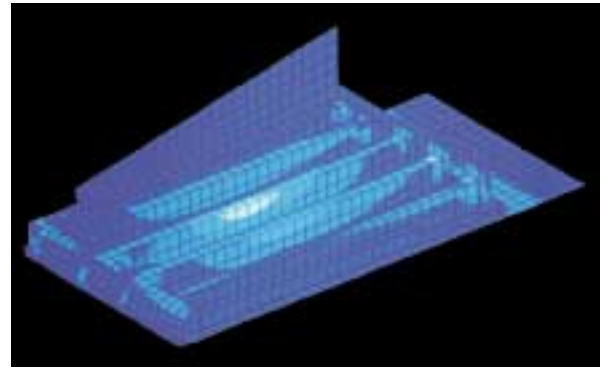


Fig. 10

Balanced Design for Structural Harmony

Other dock leveler manufacturers boast of individual components as though they were unrelated to each other in strength. Little thought is given to the overall structural balance of the combined load-bearing components.

Many dock leveler manufacturers fail to realize that, in many respects, the combination of structural components is similar to a chain and a chain is only as strong as its weakest link.

Through the use of state-of-the-art finite element analysis software, Pentlift components are designed and sized to maintain structural balance and harmony throughout, assuring maximum dock leveler life by eliminating any weak links.

Self-Retracting Lip

A self-retracting lip is an important safety and performance feature. The *Pentalogic* hydraulic manifold facilitates the self-retracting lip on Pentlift “HD” Series dock levelers.



Fig. 11

Pentalogic Hydraulic Manifold

Operating every hydraulic function with only two moving parts, the *Pentalogic* hydraulic manifold revolutionized dock leveler hydraulic control circuitry. Conventional hydraulic dock leveler control valve circuitry is comprised of several individual function valve assemblies. These assemblies are constructed from many sub components, increasing the potential of hydraulic component failure and oil leaks. Utilizing only two moving components, the non-adjustable *Pentalogic* hydraulic manifold eliminates all concerns related to on-site adjustment, oil leaks or hydraulic component failure.

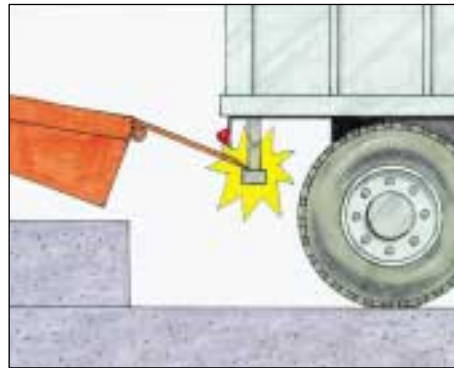


Fig. 12

Conventional hydraulic dock levelers, yieldable lip circuits utilize an “in line” pressure relief valve, maintaining the lip in the extended position. Once a vehicle departs, the deck lowers with the lip remaining in the extended position. The next incoming vehicle will impact the extended lip and any excessive force will push the lip assembly back into the pendant position. In addition, a conventional hydraulic circuit can cause the lip to get “caught on” a portion of the incoming truck (Fig. 12), resulting in extensive damage to the vehicle, dock leveler and cargo.

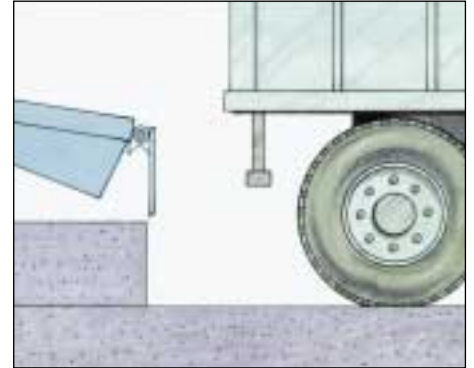


Fig. 13

On truck departure, the *Pentalogic* hydraulic manifold allows the lip assembly to gently retract into the pendant position prior to the arrival of the next incoming vehicle (Fig. 13). The *Pentalogic* hydraulic manifold assures that the lip is always pendant behind the protective bumpers. Units equipped with automatic return-to-stored-position, work in conjunction with the self-retracting lip (eliminating false signals common with other makes), to return the deck to the safe, stored position.

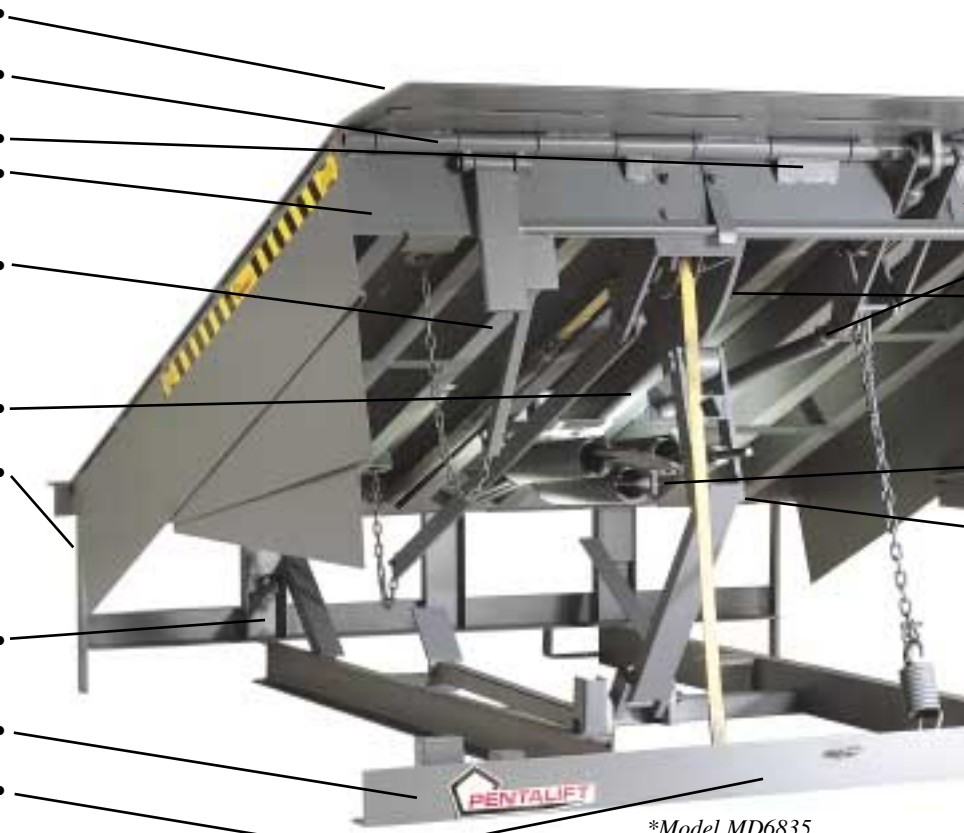
Series MD Mechanical Dock Leveler

Structural Features*

- High-strength, 4-way safety tread plate deck and lip assembly: 55,000 psi yield.
- Full-width, self-cleaning, heavy-wall hinge tube; 70,000 psi yield.
- Gussets on lip and headboard hinge maximize support.
- Deep, 8" high, one-piece headboard with bridged gaps; radii on all inside corners for maximum strength; 50,000 psi yield.
- Structural, precision-formed "C" beams; 65,000 psi yield. Specially designed beams allow Pentalift to create and build the deck support with optimal strength-to-weight ratio for a dock leveler. Utilizing 10 beams assures an even load distribution and maximum deck support.
- Central deck beam for added support of three-wheeled vehicles.
- Full-width, structural channel tailboard and one-piece, full-width rear hinge complete with heavy steel gussets. Pentalift's unique, welded assembly provides a box section (Fig. 14) for superior support.
- Rear frame assembly features five vertical structural members with eight points of even support for the full-width rear hinge.
- Heavy-duty front frame provides full-width, cross-traffic support and superior building aesthetics.
- Night lock prevents unauthorized entry when overhead door is locked on top of dock leveler.



Fig. 14



*Model MD6835

The "Easy Float" Hold-down Represents a Major Advancement in the Most Important Component of a Mechanical Dock Leveler

The Hold-down assembly in a mechanical dock leveler has two main functions; to hold the leveler in position on the back of the truck, and to allow the dock leveler to "float" up and down with the suspension of the truck as it rises and lowers during unloading and loading operations. In some instances this "floating" movement is over 12". Every time a lift truck drives in or out of the truck, a tremendous shock load is delivered to conventional ratchet and pawl type Hold-downs. This is why conventional Hold-downs are a continual source of breakdown problems with broken teeth on both the ratchets and pawls. When the Hold-down on a mechanical dock leveler breaks, the entire dock leveler is inoperable.

In 1983, Pentalift invented and patented its "Easy Float" Hold-down. Pentalift was the first in the industry to incorporate a brake band and high strength, nylon strap to eliminate the extreme stresses and impact forces that cause conventional Hold-downs to fail. Here's how Pentalift's "Easy Float" Hold-down operates compared to conventional ratchet and pawl type Hold-down assemblies.

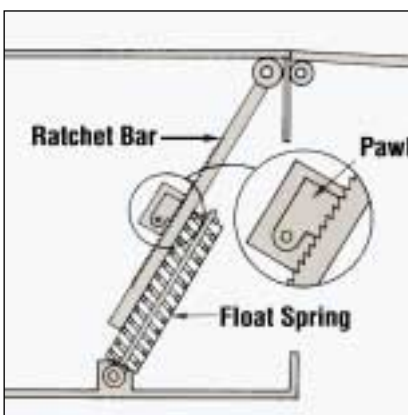


Fig. 16

Ratchet and Pawl Hold-down

A float spring compensates for truck bed movement. The spring's resistance becomes progressively greater as the deck rises. Once the float spring is fully compressed, the severe upward force results in substantial Hold-down damage. Accumulated over-working weakens the spring, creating "bounce" during rollover. The shock load stresses during float bear directly on the hardened metal ratchet bar and the rigid pawl teeth. (Fig. 16). These damaging conditions, common during normal usage, cause aggravating ratchet and

pawl teeth failure. Some designs release the pawl from the ratchet once the float spring has been compressed. The teeth automatically release and reset under spring pressure, causing premature ratchet and pawl failure.

"Easy Float" Hold-down

Controlled, automatic compensation of the brake assembly, under a light upwards force (approximately 200 lb.), allows Pentalift's dock leveler deck to float gently upwards and maintain positive lip contact with the truck bed. The brake band design assures that the automatic compensation force will remain constant throughout the entire operating range. The high-strength nylon strap absorbs shock loads because of its semi-elastic properties.

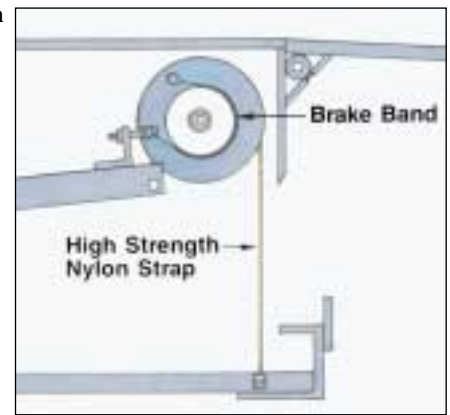


Fig. 17

Operating Features

- Positive lock lip maintains extension of the lip, then automatically retracts once the truck departs. Lip is yieldable if contacted in extended position during truck/trailer positioning.
- Lip-assist spring assembly counterbalances the weight of lip for smoother extension and retraction.
- Mechanical safety legs limit platform free fall in the event of premature truck departure; includes below level control.
- Computer optimized cam profile reduces “walkdown” forces.
- Full-range telescopic toe protection; upper and lower sections feature a “bend relief” to increase strength.
- Heavy-duty, adjustable lift springs.
- Safe, easy maintenance; only three adjustment points, conveniently located at the front of the leveler, eliminate the need to enter the pit.
- Fixed rear hinge remains flush with the rear of the pit to eliminate potential pinch points and surface obstructions. Design allows 4” of lateral deck compensation to accommodate canted truck/trailer beds.

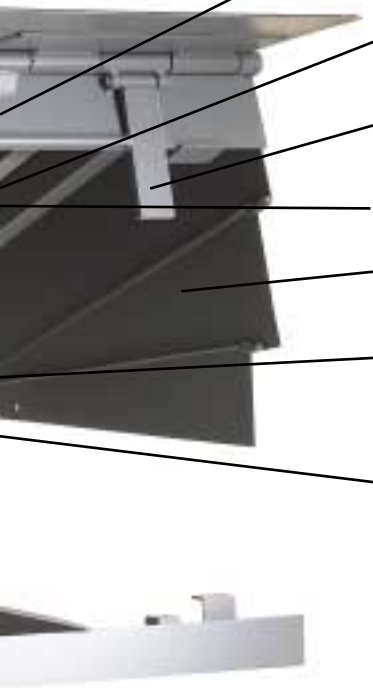


Fig. 15

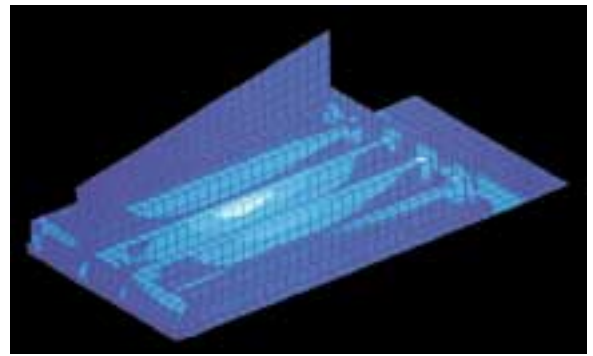


Fig. 18

Balanced Design for Structural Harmony

Other dock leveler manufacturers boast of individual components as though they were unrelated to each other in strength. Little thought is given to the overall structural balance of the combined load-bearing components.

Many dock leveler manufacturers fail to realize that, in many respects, the combination of structural components is similar to a chain and a chain is only as strong as its weakest link.

Through the use of state-of-the-art finite element analysis software, Pentalift components are designed and sized to maintain structural balance and harmony throughout, assuring maximum dock leveler life by eliminating any weak links.



Fig. 19

Pull Ring Force Required to Release Hold-down

Hold-downs are released manually to allow the deck of the dock leveler to rise for use or to be restored after use when the truck is still at the dock. This is done by pulling a Hold-down release ring installed in the dock leveler deck. The pull force required to release the Hold-down is always a concern.

The release forces for a ratchet and pawl Hold-down can be up to 100 lb. when it is compensating for upward deck float; even under best case conditions 20-30 lb. of pull force is required. The “Easy Float” Hold-down only requires pull force of 8 lb. throughout the entire operating range of the dock leveler. Proven benefits of the Pentalift “Easy Float” Hold-down design result in maximum component life, and minimized risk of discomfort and injury to the dock attendant.

Effect of Canting Deck on Hold-down

Truck beds are not always level with the floor in which the dock leveler is installed. This is the result of trucks loaded on one side or because of laterally uneven driveways. Therefore, the dock leveler deck must be able to cant (tilt sideways) to compensate for the out-of-level truck bed.

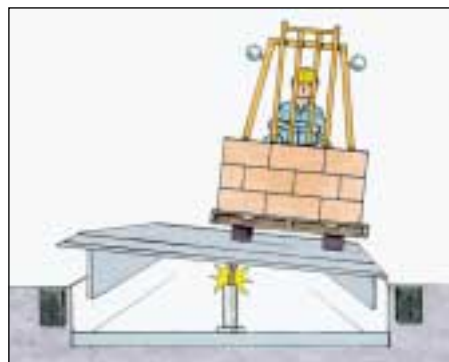


Fig. 20

Ratchet and Pawl Hold-down

Rigid steel ratchets and pawls connect the Hold-down from the deck to the frame of the dock leveler. The repetitive twisting forces placed on these components during the canting of the deck results in premature wear, breakage, costly downtime, expensive replacement parts and a compromise of dock safety.

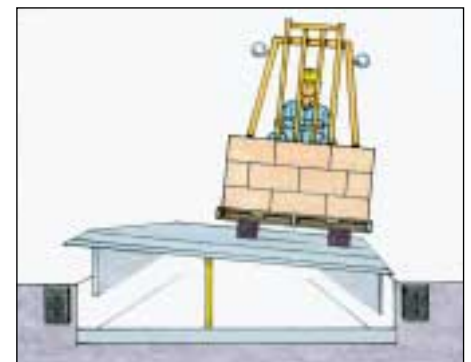


Fig. 21

“Easy Float” Hold-down

A flexible high strength nylon strap connects the Hold-down from the deck to the frame. The inherent properties of this strap allow it to easily compensate for the canting deck.

Roll-Off Stop Lip Dock Levelers

The proven performance and reliability of hydraulic operation with roll-off protection for enhanced loading dock safety.

Pentalift's "HDRS" Series of Roll-Off Stop Lip hydraulic dock levelers features all of the design, structural and operational benefits of the "HD" Series of Pentalift hydraulic dock levelers with the added safety enhancement of a roll-off stop lip.

The roll-off stop lip is a formidable barrier designed to prevent lift truck roll-off whenever there is no truck/trailer in position at a loading dock door.

The roll-off stop lip also serves to protect roll-up doors on positioned trucks/trailers from impact damage.

Roll-Off Stop Lip

Pentalift's offset hinge design automatically provides a barrier when the lip is in the vertical position.



Fig. 23

Model Selection

Pentalift's "HDRS" Series Roll-Off Stop Lip hydraulic dock levelers are available in a range of standard widths and lengths with capacities from 25,000 to over 100,000 lb.

Options

- pour-in place design
- interlock to vehicle restraint system
- interlock to overhead door
- foam insulated deck
- 18" lip length
- 20" lip length
- other options available

Consult a Pentalift Sales Representative for additional information or equipment recommendations.

NOTE: Some photos may reflect products with optional features. All Pentalift Equipment products are subject to design improvement through modification without notice.

PENTALIFT EQUIPMENT CORPORATION

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Fig. 22

The full width, self-cleaning, piano-style hinge ensures on-going, reliable performance with low maintenance.

By eliminating intricate sliding mechanisms, Pentalift's "HDRS" Series levelers maintain the roll-off stop feature at all times, even during higher risk, below level, end-loading operations.



Fig. 24