

MEASURE 6.2.6 Install dock-to-truck seals.

RATINGS		
New Facilities	Retrofit	O&M
B	B	

Most of the world’s goods are transported at some time by trucks and tractor trailers. Many of these are loaded and unloaded at enclosed truck docks. When a truck pulls up to the dock, the gap between the vehicle and the dock is a major path for air leakage. In fact, the gaps along a line of vehicles in effect convert an enclosed truck dock to an outdoor space. This greatly increases heating requirements in the loading dock and adjacent spaces during cold weather. When loading to and from refrigerated trucks and spaces, the air leakage radically increases refrigeration cost.

You can prevent most of this loss by installing sealing systems on the outside of the truck dock wall that mate with the vehicles. These systems are commonly called “dock seals.” Figure 1 shows a truck dock that uses dock seals effectively.

Dock seals have become popular. They continue to evolve, so get the latest catalogs.

SUMMARY

Greatly reduces infiltration into enclosed truck docks. Essential for cold weather, and when loading to and from refrigerated spaces.

SELECTION SCORECARD

Savings Potential	\$	\$	\$	\$
Rate of Return, New Facilities	%	%	%	%
Rate of Return, Retrofit	%	%	%	
Reliability	✓	✓	✓	
Ease of Retrofit	☺	☺	☺	

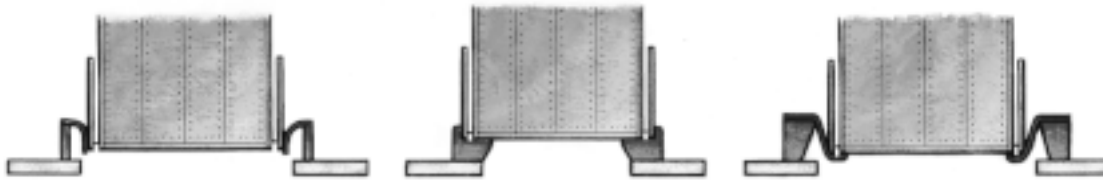
Types of Dock Seals

Contemporary dock seals come in two basic type. We will call these “butt seals” and “side seals,” although



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Fig. 1 Truck dock equipped to minimize infiltration Each entry has a tightly sealing door for times when it is not being used. To seal the gap between the trailer and the dock, butt-type seals are installed. Simple alignment marks are attached to the butt seals to help the driver mate the trailer to the seal properly. Dock levelers are installed to accommodate variations in trailer height. The dock leveler at left is in its vertical stowed position, where it acts as a safety feature to keep people from driving off the dock. A latching mechanism for the trailer’s ICC bar is installed below the dock leveler. The trailer at right is being held in place by wheel chocks. The entire assembly is protected from precipitation by the roof overhang.



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Fig. 2 Types of dock seals The type at left is a sliding seal, which contacts the sides of the trailer, seen here from above. The type in the center is a butt seal, which contacts the rear of the trailer. The type at right is a hybrid of the other two that seals the gap between the open door and the side of the trailer.

standard names for these types do not yet exist in the industry. Figure 2 shows both types. Each type has advantages and disadvantages in particular applications. There are variations within these two types.

With butt seals, the rear of the truck or trailer butts against thick pads on the outside of the wall opening, squeezing the pads between the vehicle and the wall. By far the most common seal of this type is made of a spongy rubber material, covered with a wear-resistant surface.



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Fig. 3 Inflatable dock seal The upper part of the seal is inflated, the sides are not. Note the guide post, the bumpers to keep the trailer from backing too far into the seal, and the spotlight. Correct alignment is essential for sealing and for protecting the seals.

Less commonly, a butt seal may consist of an inflatable bladder. The bladder is inflated with a small high-pressure fan. This type is more adaptable, but more expensive. Figures 3 and 4 show this type.

Some docks seals may use an accordion seal made of rubberized fabric. This type is unusual.

The other major type, side seals, slide along the sides and roof of the vehicle. These consist of a more flexible rubberized material. The top seal may consist of a heavy curtain of adjustable height that drapes over the top of the truck.

Dock seals should be sheltered from precipitation. Otherwise, they will collect water, rot the wooden structure, leak into the wall, and suffer freeze damage. If the building does not provide adequate shelter, as in Figure 1, you can buy appropriate hoods from dock seal manufacturers, or from other sources. The hood may



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Fig. 4 Inflatable seal deflated The small fan at the top of the unit provides all the pressure that is needed for effective sealing.

be separate from the dock seal, or it may be an integral part of some dock seal assemblies.

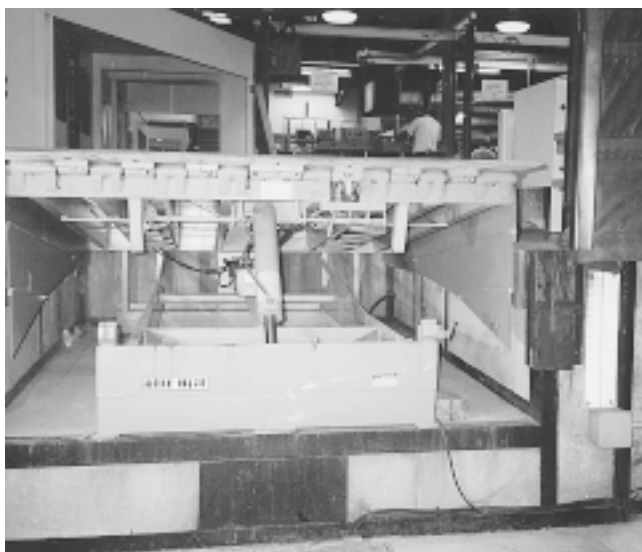
The seal along the floor of the vehicle is a special problem. The floor height varies from one vehicle to another, and the height varies as the vehicle is loaded and unloaded. If the floor height remains close enough to the dock height, a simple butt seal may suffice. This can be used in combination with butt seals or side seals for the sides and top of the vehicle.

An adjustable ramp, called a “dock leveler,” is commonly installed in the floor of the loading dock. Figure 5 shows a typical unit. The dock leveler adjusts to changes in the height of the vehicle floor. Unfortunately, the space underneath the dock leveler is a large path for infiltration. Dock levelers may be equipped with side guards, as shown in Figure 5.

The side guards are intended as a safety feature, and to keep things from falling into the dock leveler pit. They may substantially reduce infiltration, especially from wind. One of these days, dock leveler manufacturers will realize that these guards can easily be augmented to make them effective infiltration seals. If you get dock levelers, make sure they have this feature.

Dock levelers are made of steel, so condensation and ice tend to form on the ramp when the outside air is cold. This is dangerous. To avoid this problem, you can order insulation as an option on the dock leveler. Get this feature. It also saves a small amount of heat loss.

An older method of minimizing infiltration at truck docks is to attach a short tunnel to the outside of the building. It is effective primarily against wind, rather than convective heat loss. The tunnel must fit the vehicle body closely to be effective. This requires that all vehicles have the same dimensions, and it is more



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Fig. 5 Dock leveler This is a steel ramp that is moved by a hydraulic jack. The metal skirts on each side are intended as a safety feature. They also reduce infiltration from underneath the trailer into the space.

difficult to back the vehicle into position properly. The availability of effective dock seals has made this method obsolete.

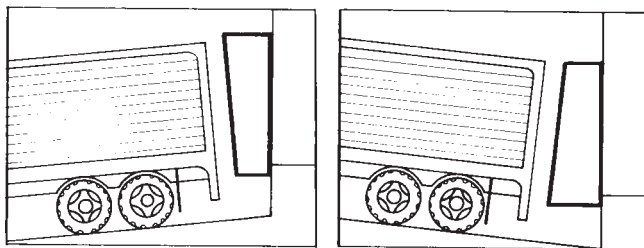
How to Select a Dock Sealing System

Dock sealing systems are another example of an important energy conserving action that is simple in concept, but that requires careful planning. Consider these issues before you buy:

- **adaptability to different vehicle dimensions.** Truck or trailer dimensions will eventually change, even in fleet operations, where dimensions may be standardized. One day, your standard dimensions will change. Butt seals are more adaptable than side seals to differences in vehicle width. Major differences in vehicle height require a curtain-type seal to contact the roof of the vehicle.
- **adaptability to height change in loading.** The vehicle changes height at the dock as it is loaded and unloaded. Butt seals and sliding seals can accommodate these changes in height. However, the vertical movement tends to wear out the pads of butt seals. Different manufacturers address this problem in different ways. One method is to use pleats in the surface material, so the pleats slide as the vehicle height changes. If you use a dock leveler to accommodate changes in vehicle floor height, be sure to include effective seals in the dock leveler.
- **adaptability to vehicle tilt.** At many loading docks, the vehicle ramps has an upward or downward slope. Most side seals can accommodate the tilt without special provisions. With butt seals, you have to order side pads that are tapered from top to bottom, as shown in Figure 6. Butt seals have only limited ability to deal with variations in the vehicle tilt. Inflatable seals are more adaptable than solid butt seals. If the ramp does not have a constant slope, vehicles may come to rest at different degrees of tilt, depending on the distance between the front and rear wheels.
- **adaptability to different types of vehicle doors.** Butt seals are efficient with all types of doors that swing completely out of the way of the rear face of the vehicle. Ordinary side seals have a problem with doors that swing open. The gap at the door hinge creates a channel between the open door and the side of the vehicle that is a path for infiltration. A variation of side seals, shown in Figure 2, has extensions that cover this gap at the rear of the vehicle. However, this type of side seal cannot accommodate much variation in vehicle tilt.
- **resistance of seal to damage from goods and loading equipment.** The opening between the pads of a butt seal must be narrower than the width of the vehicle. This makes the pads vulnerable to

damage as goods are being loaded and unloaded. For example, a forklift truck carrying pallets into a trailer can sideswipe the seal. This problem does not exist with side seals.

- **resistance of wall to damage from vehicle pressure.** The seal should be designed so that the pressure of the vehicle is exerted primarily on the dock floor, not on the wall of the building. The force of a vehicle backing against a wall is enough to damage it. This is true of all wall types, even concrete block. (Concrete has great compression strength, but no significant tensile strength. The wall is held together by the weight above each block. A side load can buckle a concrete block wall fairly easily.) Side seals transmit much less force to the wall than butt seals. If you need a butt seal, consider an inflatable type. Alternatively, brace the wall or the door frame.
- **compatibility with dock doors.** Each opening in the truck dock needs a door, as shown in Figure 1. The door is normally installed on the inside of the wall, while the sealing system is normally installed on the outside of the wall. However, there may be interference between the two, especially if the sealing system must be bolted through the wall.
- **latching the vehicle to the dock.** Safety may require a system that latches the truck or trailer to the dock. The latch is below the level of the truck floor, as shown in Figure 1. In the United States, trucks and trailers must have an “ICC bar.” This is a fender bar that is attached to the rear of the vehicle to keep following automobiles from riding under the truck or trailer in a collision. Some manufacturers offer systems that latch the ICC bar to the dock. Make sure that the sealing system does not interfere with the latch, or vice versa. An alternative is installing automatic chocks for the rear tires of the vehicle, which are also shown in Figure 1. These do not interfere with the dock seal.
- **durability and ease of repair.** The sealing system must withstand slamming by vehicles that weigh tons, sliding stresses from changing vehicle height, and uneven pressure on the pads. All dock seals have components that wear out and require



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Fig. 6 Butt seals must be tapered to accommodate sloping ramps

occasional replacement. Nobody likes maintenance, so repairs tend to be neglected. To minimize heat loss over the long term, select seals that last for a long time and are easy to repair.

- **ease of installation.** Labor is a large part of the total cost of a dock seal. Especially in retrofit applications, look for a sealing system that can be installed easily to the existing dock.

Align the Vehicles with the Dock

With butt seals, it is important to align the vehicle perpendicular to the dock. With side seals, it is important to position the vehicle laterally within the seal. Provide guides to aid drivers in aligning their vehicles.

An inexpensive method is to install painted stripes on the dock face to help drivers to align visually. For night operations, install reflective tape or position lights. Figure 1 shows simple alignment marks made of reflective tape that are attached to the face of a butt seal.

A more positive method is to install guide rails for the tires. With butt seals, make the rails long enough to guide both the front and rear tires. To prevent tire damage, make the rails rounded. Large steel pipe is effective for this purpose. Figure 3 shows guard posts that are installed near the dock seal.

Coordinate with Dock Doors and Interior Doors

Truck-to-dock seals are useless if the adjacent dock doors are left open to the outside. Make sure that you have good dock doors that close effectively and easily. See the Measure 6.2.4 about exterior doors. Also, see Measures 6.2.5 ff for interior doors that you can use to isolate the truck dock from the rest of the building.

ECONOMICS

SAVINGS POTENTIAL: Thousands of dollars per year, typically. Depends on climate, fuel cost, space layout, etc.

COST: Butt seals and sliding seals typically cost \$1,000 to \$2,000, installed. Inflatable seals may cost twice this much. Additional sealing features for dock levelers may cost about \$500.

PAYBACK PERIOD: Several years, or longer.

TRAPS & TRICKS

SELECTING THE EQUIPMENT: Shop the market to find all your options. If you have several dock doors, consider installing one sealing system on a trial basis. Talk to other operators about their systems.

EXPLAIN IT: Install large placards that tell drivers how to engage the sealing system.

MAINTAIN IT: Expect to replace parts from time to time. Keep spares on hand. Schedule inspections in your maintenance program.