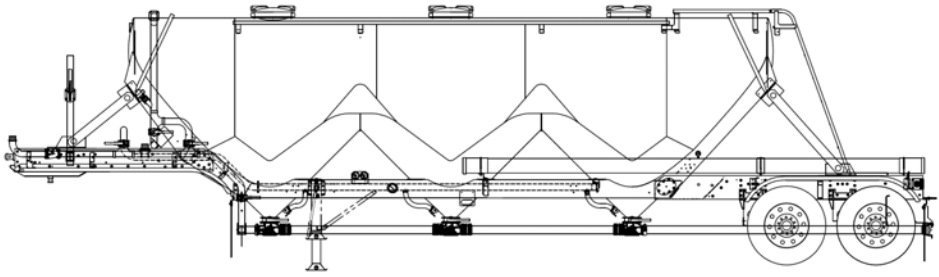
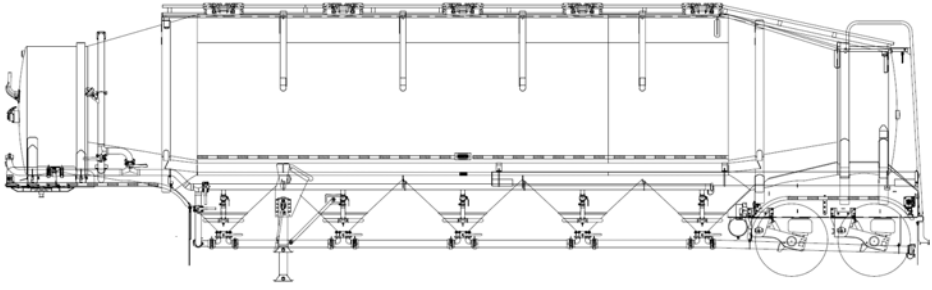
SOLUTIONS BUILT FOR YOU.

ISO 9001, ISO 14001, OHSAS 18001 - Certified

Dry Bulk Pneumatic Trailer

Owner's/Operator's Manual





This manual is intended to help ensure the safe and efficient operation of your Heil Trailer and products. IF INCORRECTLY USED, OPERATED, MAINTAINED OR REPAIRED, THIS EQUIPMENT CAN CAUSE SEVERE INJURY, DEATH AND PROPERTY DAMAGE. THOSE WHO USE, OPERATE, MAINTAIN AND REPAIR THE EQUIPMENT SHOULD BE TRAINED IN ITS PROPER USE, OPERATION, MAINTENANCE AND REPAIR, WARNED OF ITS DANGERS, AND SHOULD READ THIS ENTIRE MANUAL BEFORE ATTEMPTING TO USE, OPERATE, MAINTAIN, SET UP, ADJUST, SERVICE OR REPAIR THE TRAILER OR PRODUCT. Recommended operating practices furnished in this manual are general practices. HEIL Trailer cannot possibly know, evaluate, or advise a nyone of all conceivable ways a Heil trailer or product might be used, operated, maintained, set up, adjusted, repaired or of all possible consequences of each way. ALL PERSONS WHO PERFORM ANY OF THESE TASKS MUST FIRST SATISFY THEMSELVES THOROUGHLY THAT NEITHER THEIR SAFETY OR THE SAFETY OF THE GENERAL PUBLIC WILL BE JEOPARDIZED BY ANY METHOD THEY SELECT. KEEP THIS MANUAL FOR FUTURE REFERENCE.

Image Disclaimer

The pictures and images contained in this manual portray both standard and non-standard (optional) equipment to meet specific customer needs. These pictures are used for referencing components and general nomenclature of a Heil Dry Bulk Materials transport. Your trailer may or may not have the components shown in this manual.

Publication Disclaimer

The information and specifications included in this publication were in effect at the time of approval for printing. Heil Trailer International, Co. Athens, TN USA reserves the right, however, to discontinue or change specifications or design at any time without notice and without incurring any obligation whatsoever. Revision 1/2016.

WARRANTY STATEMENT

Heil Trailer International, Co. warrants trailers sold by us to be free from defects in material and workmanship. This coverage is subject to and limited to coverage periods listed in the Heil Trailer International, Co. Limited Silver Warranty Sub Part A - Limitations document and as defined in the Heil Trailer International, Co. Limited Warranty Sub Part B – Definitions document. Our obligation and liability under this Warranty is expressly limited to repairing or replacing, at our option, within the coverage time limitations listed in the Heil Trailer International, Co. Limited Silver Warranty Sub Part A - Limitations document, from the date of shipment any defective product except for maintenance items, tires, and purchased items which are warranted separately by the original manufacturer. Any repair(s) determined by Heil Trailer International, Co., at our sole discretion, to be major or critical to the structural integrity of any trailer at any time whatsoever during the warranty period must be performed at a Heil Trailer Certified Service Center as determined by Heil Trailer International, Co. Repairs not performed in a Certified Service Center once directed by Heil Trailer International, Co. will void this warranty. A failure that is determined by Heil Trailer International, Co., at our sole discretion, to be caused by wear and tear or misuse as opposed to product defect is not covered at any time in the warranty period. WE MAKE NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AND MAKE NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. Our obligation under this warranty shall not include any transportation charges, or any liability for direct, indirect or consequential damage, loss of profit or delay. Any Improper use, operation beyond rated capacity, substitution of parts not approved by us, or any alteration or repair by others in such manner as in our judgment affects the product materially and adversely shall void this warranty. NO EMPLOYEE OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY WITHOUT THE WRITTEN AUTHORIZATION OF AN OFFICER OF HEIL TRAILER INTERNATIONAL, CO..

Heil Trailer International, Co. warrants that this trailer is manufactured in accordance with the specifications of the order. Heil Trailer International, Co. does not warrant this piece of equipment for use in hauling any specific product. Heil Trailer International, Co. accepts no responsibility for damage to the equipment, or for cargo losses due to an adverse affect on the equipment, caused by the incompatibility of the product being hauled in the trailer. Where Tanks are prepared for lining, all agreements, billing included, that concern the tank barrel lining will be the responsibility of the customer and the lining company. In this connection, Heil Trailer International, Co. makes no warranty of products, including lining manufactured and /or installed by others, the same being subject to warranties, if any, of their respective manufacturers or installers. The customer shall bear the risk for damage or loss to the tank or injury to property or persons while the tank is either at or in transit to or from the lining company.

Warranty will be paid only if Heil Trailer International, Co. procedures for filing warranty claims are followed. Pre-approval prior to any repairs is a mandatory requirement for receiving payment along with strict adherence to all other conditions of the procedures. Warranty repairs will only be permitted at Heil Trailer International, Co. approved, authorized, or certified service centers.

General

Operating Instructions

Preventative Maintenance Instructions

INTRODUCTION

This manual is designed to help ensure safe and efficient operation of the HEIL Trailer Dry Bulk Materials Transport.

The book is divided into three sections. Part 1 will familiarize you with the unit. Part 2 gives operating procedures and tips. Part 3 covers the maintenance necessary to keep the unit in safe operating condition.

TO THE OWNER

We at the Heil Trailer International, Co. take pride in the products we manufacture. We trust you will be well satisfied with your purchase. Properly operated and maintained, the Dry Bulk Materials Transport will provide many years of low-cost, trouble-free service.

WARRANTY CLAIMS & INQUIRIES

The Heil Trailer Standard Warranty is included in this manual. In the unlikely event you need warranty service on your tank equipment purchased from Heil Trailer International, Co. or its distributors, contact the distributor or Heil Trailer International, Co. (800-400-6913) directly, for service and repair procedures.

For all parts, claims or inquiries refer to the model and serial number of your unit. This information is found on the identification plate (see Figure 1).

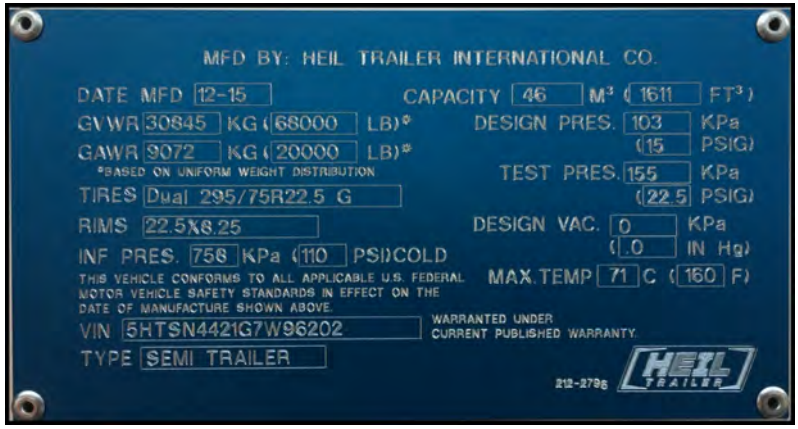


Figure 1. Example Identification Plate

DIRECTIONAL REFERENCE

For your reference the sides of the tank transport are determined by facing in the direction of forward travel. The right side is the "Curbside"; the left side is the "Roadside or Streetside".

IMPORTANT SAFETY MESSAGES

DANGER

WARNING

CAUTION

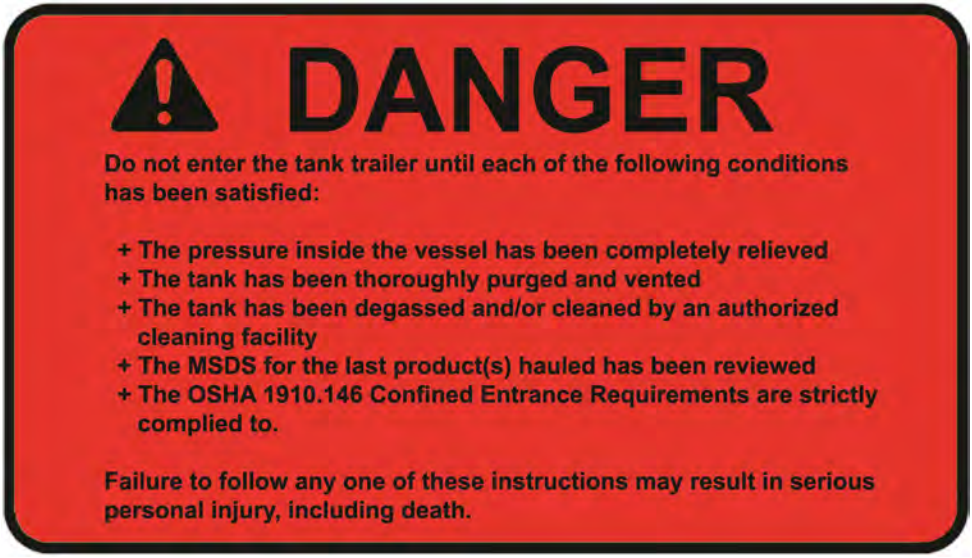
NOTICE

THESE SAFETY ALERT SYMBOLS INDICATE IMPORTANT SAFETY MESSAGES THROUGHOUT THIS MANUAL.

WHEN YOU SEE THESE SYMBOLS, CAREFULLY READ THE MESSAGES THAT FOLLOW AND BE ALERT TO THE POSSIBILITY OF ENVIRONMENTAL AND/OR PROPERTY DAMAGE, PERSONAL INJURY OR DEATH TO YOURSELF OR OTHERS.

IMPORTANT SAFETY MESSAGES

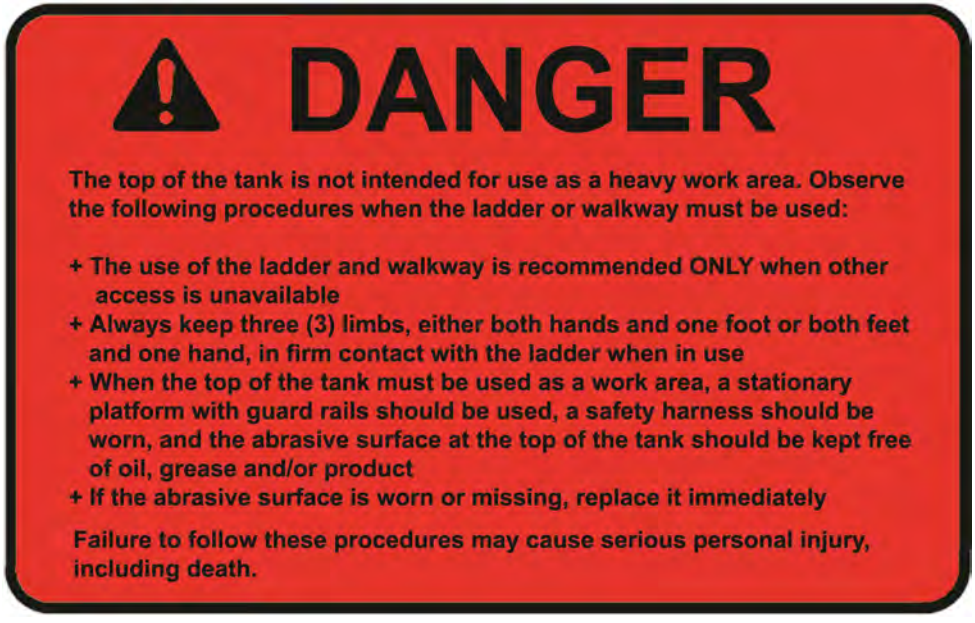
IMPORTANT SAFETY MESSAGES



IMPORTANT SAFETY MESSAGES

IMPORTANT SAFETY MESSAGES

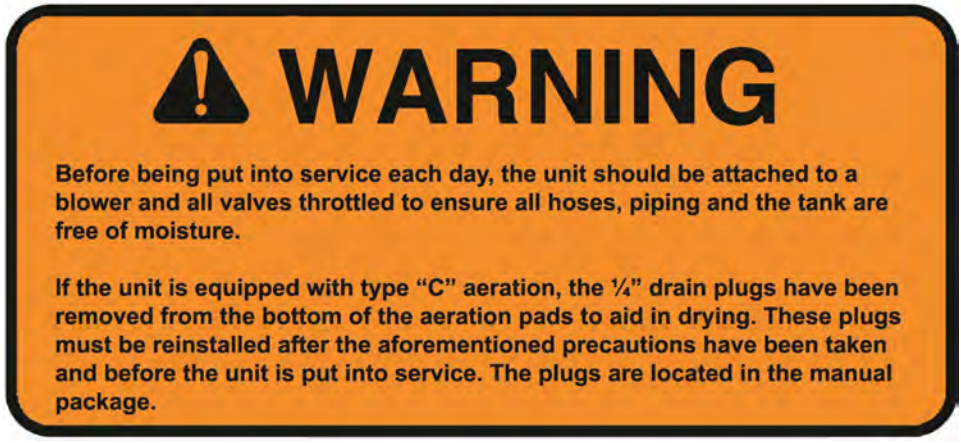
IMPORTANT SAFETY MESSAGES



IMPORTANT SAFETY MESSAGES

IMPORTANT SAFETY MESSAGES

IMPORTANT SAFETY MESSAGES



SAFETY DECALS

SAFETY DECALS ARE PROVIDED WITH YOUR HEIL DRY BULK MATERIALS TRANSPORT . PLEASE CAREFULLY READ THE MESSAGES CONTAINED WITHIN THE DECALS AND BE ALERT TO THE POSSIBLILITY OF PERSONAL INJURY OR DEATH.

WARNING

Do not exceed working pressure. If pressure rises above limits, shut down immediately and investigate.

WARNING

NEVER open manhole unless tank is completely depressurized. Even a slight amount of residual pressure will cause manhole to fly open when unlatched.

WARNING

The Relief Valve must be operational to maintain system pressure within safe limits. Failure to properly maintain the relief valve may cause property damage, potential injuries and death.

WARNING

When unloading, the discharge hose must be secured at both ends prior to pressurizing unit. Always relieve pressure in discharge hose before disconnecting it.

NOTICE

Blowdown valve should be OPEN at all times except when unloading. This will help relieve pressure buildup due to changes in ambient temperature, friction, product expansion, etc.

WARNING

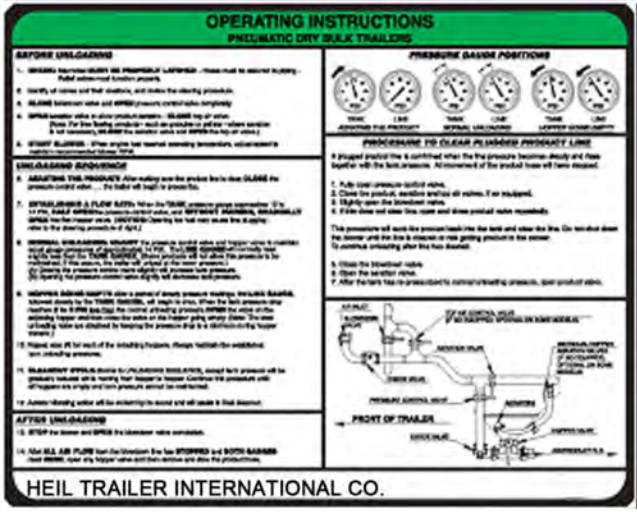
To avoid suffocation, never enter a tank containing pulverants, liquids, flammable or caustic materials. Always follow all confined space entry procedures.

CAUTION

To avoid product contamination or mixing of incompatible materials, clean tank thoroughly before switching payloads.

CAUTION

To prevent a vacuum from developing when unloading without pressure, open manhole before opening discharge valve.



WARNING

Never operate this bulk transport unless you are fully aware of the location of all the control valves and shut down procedure.

CAUTION

Vehicle safety checks should be performed daily prior to operation.

CAUTION

If a leak is discovered during operation, shut down immediately and repair the leak.

CAUTION

To avoid spillage, product discharge valves must be closed prior to loading and while in transit.

Notice

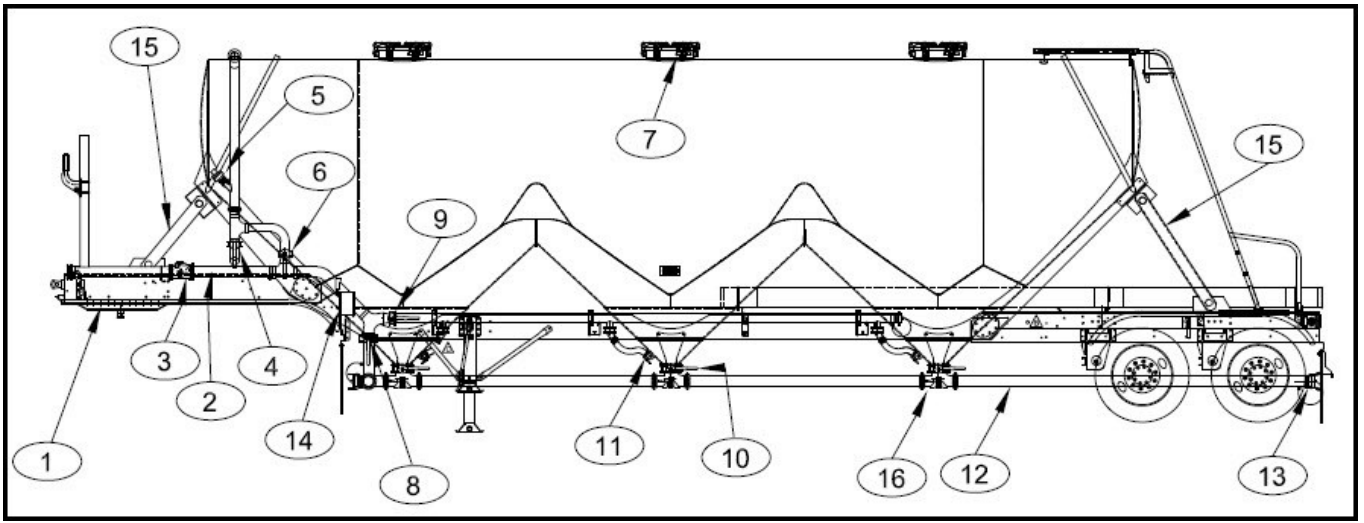
All check valves must be operational to prevent product back-up into the supply lines.

WARNING

Maintain non-skid surface at top of tank free of ice, snow, sleet, rain, oil, grease, etc. prior to climbing on top.

WARNING

Decals are posted on the tank to alert the operator of potential dangers. Replace decals when illegible.



1. **Fifth Wheel/King Pin Assembly**
2. **Air Inlet Line**
3. **Check Valve**
4. **Blow Down Valve**
5. **Pressure Relief Valve**
6. **Top Air Valve**
7. **Manhole Assembly**
8. **Proportioning Valve**
9. **Aeration Control Valve**
10. **Product Valve**
11. **Flow Cone Aerator**
12. **Discharge Line**
13. **Discharge Adapter & Cap**
14. **Gauge Box**
15. **Strut Assembly**
16. **Product Tee**

1. **Fifth Wheel/King Pin Assembly.** Primary function is to couple the trailer to the tractor. Also, the kingpin dimension in conjunction with the set ahead dimension of the tractor fifth wheel assures that the trailer is balanced for the loads that the trailer is expected to carry. These dimensions are calculated by performing a weight distribution on the specific tractor/trailer combination.
2. **Air Inlet Line.** Serves to direct air from the blower into the vessel. This line directs air to the discharge line, aerator manifold and top air line, if so equipped.
3. **Check Valve.** "Checks" the direction of the airflow, ensuring that it flows in only one direction. It is a one way valve that prevents air from reversing its direction of flow and reentering the blower, possibly carrying with it product from inside the vessel thus damaging the blower. Each Heil trailer is equipped with two check valves: one in the air inlet line and one just forward of the first hopper at the beginning of the product discharge line.
4. **Blow Down Valve.** Used to relieve pressure from within the vessel after unloading. Should be left open at all times except when unloading to prevent damage to the vessel as air inside the tank expands and contracts with ambient temperature changes.
5. **Pressure Relief Valve.** Used to prevent excessive pressure from building inside the vessel during the unloading process. Operates at a specific, preset pressure limit and is tamper-proof due to the valve body being completely sealed. A broken seal may void the vessel warranty relative to cracking.
6. **Top Air Valve.** Used to direct air to the top of the tank and force the product into the discharge line when transporting free flowing products such as sugar, plastic pellets, etc. Typically, if top air is used, aeration is not necessary.
7. **Manhole Assembly.** The Heil manhole is the most heavy duty cover in the industry. Designed by Heil, It is used to load the vessel and to gain access to the inside of the vessel for cleaning, etc.

8. **Proportioning Valve.** Used to meter the airflow between air manifold and discharge line.

9. **Aeration Control Valve.** Used to further meter the airflow to the aerators.

10. **Product Valve.** The product valve is used to meter the flow of product into the product tee which then directs product into the discharge line.

11. **Flow Cone Aerator.** Used to fluidize products such as cement, flour and other "packable" products for easier and faster unloading. The standard Flo cone is shown, inverted style available for abrasives service.

12. **Product Discharge Line.** Directs product to a flexible line, typically connected to the rear of the trailer leading to a product storage facility at the job site. For abrasive products (sand, cement, etc), this line is usually sch. 40 steel. For nonabrasive products such as flour, the discharge line is usually sch. 40 aluminum.

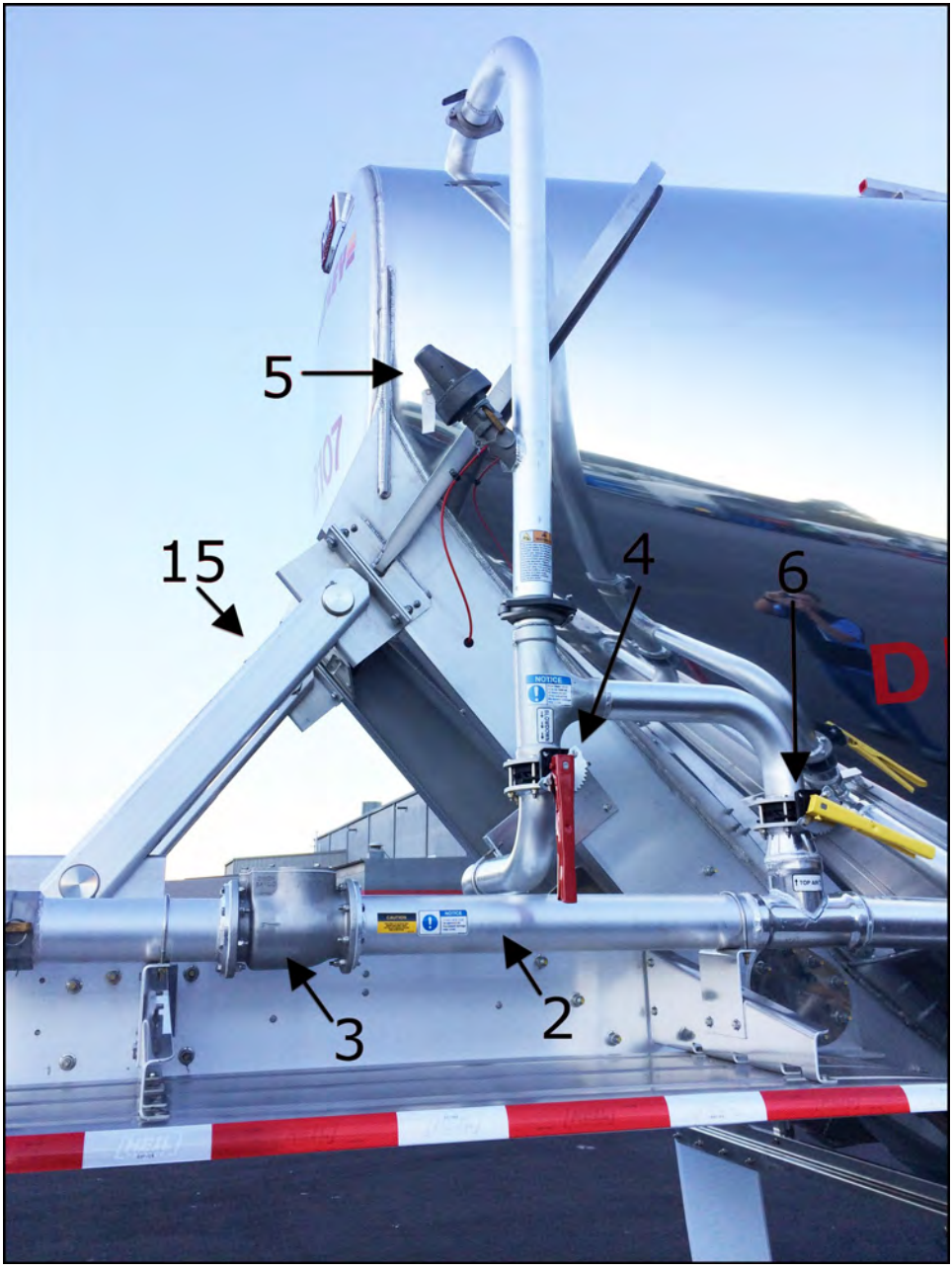
13. **Discharge Adapter and Cap.** Allows connection of a flexible line, via cam-locks, at the job site to facilitate unloading of the product from the trailer to the job site storage facility. Comes with dust cap.

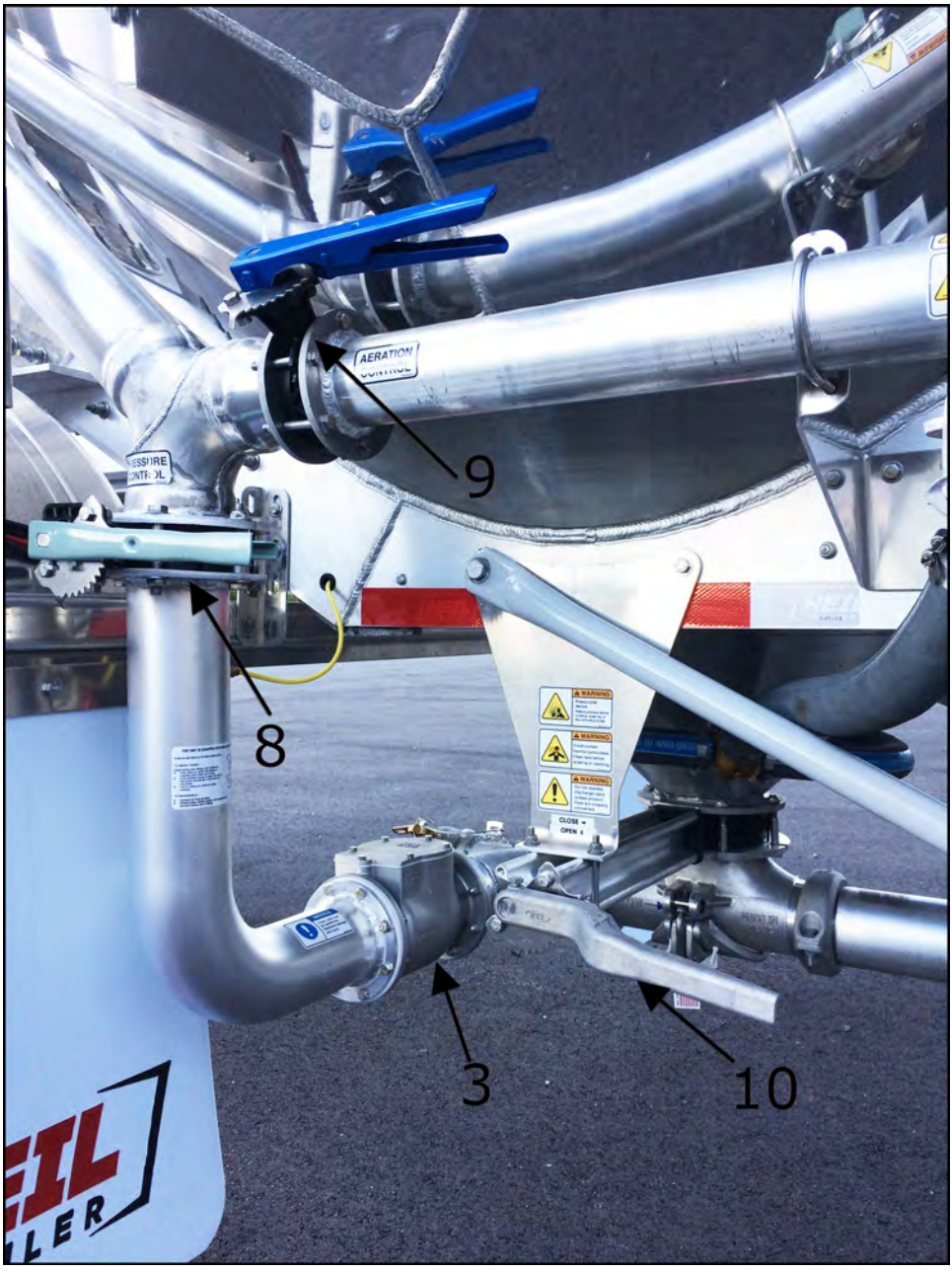
14. **Gauge Box.** Houses two 30psi gauges, one for monitoring tank pressure and one for measuring line pressure. Gauge pressures indicate amount of product inside the vessel.

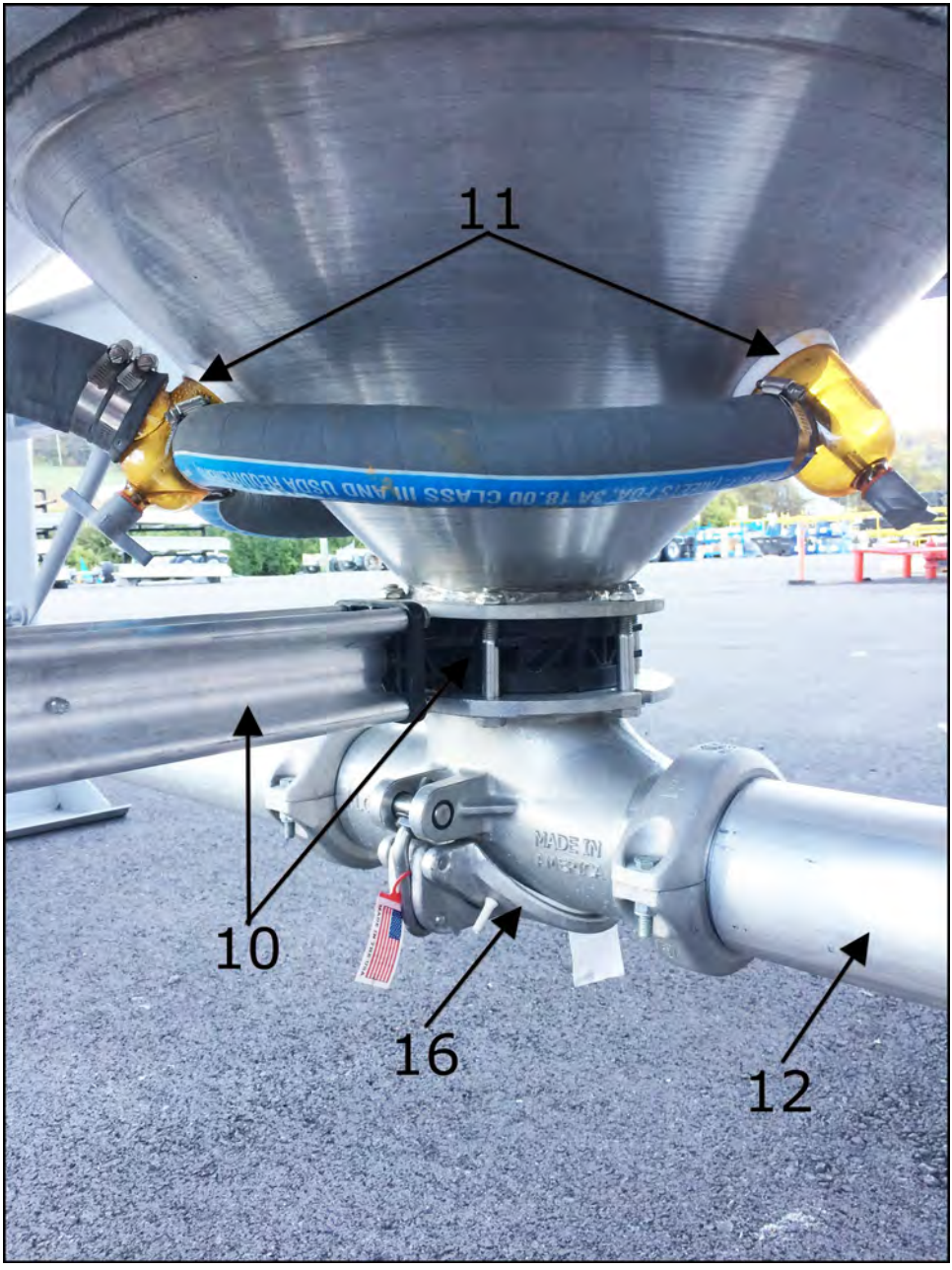
15. **Strut Assembly.** A major vessel structural member used to join the vessel to the trailer end frames. Made of 6061 alloy aluminum, the strut is fastened to the vessel and to the end frames via 3" pins. This pinned design allows the vessel to "flex" in transit, thus assisting in the prevention of vessel cracks.

16. **Product Tee.** Controls the flow of product from the hopper into the product discharge line.


Air Inlet
1


5
15
4
6
3
2


AERATION
9
8
3
10


11
10
16
12
MADE IN

AERATION SYSTEM OPERATIONAL DESCRIPTION

The purpose of the Flo Cone, sometimes referred to generically as an aerator or fluidizer, is to make the product that is being hauled simulate the properties of a liquid so that unloading may be accomplished. The Flo Cone accomplishes this by injecting air into the hopper through elastic membranes stretched over the Flo Cone body. The flow of air over this membrane also causes vibration which also serves to shake the product from the interior walls of the vessel and promote more thorough unloading of each hopper. Typically, there are three aerators per hopper, each mounted radially in the lower cone of the hopper with a with 120° separation angle. Air flow to the aerators is governed by the use of the proportioning valve or sometimes the combination of the aeration manifold valve and the proportioning valve. A diagram of the airflow (in blue) through the vessel is shown below.

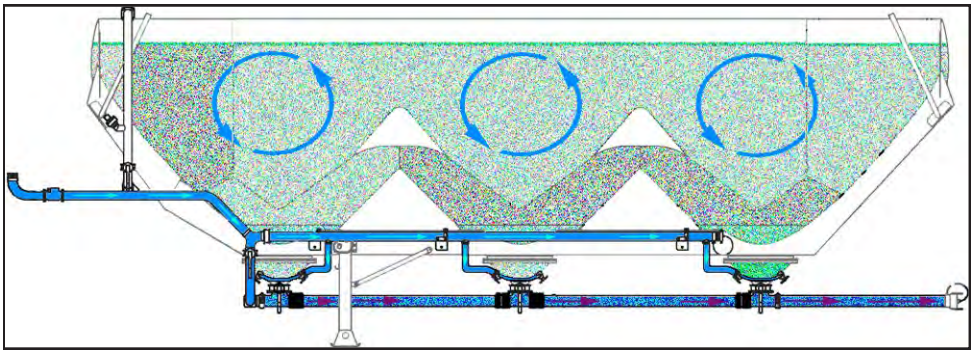


Figure 2. Simplified Aeration System Diagram

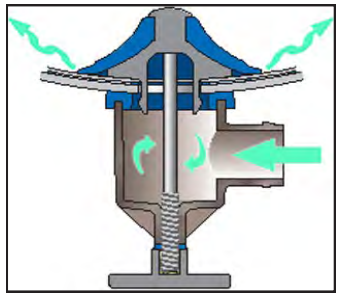


Figure 3. Aerator Air Flow

OPERATING INSTRUCTIONS

HOOKING TRACTOR TO TRAILER

WARNING

Never operate this bulk transport unless you are fully aware of the location of all the control valves and shut down procedure.

Prior to backing tractor under trailer, check the following items:

1. Trailer brakes are set or wheels blocked to prevent trailer from rolling.
2. Upper 5th wheel is at approximate height of lower 5th wheel.
3. Latch on lower 5th wheel is in "Open" position.
4. All personnel are clear of the area.

Then proceed as follows:

1. Back tractor under trailer, aligning king pin with slot in lower 5th wheel. When latch "sets" around king pin, check hookup by attempting to pull forward.
2. Shut down engine and apply parking brake.
3. Double Check latch on 5th wheel to ensure that it is fully engaged.
4. Connect tractor supply and control brake hoses to glad hands on trailer. The glad hands are marked for correct installation.
5. Connect electrical connector to receptacle on trailer.
6. Raise landing gear supports.
7. Check brakes and lights for proper operation.
8. Anti-Lock pilot light must be lit when brakes are applied.

SAFETY CHECK

A vehicle safety check should be performed daily prior to operation. See Preventive Maintenance Section.

DANGER

NEVER open manhole unless tank is completely depressurized. Even a slight amount of residual pressure will cause manhole to fly open when unlatched.

START-UP

When units are parked, especially over night, moisture can form inside the tank and piping. To clear out most of the moisture, remove dust cap on discharge line, start compressor or blower and pressurize unit. Then open each of the hopper discharge valves to blow out the unit. This procedure will help prevent the discharge valves and aerators from becoming clogged.

CAUTION

Blow-down valve should be OPEN at all times except when unloading. This will help relieve pressure buildup due to changes in ambient temperature, friction, product expansion, etc.

LOADING

The type of cargo being hauled and the loading situation will determine the best method of loading. Heavier materials such as sand and sugar can normally be loaded through the center manhole and allowed to overflow into the adjoining hoppers. Light and bulky products such as flour or plastic pellets should be loaded through the individual manholes for better distribution. The pneumatic loading line, on units so equipped, offers an alternate loading method.

1. Close all valves except the blow-down valve before loading and while in transit.
2. Position trailer properly for most efficient loading.
3. Secure all manhole covers after loading.

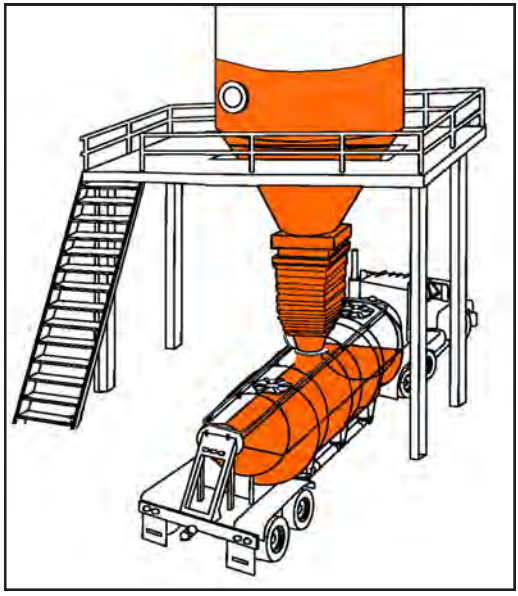


Figure 4. Typical

Loading Site

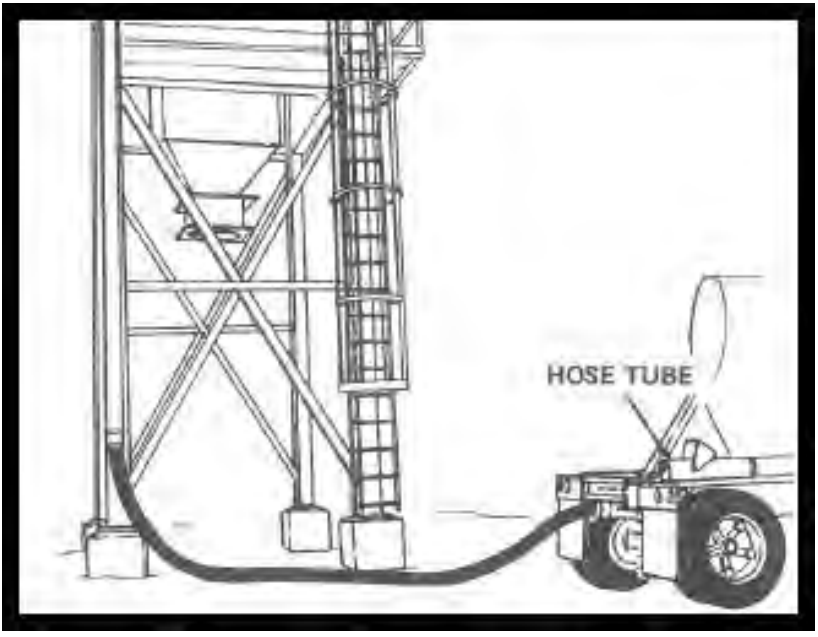


Figure 5. Typical

Unloading Site

UNLOADING

- Before every load, always visually inspect the trailer and its safety devices to insure proper operation.
- Never exceed recommended operating pressure. Failure to operate the vessel to operating pressures may cause the vessel to rupture causing serious injury or death.
- Always make sure that the pressure relief valve is operational. It could save your life by preventing the vessel from becoming over pressurized. A relief valve that is not operational is worthless.
- Always keep the blow down line open except when unloading. This allows the trailer to breathe as the air inside expands and contracts with the changing ambient conditions, thus preventing a vessel failure.
- Avoid walking on top of the trailer while it is pressurized. A sudden pressure raise could occur (due to a line plug, for example) and cause the vessel to rupture, causing serious injury or death.
- Never open a manhole unless the trailer is completely purged of pressure.
- Never load a product into a vessel that exceeds 180°F. Temperatures above 180°F cause accelerated, irreversible damage to aluminum's mechanical properties, thus weakening the vessel, possibly leading to serious injury or death.
- Avoid uncoupling hoses from the trailer until the vessel has been completely purged of pressure. Otherwise, the hoses could break free and seriously injure the operator.

Operation of the Vessel. The operation of the vessel is fairly straightforward and the product can be pneumatically conveyed from the trailer in a few simple steps. The first thing to do is to make sure that the storage facility can accept the entire load. If so, you should perform a back pressure check on the silo to ensure that there are no clogged lines and that the silo has proper ventilation. A back pressure check is simply done by routing all the blower air down the product piping and into the silo and taking a reading from the line gauge. First, connect the discharge line adapter to the storage facility flexible hose and the trailer air inlet line to the blower. With the blow down valve still open, close the aeration and/or top air valve, open the pressure control/proportioning valve (directing all the air to the silo) and engage the blower. The line gauge should have a reading of 2 psi or less. A reading of more than this could indicate poor piping, a blockage in the line or inadequate venting of the storage facility. All of these factors would affect unloading time.

NOTICE

Do not close a valve unless the air is directed in another path. Dead heading the blower can cause serious damage and injury.

Next, begin to pressurize the vessel to unload. Close the blow down valve, open the top air valve and/or aeration control valve and close the pressure control/proportioning valve, you are now routing all the air into the vessel. Monitor the tank gauge to ensure that the maximum allowable working pressure (MAWP) is not exceeded. The MAWP is stamped on the VIN plate. If you have a question regarding the MAWP of your tank, by all means, call the factory at 1-800-400-6913. Once operating pressure has been reached, open the proportioning valve halfway and the slowly open the center product valve since the center hopper holds the most product. The best unloading times will be accomplished when the pressure drop during this initial process is kept to a minimum. Continue to monitor the gauges and adjust the proportioning valve as necessary to maintain approximately 14-15 psi in the tank. Opening the proportioning valve decreases tank pressure and increases discharge line airflow, while closing of the proportioning valve will increase tank pressure and decrease airflow in the product line. Too little airflow in the discharge line will promote line plugging.

As unloading commences, the tank gauge should begin to rise and settle back to the initial pressure and the line gauge should now show approximately one pound less than the reading on the tank gauge. The tank gauge should be steady, while the line gauge will show some fluctuation as the product moves through the line. A steady, slow rising line gauge is usually an indication of a plugged line. How to deal with a plugged line is addressed on page 38.

Continue unloading the trailer until the line and tank gauges show a pressure drop of approximately four pounds. At this point, slowly open one of the remaining hopper valves and the quickly close the previous one. During this operation, the best unloading times will be afforded the operator who has the least pressure drop during this step.

Repeat the operation for the remaining hoppers until all hoppers have been unloaded.

When the last hopper has been unloaded, product will have settled back into the other hoppers during the unloading process. Repeat the unloading sequence, starting again with the middle hopper and proceed as before, monitoring gauge pressures. Continue the operation at each hopper until it is impossible to maintain tank pressure. This will unload any remaining product from the trailer. At this point, the trailer is unloaded.

Open the blow down valve (depressurizing the tank) and bring tractor R.P.M. back to idle. Allow the blower to cool as the tractor idles. When the blower has cooled down disengage the P.T.O. and remove the air inlet hose from the blower. After all pressure has been relieved from the tank and line as indicated by the gauges, disconnect the discharge line from the storage facility line. Reattach dust cap and place hoses in hose tubes if appropriate. Close all valves, except blow down valve.

Step by steps instructions are located on the following pages.

UNLOADING—STEP BY STEP

NOTICE

Never discharge payload into a storage facility of unknown contents or capacity. Check to ensure that the storage facility will accept the total payload.

1. Position trailer for optimum unloading. See page 29.
2. Retrieve discharge hose and connect it to the discharge line. Attach opposite end of hose to adapter on storage facility fill line.
3. Open the pressure control valve.
4. Engage blower or compressor.

DANGER

When unloading, the discharge hose must be secured at both ends prior to pressurizing unit. A loose hose will bull whip potentially causing injury.

NOTICE

When pressurizing unit, look for air leaks. If any are found, shut down immediately relieve pressure from the tank and line.

5. Open all aeration valves and close pressure control valve and blow-down valve. Pressurize unit. If cargo does not require aeration, open the Top Air supply valve to pressurize the unit.
6. When unit has reached operating pressure open the proportioning valve ½ to ¾ of full open.
7. SLOWLY open discharge valve on center hopper.
8. Adjust the pressure control valve to maintain maximum operating pressure and slight movement of discharge hose.
9. Close the front and rear individual hopper aeration control valves, on units so equipped.

14. Readjust pressure control valve if necessary.

10. When tank pressure begins to drop rapidly, open the aeration valve on the front hopper.
11. SLOWLY open the discharge valve on front hopper.
12. Quickly close the center hopper discharge valve.
13. Close the aeration valve on center hopper.
14. Readjust pressure control valve.
15. When tank pressure begins to drop rapidly, open the aeration valve on the rear hopper.
16. SLOWLY open rear hopper discharge valve.
17. Quickly close the front hopper discharge valve.

DANGER

Do not exceed working pressure. If pressure rises above limits, shut down immediately and investigate.

18. Close aeration valve on front hopper.
19. When tank pressure begins to drop rapidly, close rear discharge valve.
20. Purge unit by opening all aeration valves and opening and closing discharge valves rear to front.

CAUTION

Before opening blow-down line, make sure no one is in line of air stream.

21. Open blow-down line to return the unit to atmospheric pressure.
22. Disengage blower or compressor.

DANGER

Always relieve pressure in discharge hose before disconnecting it.

23. Disconnect and stow discharge hose.
24. Close all valves except the blow-down valve.

NOTICE

Variations or deviations to the unloading procedure may be necessary due to the type of product being unloaded or the nature of the unloading site. Operating more than one hopper at a time is common with extremely large capacity blowers or a combination of compressor and blower only. A second and third hopper can be activated to maintain desirable product to air mixture.

OPERATING TIPS

MINIMIZING UNLOADING TIME

Unloading time will depend, however, on variables such as type of product being unloaded, unloading site, condition of equipment, etc. The following points should be considered.

1. Vertical positioning of discharge hose results in smoother product flow. Product tends to "settle" in portions of hose which runs horizontally (see Figure 6). This accumulation of product will restrict product flow, will increase unloading time, and may eventually clog the line. Ideally, the product will would change to vertical immediately after leaving the trailer into the storage line with zero elbows. Since having no elbows in the line may not be practical, all bends or elbows should be sweep types having a large radii. The radius should be 15x the pipe diameter.

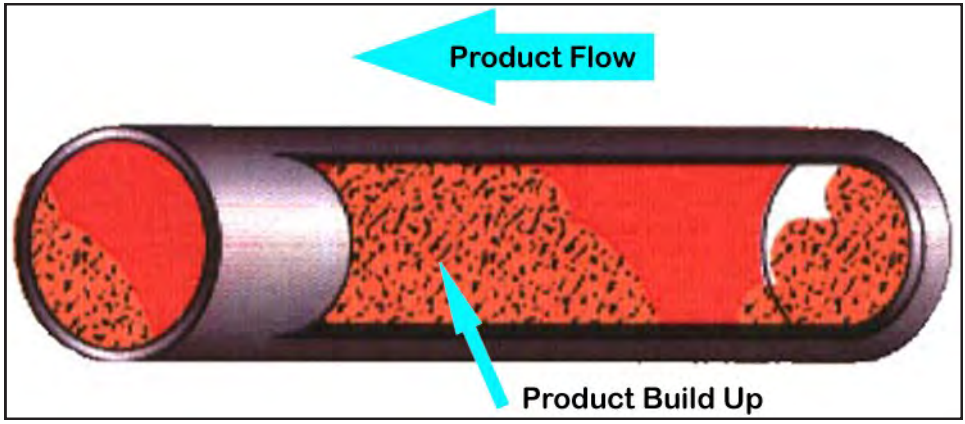


Figure 6. Product Flow and Build Up

Comparing product flow through a hose in the vertical portion of hose (Figure 7). It can readily be seen that vertical positioning of hose results in smoother product flow.

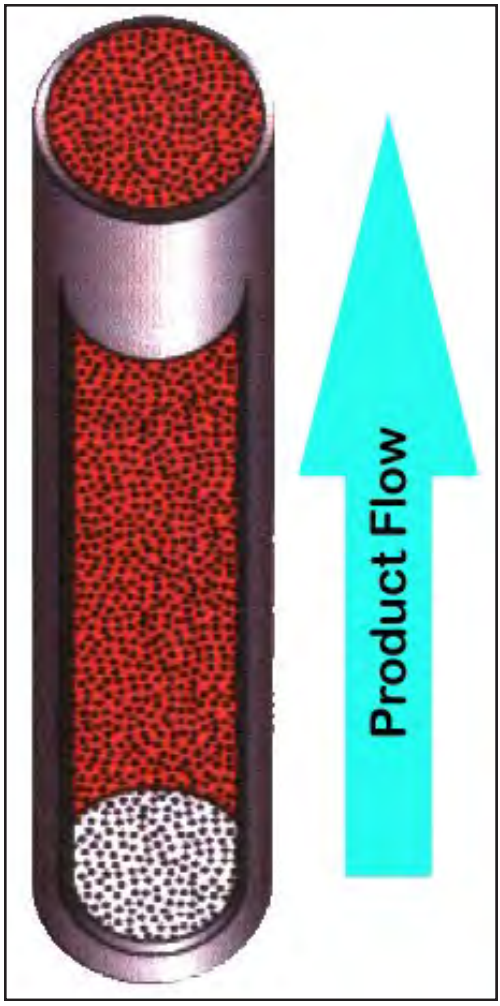


Figure 7. Vertical Product Flow

NOTICE

If discharge hose must be run horizontally for any considerable distance, elevate the hose at intervals to create slight "humps" in the hose. This will help keep the product flowing freely.

2. The relative density (product to air ratio) decreases as the elevation increases. The higher the storage facility, the longer it will take to unload. Figure 8, illustrates the relative density at various elevations. Note that as the product head decreases, the air velocity will increase and air pressure will decrease.

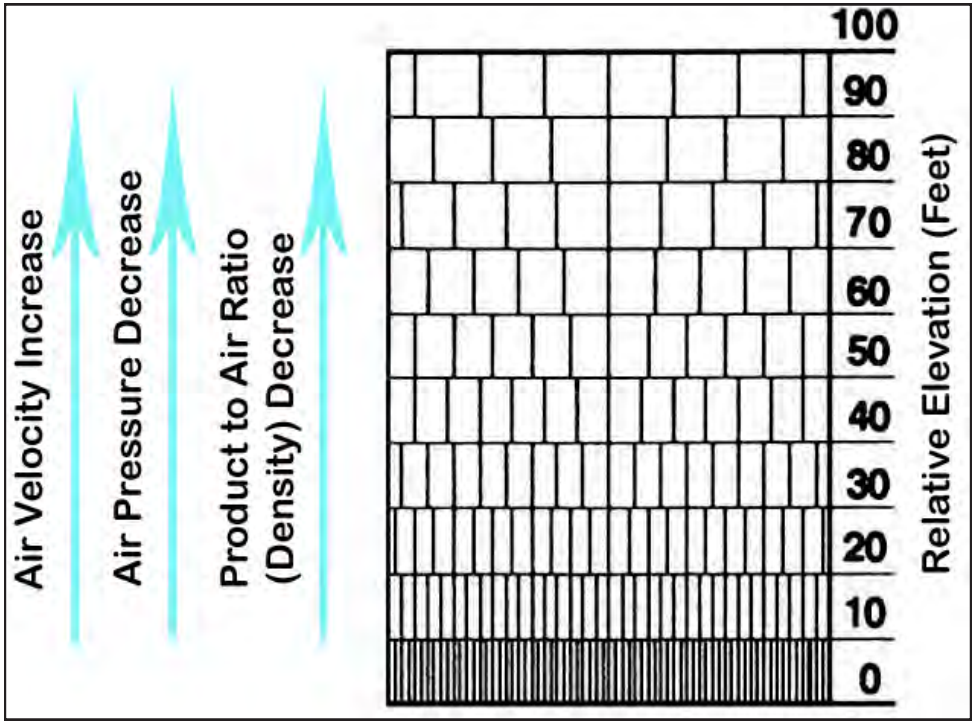
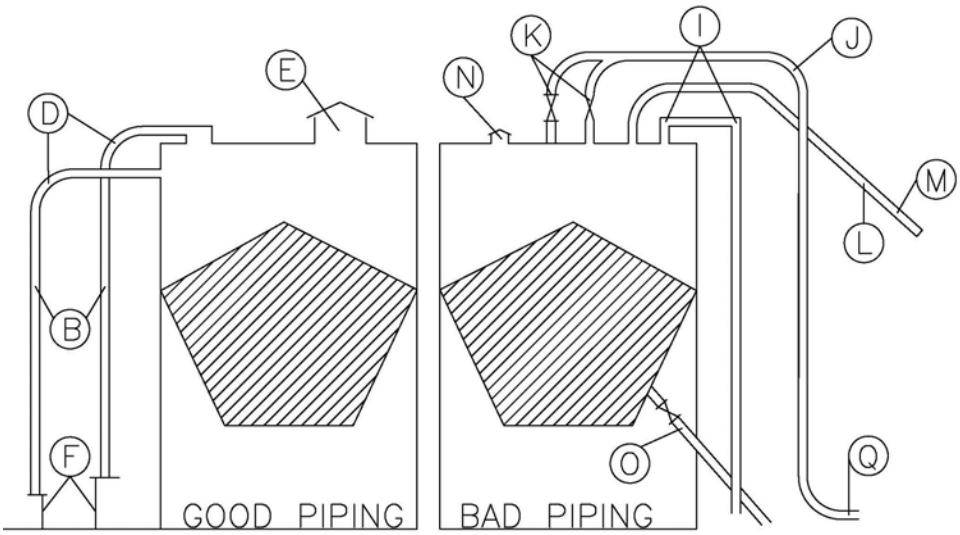


Figure 8. Relative Density at Various Elevations

3. Heavy, fine materials such as sand or sugar require considerably more unloading time. Light, bulky products offer more resistance and are more easily carried by the air stream. Use the pressure control valve and the product discharge valve to maintain the optimum product-to air ratio for the type of product being unloaded.

4. Avoid abrupt, unnecessary changes in pipe diameter, especially increases in diameter of pipe spanning long conveying distances. Increasing pipe diameter allows the air in the line to expand, thus causing a loss of pressure. Although conveying distance is a function of both air volume and pressure, effective conveying distances will be decreased with sudden pressure drops.

Example of Good Piping Techniques



GOOD PIPING

A. Keep as short as possible
B. Strictly vertical and horizontal alignments.
C. Minimize bends.
D. Give bends 4′ or 5′ radius (or 15x diameter of pipe).
E. Adequate venting of receiving bin (min. 12″ diameter).
F. Ample ground clearance (4′-6′) at hose hook up.
G. Tight and smooth joints.
H. Use 5″ long when high unloading rate is required (assume adequate CFM).

BAD PIPING	**EFFICIENCY REDUCTION**
I. Sharp turns or elbows.	15-25%
J. Useless bends or turns	10-20%
K. Shut-off or diverter valves in line.	8-10%
L. Longer line than necessary.	8% per 10′
M. Diagonal piping.	10-20%
N. Inadequate venting.	30-50%
O. Fill pipe at bottom of hopper.	Exponential
P. Reduction in pipe size.	30-50%
Q. Horizontal hookup connection.	

HOW TO UNPLUG A LINE

Cleaning of a plugged line without uncoupling the product hose is easy with a Heil trailer. Proper manipulation of the valves directs all the air from the blower into the plugged line. Air in the pressurized line is then released through the product valve into the non-pressurized vessel, pulling a portion of the plug into the tank.

The line is plugged when the line pressure becomes steady and the tank and line pressure rise together. All movement of the product hose is stopped.

Step 1: Completely close the product discharge valve.

Step 2: Close Aeration Control Valve.

Step 3: Fully Open the Pressure Control Valve.

If the line pressure does not drop off within a few minutes (indicating product flow), open and close the pressure control valve quickly several times, creating surges of air into the product line.

If the line doesn't clear, follow the steps on the next page...

The following steps are shown in a graphic on the next page…

Step 1: Close all product valves.

Step 2: Stop blower.

Step 3: Open blow down valve. (Leave it open)

Step 4: Open pressure control valve.

Step 5: Close aeration control valve.

Step 6: Close top air valve (if equipped with one).

Step 7: Re-start the blower.

Step 8: Allow line pressure to build up to 15 PSI.

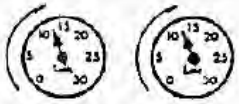
Step 9: Quickly open the product valve of the most empty hopper. Part of the product plug will rush back into the open hopper.

Step 10: When line pressure is zero, close the product valve and allow the line pressure to build back up to 15 PSI.

Step 11: Quickly open the product valve again.

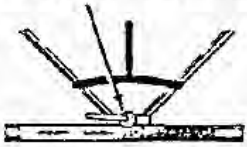
Step 12: Continue this procedure, eroding away at the plug each time, until the line is clear and the pressure in the line does not build up.

Step 13: Once clear (line pressure will not build up), close the hopper valve, open aeration valve, close blow down valve—the tank is now pressurizing, resume unloading procedures.

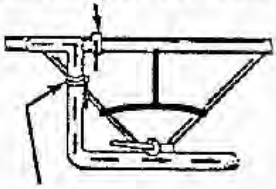


The line is plugged when the line pressure becomes steady and the tank and line pressure rise together. All movement of the product hose is stopped.

1. CLOSE PRODUCT VALVE



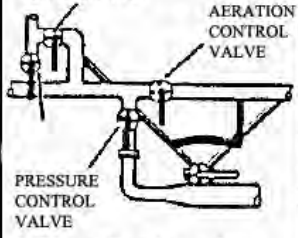
2. CLOSE AERATION CONTROL VALVE.



3. FULLY OPEN PRESSURE CONTROL VALVE.

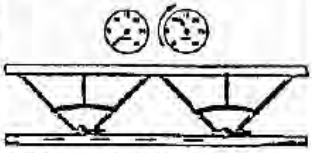
If the line pressure does not drop off within a few minutes (indicating product flow), open and close the pressure control valve quickly several times, creating surges of air into the product line.

If the line still doesn't clear, follow these easy steps...



1. Close all product valves.
2. Stop blower.
3. Open blow down valve.
4. Open pressure control valve.
5. Close aeration control valve.
6. Close top air valve. (If equipped with one)
7. Re-start the blower.

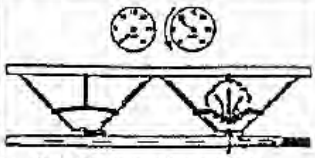
8. Allow line pressure to build up to 15 PSI.



9. QUICKLY OPEN PRODUCT VALVE OF THE MOST EMPTY HOPPER.

(Part of the product plug will rush back into the open hopper.)

10. When the line pressure is zero, close the product valve and allow the line pressure to build back up to 15 PSI.



11. Quickly open the product valve again.
12. Continue this procedure, eroding away at the plug each time, until the line is clear and the pressure in the line does not build up.
13. Once clear (line pressure will not build up), close the hopper valve, open aeration valve, close blow down valve the tank is now pressurizing, resume unloading procedures.

Recommended Airflow Volumes for Various Bulk Density Products

Nature of Product: Density, Particle Size, etc.	**Approximate Airflow Requirement: Cubic Feet per minute (CFM)[1]**
Light density pulverants up to 40 lb/ft^3 (flour, lime, etc. having good aeration characteristics).	Best handled with 190-200 CFM air. Can be conveyed efficiently at tank pressure of 12-25 psi.
Medium density pulverants 40 lb/ ft^3 - 60 lb/ft^3 (talcum powder which has good aeration characteristics).	Best handled with 225-325CFM air. Can be conveyed efficiently at tank pressure of 12-25 psi.
High density pulverants 80 lb/ft^3 - 110 lb/ft^3 (talcum powder which has good aeration characteristics).	Best handled with 275-400 CFM air. Can be conveyed efficiently at tank pressure of 12-25 psi.
Small granular 40 lb/ft^3 - 80 lb/ft^3 (table salt, beet sugar).	Best handled with 450-550 CFM air. Can be conveyed efficiently at tank pressure of 10-15 psi.
Medium granular 40 lb/ft^3 - 80 lb/ ft^3 (wheat, corn, pebble lime).	Best handled with 475-600 CFM air. Can be conveyed efficiently at tank pressure of 8-12 psi.
Course granular (.25″ - 1.5″ particle size.)	Air volume and pressures for conveying these products depend on particle size, bulk density and distance to be conveyed. Typically requires greater than 500 CFM and

Table 1. Pressure and airflow requirements for various bulk density products.

[1] Figures based on 15 psi blower outlet pressure and 4 inch discharge line.

Calculation of Blower Speed Based on Product Requirements

Once the airflow requirement for a particular product has been established, a cross reference on the blower make must be performed to secure the required blower speed for the production of the necessary volume of air. Knowing this, the required engine speed can be calculated for the situation, if the make and model of both the transmission and the selected power take off (PTO) are known. The details of the PTO (location on the transmission, etc.) are defined once the transmission type is determined.

Example:

Given: Product to be hauled is Portland Cement. It will be unloading using a Gardner-Denver T5CDL9 blower.

Required: Calculate the engine speed needed to produce the required air volume from the blower to effectively convey the cement.

Assume: Operating pressure will be 15 psi and 4 inch discharge line will be used.

Solution: From the **Product Bulk Densities** beginning on page 44, we find that Portland Cement has a bulk density of 94 lbs/ft^3. Now, cross referencing this bulk density to the **Recommended Airflow Volume for Various Bulk Density Products** on page 41 we find that the required air volume for the products having this bulk density averages 338 CFM.

From the blower manufacture's product literature, we find that the closest mat at 15 psi is 375 CFM at 1500 RPM blower speed. This is what we will design around.

Now, we need to know the make and model number of the transmission to cross reference a power take off in order to determine the ratio of the PTO.

The make and model number of the transmission and make, model number and location of the PTO are cross referenced in the PTO Manufacture's Guidebook in order to secure the final ratio. The tractor manufacture should also be able to help with this information. PTO final drive ratios typically average 130% to 180% for dry bulk service. What this means is that the PTO turns 80% faster than the engine.

For the sake of this discussion, assume we have a PTO of 180%. We calculate the necessary engine RPM by the following.

$$\frac{\text{Blower RPM}}{\text{PTO Ratio}} \text{ X } 100 = \text{Engine}$$

Substituting our values, we have:

$$\frac{1500 \text{ RPM}}{180\%} \text{ X } 100 = 833 \text{ Engine}$$

Therefore, to ensure that we are supplying an adequate supply of air to our trailer system, then engine of the tractor must turn 833 RPM with this PTO. With the tractor engine turning so few RPM efficiency may be sacrificed. Therefore, it may be necessary to select a PTO with a lower ratio to ensure that the engine turns fast enough to operate within its power band and at the highest efficiency possible. Selecting a PTO with a 130% ratio brings engine speed up to 1154 RPM, which may be better on the engine from an efficiency and, hence fuel consumption standpoint.

Product	Lbs. / Cu. Ft.
Alfalfa Meal	14-22
Alfalfa Pellets	41-43
Alfalfa Seed	10-15
Almonds, Broken	28-30
Almonds, Whole Shelled	28-30
Alum, Fine	45-50
Alum, Lumpy	50-60
Alumina Fines	35
Alumina	50-65
Alumina Sized or Briquette	65
Alumina Chips, Oily	7-15
Alumina Chips, Dry	7-15
Aluminum Hydrate	13-20
Aluminum Oxide	60-120
Aluminum Silicate (Andalusite)	49
Aluminum Sulfate	45-58
Aluminum Chloride, Crystalline	45-52
Aluminum Nitrate	45-62
Aluminum Sulfate	45-58
Ammonium Chloride	45-52
Ammonium Nitrate	45
Ammonium Sulfate, Granular	45-58
Ash, Black Ground	105
Ashes, Coal, Dry-1/2"	34-35
Ashes, Coal, Dry-3" & Under	35-40
Ashes, Coal, Wet-1/2"	45-50
Ashes, Coal, Wet-3" & Under	45-50
Asphalt Binder	80-85
Asphalt, Crushed-1/2"	45
Bakelite, Fine	30-45
Baking Powder	40-55
Baking Soda (Sodium Bicarbonate)	40-55
Barite (Barium Sulfate) + 1/2"	120-180
Barite, Powder	120-180
Barite, Carbonate	72
Bark, Wood, Refuse	10-20
Barley, Fine, Ground	24-38
Barley, Malted	31
Barley, Meal	28
Barley, Scoured	41
Barley, Whole	36-48

Product	Lbs. / Cu. Ft.
Basalt	80-105
Bauxite, Dry, Ground	68
Bauxite, Crush-3	75-85
Bauxite, Mine Run	66-90
Beets, Whole	48
Bentonite, Crude	35-40
Benzene Hexachloride	56
Blood, Dried	35-45
Blood, Ground	30
Bones, Whole	35-50
Bones, Crushed	35-50
Bones, Ground	50
Bonemeal	50-60
Bone Ash (Tricalcium Phosphate)	40-50
Borax 2"-3" Lump	60-70
Borax 1-1/2"-2" Lump	55-60
Borax Screening - 1/2"	55-60
Borax, Fine	45-55
Boric Acid, Fine	55
Boron	75
Bran, Rice-Rye Wheat	16-20
Brewer's Grain, Spent, Dry	14-30
Brewer's Grain, Spent, Wet	55-60
Brick, Hard Burned	125
Brick, Soft Burned	100
Brick, Ground 1/8"	100-120
Bronze Chips	30-50
Buckwheat	37-42
Calcine, Flour	75-85
Calcium Acetate	125
Calcium Carbide (Crushed)	70-80
Calcium Lactate	26-29
Calcium Carbonate	90-100
Calcium Oxide	40-50
Carbon, Activated, Dry, Fine	8-20
Carbon, Black, Pelleted	20-25
Carbon, Black, Powder	4-7
Carborundum	100
Cashew Nuts	32-37
Cast Iron, Chips	130-200
Caustic Soda	88

Product	Lbs. / Cu. Ft.
Caustic Soda, Flakes	47
Cement, Clinker	75-95
Cement, Portland	94
Cement, Aerated (Portland)	60-75
Cement, Mortar	133
Chalk, Crushed	75-95
Chalk, Pulverized	67-75
Charcoal, Lumps	18-28
Charcoal, Ground	18-28
Chips Hogged Fuel	15-25
Chrome Ore	125-140
Cinders, Blast Furnace	57
Cinders, Coal	40
Clay, Cacined	80-100
Clay, Brick, Dry, Fines	100-120
Clay, Ceramic, Dry, Fines	60-80
Clay, Dry, Lumpy	60-75
Coal, Anthracite, Sized - 1/2"	55-60
Coal, Bituminous, Mined 50M & Less	50-54
Coal, Bituminous, Mined	40-60
Coal, Bituminous, Mined, Sized	45-55
Coal, Bituminous, Mined, Run of Mine	45-55
Coal, Bituminous, Mined, Slack	43-50
Coal, Bituminous, Stripping, Not Cleaned	50-60
Coal, Lignite	40-45
Coal, Char	24
Cocoa Beans	30-40
Cocoa, Nibs	35
Cocoa, Powdered	30-35
Coconut, Shredded	20-22
Coffee, Green Bean	25-35
Coffee, Ground, Dry	25
Coffee, Roasted Bean	22-26
Coffee, Soluble	19
Coke, Loose	25-35
Coke, Petroleum, Calcined	3-45
Coke, Breeze, 1/4" and under	25-35
Concrete, Cinder	90-100
Concrete, 2" Slump	100-150
Concrete, 4" Slump	110-150
Concrete, 6" Slump	110-150

Product	Lbs. / Cu. Ft.
Concrete, In Place, Stone	130-150
Concrete, Pre-Mix, Dry	85-120
Copper Ore	120-150
Copper Ore, Crushed	100-150
Copper Sulfate (Bluestone)	75-85
Cork, Fine Ground	12-15
Cork, Granulated	12-15
Corn, Cracked	45-50
Corn Cobs, Ground	17
Corn Cobs, Whole	12-15
Corn, Ear	56
Corn Germ	21
Corn Grits	40-45
Corn Oil Cake	25
Corn, Seed	45
Corn, Shelled	45
Corn, Sugar	30-35
Cornmeal	38-40
Cottonseed Cake, Crushed	40-45
Cottonseed Cake, Lumpy	40-45
Cottonseed, Dry, Delinted	35
Cottonseed, Dry, Not Delinted	18-25
Cottonseed Flakes	20-25
Cottonseed Hulls	12
Cottonseed Meal, Extracted	35-40
Cottonseed Meal, Expeller	25-30
Cottonseed Meats, Dry	40
Cottonseed Meats, Rolled	35-40
Cracklings, Crushed	40-50
Cullet, Fine	80-120
Cullet, Lump	80-120
Diatomaceous Earth	11-14
Dicalcium Phosphate	40-50
Disodium Phosphate	25-31
Distillers' Grain, Spent, Dry	30
Distillers' Grain, Spent, Wet	40-60
Dolomite, Crushed	80-100
Dolomite, Lumpy	90-100
Earth, As Excavated, Dry	70-80
Earth, Loam, Dry, Loose	76
Earth, Wet, Containing Clay	100-110

Product	Lbs. / Cu. Ft.
Epsom Salts	40-50
Feldspar, Ground	65-80
Feldspar, Lumps	90-100
Feldspar, Powder	100
Feldspar, Screening	70-85
Ferrous Sulfate	60-70
Ferrous Sulfide, 1/2"	120-135
Ferrous Sulfide, Powder	105-120
Fish Meal	35-40
Fish Scrap	40-50
Flaxseed	45
Flaxseed Cake (Linseed Cake)	48-50
Flaxseed Meal (Linseed Meal)	25
Flour, Wheat	35-40
Flue Dust, Blast Furnace	110-125
Flue Dust, Basic Oxygen Furnace	45-60
Flue Dust, Boiler House, Dry	35-40
Fluorspar Fine (Calcium Fluoride)	80-100
Fluorspar, Lumps, 1-1/2" to 3"	90-100
Fluorspar, Screenings, 1/2"	85-105
Fly Ash	30-45
Foundry Refuse, Old Sand Cores, Ect	70-100
Fuller's Earth, Dry, Raw	30-35
Fuller's Earth, Oily, Spent	60-65
Fuller's Earth, Burned, Roasted	40
Glass Batch	80-100
Glue Ground	40
Glue, Pearl	40
Glue, Vegetable, Powdered	40
Gluten Meal	40
Granite, Broken	95-100
Granite, Lumps 1-1/2" to 3"	85-90
Granite, Screenings, 1/2"	80-90
Graphite, Flake	40
Graphite, Flour	28
Graphite, Ore	65-75
Grass Seed	10-12
Gravel, Bank Run	90-100
Gravel, Dry, Sharp	90-100
Gravel, Pebbles	90-100
Gypsum, Calcined	55-60

Product	Lbs. / Cu. Ft.
Gypsum, Calcined, Powdered	60-80
Gypsum Dust, Aerated	60-70
Gypsum Dust, Non Aerated	93
Gypsum, Lumps, 1-1/2" to 3"	70-80
Gypsum, Raw, 1"	70-80
Gypsum, Screenings, 1/2"	70-80
Guano, Dry	70
Hops, Spent, Dry	35
Hops, Spent, Wet	50-55
Iron Borings, Machine Shop	125
Iron Ore	100-200
Iron Ore, Concentrates	120-180
Iron Ore, Crushed	135-150
Iron Oxide, Pigment	25
Iron Oxide, Mill Scale	75
Kaffir Corn	40-45
Kaolin Clay 3" and Under	63
Kaolin Clay, Talc, 100 Mesh	42-56
Lactose	32
Lead Arsenate	72
Lead Carbonate	240-260
Lead Ore, 1/8"	200-270
Lead Ore, 1/2"	180-230
Lead Oxide (Red Lead) 100 Mesh	30-150
Lead Oxide (Red Lead) 200 Mesh	30-180
Lead Sulfide, 100 Mesh	240-260
Lime, Ground, 1/8" and Under	60-65
Lime, Hydrated, 1/8" and Under	40
Lime, Hydrated, Pulverized	32-40
Lime, Pebble	50-56
Limestone, Agricultural, 1/8" and Under	68
Limestone, Crushed	85-90
Limestone, Dust	55-95
Litharge, Pulverized (Lead Oxide)	200-250
Magnesium, Chloride	33
Malt, Dry Whole	20-30
Malt, Meal	36-40
Malt, Sprouts	13-15
Malt, Wet or Green	60-65

Product	Lbs. / Cu. Ft.
Manganese Dioxide	70-85
Manganese, Ore	125-140
Manganese, Oxide	120
Manganese Sulphate	70
Marble, Crushed	80-95
Meat, Scrap with Bone	40
Milk, Dried Flakes	42130
Milk, Malted	30-35
Milk, Whole, Powdered, Dry	20-36
Milk Sugar	32
Mill Scale	120-125
Milo	40-45
Milo, Ground	32-36
Molybdite, Powder	107
Mortar, Wet	150
Mustard Seed	45
Monosodium Phosphate	50
Niacin (Nicontinic Acid)	35
Nickel (Cobalt Sulphate Ore)	80-150
Oats	26
Oats, Crimped	19-26
Oats, Crushed Oats, Rolled	22 35
Oat Flour Oat Hulls	19-24 8-12
Oil Cake	45-50
Orange Peel, Dry	15
Oxalic Acid, Crystals	60
Oyster Shells, Ground	50-60
Oyster Shells, Whole	80
Paper Pulp (4% or less)	62
Paper Pulp (6% to 15%)	60-62
Peanuts, Raw, Uncleaned, Unshelled	15-20
Peanuts, Clean, In Shell	15-20
Peanuts, Shelled	35-45
Peanut Meal	30

Product	Lbs. / Cu. Ft.
Peas, Dried	45-50
Perlite, Expanded	8-12
Perlite, Expanded, Powder	4-12
Phosphate Acid Fertilizer	60
Phosphate Rock Broken	75-85
Phosphate Rock Pulverized	60
Phosphate Sand	90-100
Phosphate, Triple Super, Ground	50-55
Polyethylene Resin, Pellets	30-35
Polystyrene Beads	40
Polyvinyl Chloride, Pellets	20-30
Polyvinyl Chloride, Powder	20-30
Potash (Muriate) Dry	70
Potash (Muriate) Mine Run	75
Potash Salt (Sylvite)	80
Potassium Carbonate	51
Potassium Chloride, Pellets	120-130
Potassium Nitrate	80
Potassium Sulfate	42-48
Potato Flour	48
Pumice, Ground	40-45
Pyrites, Iron Pyrites, Iron, Pellets	135-145 120-130
Quartz Dust	70-80
Quartz	80-95
Rice, Hulled	45-49
Rice, Polished Rice, Rough Rice, Bran	30 32-36 20
Rice, Grits Rice, Hulls	42-45 20-21
Rubber, Reclaimed, Ground Rubber, Reclaimed Rubber, Pellets	23-50 25-30 50-55
Rye Rye, Feed Rye, Meal	42-48 33 35-40
Rye, Middlings	42
Rye, Bran	15-20
Rye, Shorts	32-33

Product	Lbs. / Cu. Ft.
Safflower Seed	45
Safflower Cake	50
Safflower Meal	50
Salicylic Acid	29
Salt, Dry Coarse	45-60
Salt, Dry Fine	70-80
Salt Cake, Dry Coarse	85
Salt, Dry Pulverized	65-85
Sand, Dry Bank (Damp)	110-130
Sand, Dry Bank (Dry)	90-110
Sand, Foundry, Prepared	65-75
Sand, Foundry (Shake Out)	90-100
Sand, Dry Silica	90-100
Sand, (Resin Coated) Silica	104
Sand, (Resin Coated) Zircon	115
Sandstone, Broken	85-90
Sawdust, Dry	10-13
Sea-Coal	65
Sesame Seed	27-41
Shale, Broken	90-100
Shale, Crushed	85-90
Shellac	80
Shellac, Powdered or Granulated	31
Silica, Flour	80
Slag, Blast Furnace, Crushed	130-180
Slag, Furnace, Granular, Dry	60-65
Slag, Furnace, Granular, Wet	90-100
Slate, Crushed, Minus 6	80-90
Slate, Dust	70-80
Slate, Crushed, Minus 1/8"	82-85
Slate, Lump	85-95
Sludge, Sewage, Dried	40-50
Sludge, Sewage, Dry Ground	45-55
Soap, Beads or Granules	15-35
Soap, Chips	15-25
Soap, Detergent	15-50
Soap, Flakes	5-15
Soap, Powder	20-25
Soapstone, Talc, Fine	40-50
Soda Ash, Briquettes	50
Soda Ash, Heavy	55-65
Soda Ash, Light	20-35
Soda Alum	75
Sodium Aluminate, Ground	72
Sodium Aluminate, Sulphate	75
Sodium Nitrate	70-80
Sodium Phosphate	50-60
Sodium Sulfite	96
Soy Bean, Cake	40-43
Soy Bean, Cracked	30-40
Soy Bean, Flake, Raw	18-25
Soy Bean, Flour	27-30
Soy Bean Meal, Cold	40
Soy Bean Meal, Hot	40
Soy Beans, Whole	45-50
Starch	25-50
Steel, Turnings, Crushed	100-150
Steel, Turnings	75-150
Sugar Beet Pulp, Dry	12-15
Sugar Beet Pulp, Wet	25-45
Sugar, Refined, Granulated, Wet	50-55
Sugar, Raw	55-65
Sugar Cane, Knifed	15-18
Sulphur, Crushed Minus 1/2"	50-60
Sulphur, Lumpy Minus 3"	80-85
Sulphur, Powdered	50-60
Sunflower, Seed	19-38
Taconite, Pellets	116-130
Talcum Powder	50-60
Talcum, Minus 1/2"	80-90
Talc, Solid	165
Tallow	58
Tanbark, Ground	55
Trap Rock, Screenings	90-100
Trap Rock, Lumps	100-110
Tricalcium Phosphate	40-50
Trisodium Phosphate	60
Trisodium Phosphate, Granular	60
Trisodium Phosphate, Pulverized	50
Triple Super Phosphate	50-55
Urea Prills, Coated	43-46
Vemiculite, Ore	80

Product	Lbs. / Cu. Ft.
Vemiculite, Expamded	16
Vetch	48
Walnut Shells, Crushed	35-45
Wheat	45-48
Wheat Bran	16-20
Wheat, Cracked	40-45
Wheat, Flour	33-40
Wheat, Germ	18-28
Wheat, Middlings	20-24
White Lead, Dry	75-100

Product	Lbs. / Cu. Ft.
Wood Chips, Screened	10-30
Wood Chips, Hogged Fuel	15-25
Wood, Flour	16-36
Wood, Shavings	8-16
Zinc, Concentrate Residue	75-80
Zinc, Dust	200
Zinc, Ore, Crushed	160
Zinc, Ore, Roasted	110
Zinc Oxide, Heavy	30-35
Zinc Oxide, Light	10-15

Notes:

Landing Gear Operating Instructions

WARNING: Before attempting to operate the landing gear, you must read and understand the following procedures.

1. Perform all procedures in lighted area clear of obstacles and other personnel.
2. Always grip the crank handle securely with both hands.
3. Maintain proper footing at all times.
4. Never attempt to shift the landing gear while under load.
5. Lifting and lowering of the trailer must always be done in LOW GEAR.
6. DO NOT ATTEMPT TO LIFT OR LOWER TRAILER WITH LANDING GEAR IN HIGH GEAR, AS SERIOUS PERSONAL INJURY COULD OCCUR.
7. Always secure the crank handle when not in use.

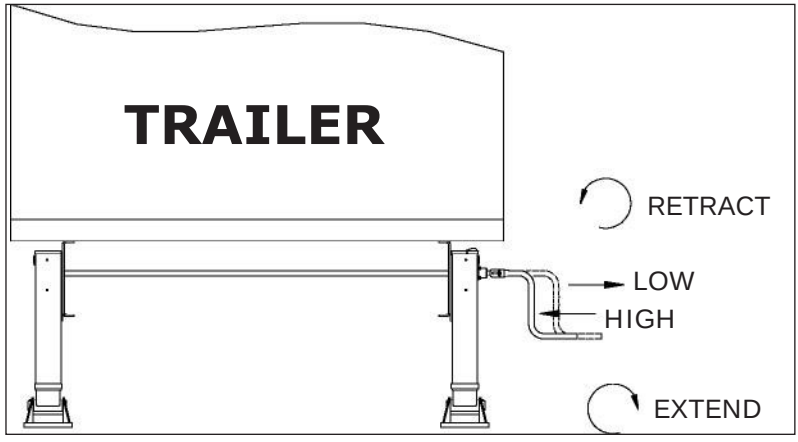


Figure 9. Landing Gear

> Push crank handle **in** for **high** gear.

> Pull crank handle **out** for **low** gear.

> Turn crank: Counterclockwise to Retract, Clockwise to Extend.

PREVENTIVE MAINTENANCE

INTRODUCTION

Lubrication and service performed at regular intervals will keep the DRY BULK TRANSPORT in top operating condition for the longest period of time. The importance of regular inspection cannot be over-emphasized. Making necessary adjustments, tightening nuts and bolts, checking air lines, lights and wiring connections will help prevent serious trouble and delays on the road.

The driver should be the first line of defense in Preventive Maintenance. A conscientious and alert operator will promptly report all need for adjustment or repair. A vehicle safety check should be performed daily prior to operation.

LUBRICANTS

It is not the policy of the Heil Trailer International, Co. to guarantee lubricant performance. The responsibility for the quality of any lubricant rests solely with the distributor or manufacturer of the lubricant.

DELIVERY INSPECTION

All units are thoroughly tested and inspected at the factory. As an added precaution, the following items should be double checked upon delivery.

Axles..... Check king pin alignment

Wheels.....Check wheel lug torque

Brakes.....Check for proper operation and adjustment

Lights and Wiring.....Check lights for proper operation

Air Spring Bolts.....Check for proper torque

Shock Absorber Bolts.....Check for proper torque

Suspension Pivot Connection Bolts.....Check for proper torque

Piping.....Check for leaks

Manhole Cover.....Check clamping device for proper cover closure

Landing Leg Support Bolts.....Check for proper torque

Front and Rear Structure Bolts.....Check for proper torque

PREVENTIVE MAINTENANCE SCHEDULE

DAILY

Anti-Lock Brake System.....Check for proper operation

Lights and Wiring.....Check all lights for proper operation

All Bolts.....Visually check for tightness

Air Reservoirs.....Drain at the end of each shift

Tires.....Check for proper inflation and inflate

WEEKLY

Wheel Seals.....Check for oil leakage and oil level

Wheel Lugs.....Check for proper torque

Wiring.....Check all connections

Suspension Bolts.....Check for proper torque

Piping.....Check for leaks and damage

Manhole.....Check clamping device for proper cover closure and check gasket for damage

Front and Rear Structure Bolts.....Check for proper torque

MONTHLY

Manhole.....Clean manhole and oil clamps

General Inspection.....Perform inspection (see page 51)

Supports.....Lubricate; check mounting bolts for proper torque

Axle Camshafts.....Lubricate all grease fittings

90 DAYS

Relief Valve.....Remove and inspect relief valve for clogs of hardened material. Bench test relief valve to ensure proper operation.

EVERY 5000 MILES

King Pin Alignment.....Check for proper alignment

Brakes.....Adjust as needed

Wiring.....Check for chafed or broken wires, ground wire Connections, loose wire retaining clips and dielectric grease.

Upper 5th Wheel.....Lubricate

Suspension.....Check for proper bolt torque

Piping.....Check all piping supports-tighten if necessary

Aeration.....Check all aeration tee bolts - hand tighten only

EVERY 10,000 TO 25,000 MILES

Wheel Bearings.....Verify proper end play and adjust as necessary

Brakes.....Inspect linings, free-up brake shoes and anchor pins

EVERY TWO YEARS

Aeration.....Inspect and replace aeration components as necessary. At a minimum, trailers in abrasive product service should be inspected every six months.

Lubrication and Service Chart

	Daily	Weekly	Monthly	5,000 Miles	10K-25K Miles	Annually
Drain any water from air reservoirs	X					
Check manhole clamps, cover closures and gaskets		X				
Clean manhole and lubricate its clamps			X			
Check the operation of all lights	X					
Check all wiring connections		X				
Check for broken or chafed wires				X		
Check brake operation	X					
Adjust brakes (Pg. 58)				X		
Inspect slack adjusters, brake linings and brake chambers					X	
Free up brake shoes and anchor pins (Pg. 58)					X	
Check condition of walkways and toe rails		X				
Check suspension bolt torque (Pg. 79)				X		
Check tires for damage and wear (Pg. 69)	X					
Check axle alignment to king pin (Pg. 71)				X		
Check lubricant level and oil seals on the axles (Pg. 66)		X				
Check ladder bolt tightness		X				
Check the operation of pressure relief device (Pg. 52)	X					
Inspect aeration system (Pg. 56)	X					
Lubricate grease fittings on axle camshafts			X			
Check wheel bearings (Pg. 66)				X		
Check lug nut torque (Pg. 70)					X	
Check piping supports and mounting fastener tightness		X				
Check front and rear structure fastener tightness		X				
Check all valves, piping and manholes for leakage	X					
Check landing gear mounting fastener tightness		X				
Check upper coupler fastener torque	X					
Check king pin wear			X			
Lubricate upper coupler plate and king pin	X					
Visually check tightness of all fasteners	X					
Check all supports and braces			X			

Notice

Tank trailer should be inspected periodically to ensure it meets D.O.T. requirements.
Refer to the D.O.T. Transportation of Hazardous Materials Handbook (paragraph 177.824) if hazardous materials at to be hauled.

LUBRICATION & SERVICE

1. **Manhole Cover-**(Weekly)-check clamping device for proper cover closure; check gasket for damage. (Monthly)-Clean manhole gasket and lubricate clamps.
2. **Lights and Wiring-**(Daily)-check all lights for proper operation. (Weekly)-Check all connections. (Every 5000 miles)-Check for chafed or broken wires.
3. **Anti-Lock Brake System-**(Daily)-Check for proper operation. Refer to Anti-Lock System Maintenance Manual. (Every 5000 miles)-Adjust brakes, see page 58. (Every 10,000 to 25,000 miles)-Inspect linings, free-up brake shoes and anchor pins.
4. **Rear Structure-**(Weekly)-Check bolts for proper torque (150 ft-lbs)
5. **Suspension-**(Every 5000 miles)-Check for proper bolt torque. See page 79 for torque chart.
6. **Tires-**(Daily)-Check for proper inflation, cuts or other damage. See Page 69.
7. **Axles-**(Weekly)-Check oil level and for leakage around oil seals, see page 66. Recommended hub oil is ***Synthetic 75W-90.*** Recommended hub grease is ***Mobilith 007*** and ***Chevron Delo***. Check pivot bolt connections for proper torque. (Every 5000 miles) Check axle alignment to king pin, see page 71. Do not mix oil with grease.
8. **Wheels-**(Weekly)-Check lug nuts or bolts for proper torque, see page 70. (Every 10,000 to 25,000 miles) Check wheel bearings. Tighten or replace as required. See page 67.
9. **Aeration -**Clean or replace as required. (Every 2 years)
10. **Piping-**Check for loose clamps, damaged hoses or leaks. (Monthly) Perform general inspection.
11. **Supports-**(Monthly)-Lubricate; check mounting bolts for proper torque (150 ft-lbs).
12. **Front Structure-**(Weekly)-Check bolts for proper torque (150 ft-lbs).
13. **Landing Gear -** (At least every 3 months) - Lithium Base 1-2% Moly EP-2. For temperatures less than −50 use Artic-Grade all weather white grease.
14. **Upper 5th Wheel-**(Every 5000 miles) Lubricate with multipurpose synthetic grease.
15. **Compressor or Blower-**Service according to manufacturer's recommendations.

GENERAL INSPECTION-AERATION SYSTEM

The following inspection should be performed monthly.

1. Check pressure gauges for accuracy.
2. Close manhole covers. Close all valves except aeration valves. Remove dust cap from product line.
3. Start compressor (or blower) and pressurize tank until relief valve opens. **DO NOT EXCEED MAXIMUM OPERATING PRESSURE.**
4. After tank is pressurized, close the aeration valves and shut off compressor blower. Tank pressure should remain relatively constant. If pressure drops excessively, check for leaks in manhole cover, relief valve, blow-down valve and tank proper. If none are found with the above inspection, check for air leaks in the aeration, pressure control and product valves.

WARNING

If relief valve does not open at pressure specified on valve, shut off compressor or blower and correct the cause of the inoperative relief valve. See page 52 for testing Relief Valve.

NOTICE

Compressors can be severely damaged if operated at speeds and pressures higher than rated and if the air filter is clogged. Check operating speed and pressure rating of the compressor to make sure it is not running too high. See Manufacturer's recommendations.

5. When inspection is complete, open blow-down valve to exhaust the air in the tank. Replace dust cap on product line. If one or more hoppers does not discharge properly, and there are no leaks in tank or valves, the following service procedure is recommended.

    1. Remove product from these sections.
    2. Check aeration line for possible plug.
    3. Check aeration device on interior of tank. Look for torn molded neoprene cone(s), rotated wear plate(s) or plugged aerator housings (see Figure 10). Replace as necessary.

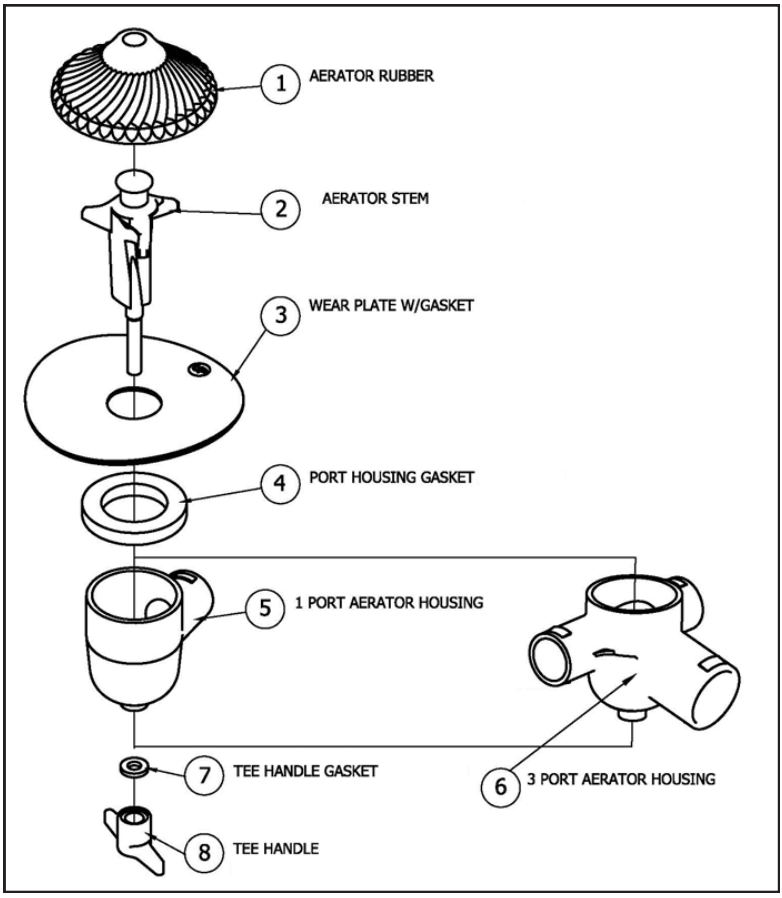


Figure 10. Exploded View of Aerator

BRAKES-MAINTENANCE & ADJUSTMENT

NOTICE

For more information reference the manufactures web literature or call their customer support.

The wheel brakes are equipped with slack adjusters for easy brake adjustment to compensate for brake lining wear. It is recommended that slack adjuster arm travel be held to a minimum for most efficient braking action. The brakes should be adjusted when total arm travel reaches 1-1/2″.

To adjust brakes, depress lock sleeve on slack adjuster, then turn adjustment screw as required. Make sure lock sleeve returns to lock position when adjustment is complete.

Every 5000 miles, the brake camshafts should be lubricated with approved chassis lubricant. Every 10,000 to 25,000 miles, the brakes should be serviced as follows:

1. Remove wheels and hubs.
2. Inspect brake roller shafts, cam rollers, anchor pins, camshaft support bushings, spider bushings and camshaft for wear and replace if necessary. Lubricate these parts with chassis lubricant upon reassembly.
3. Inspect brake linings for wear, loose rivets and any signs of grease on the braking surface. Oil-soaked linings are not reusable and must be replaced. Check to ensure that the linings have not worn to the point that rivet heads are contacting inside surface of drum. Reline or replace brake shoes if necessary.
4. Check inside surface of drum. Rebooting of drums is not recommended, as the strength of refaced drums is greatly reduced. If drum is worn, replace it.
5. Service the wheel bearings and seals if required. Reassemble hubs and wheels.

DISC BRAKE INSPECTION & PREVENTIVE MAINTENANCE

Basic Inspection w/ wheel mounted

1. For vehicles with electronic wear indicators, use the dash indicator(s) and/ or the hand-held diagnostic tool to regularly monitor the pad wear.
2. In all cases, **visually inspect the wear indicator every three months** (or keep track of the results of maintenance inspections to schedule checks 4 to 5 times during the pad lifetime). If indicators line up time to schedule inspection of pads and rotors.
3. A visual check of the mechanical wear indicator every time the tire pressures are checked is recommended. Be alert for any rotor cracks, etc. visible.
4. Follow all industry safety guidelines. On level ground, with the wheels chocked and the parking brake temporarily released, check for movement of the brake caliper. This small movement, less than 0.80" (2 mm) - approximately the thickness of a nickel - in the inboard/outboard direction indicates that the brake is moving properly on its guide pins. If the caliper has no movement or appears to move greater than the distances above, a full wheel-removed inspection will be necessary.

Basic Inspection w/ wheel removed (annually and at pad replacement)

1. Inspect the rotor for cracks, etc.
2. Inspect the running clearance and adjuster function.
3. Inspect the caliper travel.
4. Inspect the tappet and boot assemblies.
5. Inspect all covers, caps, hoses and brake exterior for damage etc.

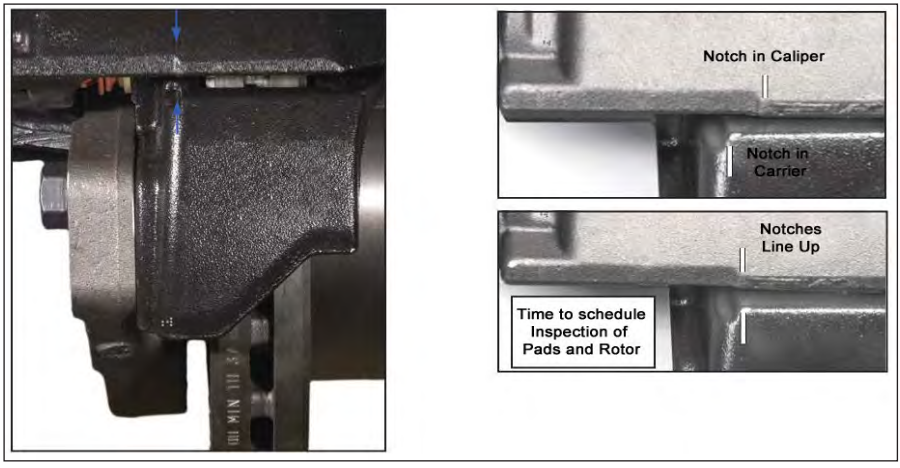


Figure 11. Pad Indicators

ROLLOVER PROTECTION AND ABS

INTRODUCTION

The rollover protection available on Heil trailers is an electronic, self-monitoring system that works with standard air brakes to enhance the safety and reduce the potential of trailer rollover accidents. Electronic rollover protection systems monitor many factors that may cause a rollover accident; vehicles speed, wheel speed, air suspension pressure, and lateral acceleration along the vehicles roll axis. Rollover protection activates when one or more factors exceed safe conditions. The trailers stability is achieved by the rollover device sensing unsafe conditions or speeds and sending a signal to the Electronic Control Unit (ECU), where it reduces the vehicles speed to a "safe" range. All data may be looked up from the information centers or by hooking up a diagnostics tool.

DANGER

IT IS IMPORTANT TO NOTE THAT THE TRAILERS "ROLL STABILITY SYSTEM" IS MERELY A LIMITED ASSIST TO MINIMIZE ROLLOVERS UNDER CERTAIN SITUATIONS AND IS NOT INTENDED TO NOR WILL IT PREVENT ROLLOVERS IN ALL SITUATIONS, AND MORE PARTICULARLY, THOSE RESULTING FROM DRIVER ERROR OR INSUFFICIENT TRAINING OR EXPERIENCE, IMPROPER TRAILER CONDITION AND LOADING, EXCESSIVE SPEED FOR CONDITIONS, ROAD DESIGN INCLUDING EXITS, ROAD DEBRI AND HAZARDS SUCH AS OTHER VEHICLE ACCIDENTS, WEATHER CONDITIONS, IMPROPER ABS, BRAKE COMPONENT AND WHEEL MAINTENANCE, IMPROPER TIRE CONDITION AND REPLACEMENTS AND OTHER CONDITIONS WITHIN OPERATOR CONTROL AND OBSERVATION FOR ASSESSING POTENTIAL ROLLOVER CONDITIONS AND HAZARDS WHICH COULD POSSIBLY LEAD UP TO A POTENTIAL ROLLOVER RESULTING IN, PERSONAL INJURIES, FATALITIES AND ENVIRONMENTAL AND PROPERTY DAMAGE.

INSTALLATION

Refer to CD supplied with tank for installation diagrams, procedures and plumbing schematics. These drawings are trailer specific.

Common Types of Trailer Rollover Protection and ABS

>Haldex. Trailer Roll Stability (TRS)
>Meritor WABCO. RSSplus Trailer ABS with Roll Stability
>Bendix. Bendix ABS with ESP (Electronic Stability System)

ROLLOVER PROTECTION AND ABS

NOTICE

Remove all air pressure and electrical power from the brake system before beginning any work on system.

DIAGNOSTICS/TROUBLESHOOTING

Most ABS or Roll Stability problems are related to:

1. Cut, corroded, or abraded wires.
2. Corroded connectors and terminals.
3. Connector terminal not latched or seated correctly to mating assemblies.
4. Excessive sensor air gap, sensor clip retention.
5. Wheel bearing end play.

Faults, problems and diagnostics are displayed two different ways. When the system detects an issue it alerts the driver/owner by either delivering a Blink Code Count to the ABS indicator lamp located on the rear streetside fender (Figure 13) or by sending a fault code to an information center (Figure 12) located on the rear frame of the trailer.

Figure 12. TRS Info Center 2

Figure 13. ABS indicator Lamp

Note. Data collected when the system detects a fault will be stored and can be retained with proper diagnostic tool.

ROLLOVER PROTECTION AND ABS

DIAGNOSTICS/TROUBLESHOOTING

Diagnostic Trouble Fault Codes List (HALDEX)

Power Supply Fault Code List	
ECU TIME OUT or NO LINK	No supply on ignition switched line. Check truck fuses, 7-way connection, 5-way ABS connection, power cable connections. Check diagnostic cable for corrosion.
PWR ISO7638 FAILI	Intermittent power loss. Check all electrical connections as mentioned above.
PWR LO VOLT	Supply voltage < 8 volts. Check voltage regulator on tractor, loose connections, and corrosion.
PWR HI VOLT	Supply voltage > 17 volts. Same as above.

Sensor/Sensor Extension Fault Code List	
	Note. The fault code identified which sensor/wheel end needs to be checked.
S1A CONT S1B CONT S2A CONT S2B CONT	Open or Short Circuit. 1. Disconnect the sensor extension cable from sensor and measure electrical resistance between the two pins in the sensor housing, it should be between 980-2350 ohms. 2. Disconnect sensor extension from ECU and measure continuity.
S1A SIGNAL S1B SIGNAL S2A SIGNAL S2B SIGNAL	Intermittent low sensor output occurs when vehicle is moving. Check for broken sensor retaining clip, damaged or misaligned exciter ring, excessive wheel bearing end play, loose/ damaged/corroded sensor connections or a break inside the sensor cabling.

DIAGNOSTICS/TROUBLESHOOTING

Sensor/Sensor Extension Fault Code List (cont..)	
S1A SIGNAL S1B SIGNAL S2A SIGNAL S2B SIGNAL	Low sensor output. 1. Rotate the wheel at 1 rev / 2 sec and measure AC voltage at the sensor plug, it should be > 200 millivolts. 2. Make sure sensors are pushed up against exciter rings.

Modulators Fault Code List	
BRK APPLY SC BRK APPLY OC BRK APPLY SC DRIVE BRK APPLY UNSPEC	Internal fault with the brake apply solenoid. Detach ECU and replace modulator.
EPRV 21 HOLD SC EPRV 21 DUMP SC EPRV 21 HOLD OC EPRV 21 DUMP OC EPRV 21 HOLD SC DRIVE EPRV 21 DUMP SC DRIVE EPRV 21 HOLD UNSPEC EPRV 21 DUMP UNSPEC	Internal fault with the hold or dump solenoids of modulator 21. Detach ECU and replace modulator.
EPRV 22 HOLD SC EPRV 22 DUMP SC EPRV 22 HOLD OC EPRV 22 DUMP OC EPRV 22 HOLD SC DRIVE EPRV 22 DUMP SC DRIVE EPRV 22 HOLD UNSPEC EPRV 22 DUMP UNSPEC	Internal fault with the hold or dump solenoids of modulator 22. Detach ECU and replace modulator.
DEMAND SC DEMAND OC	Internal fault with the service/control line pressure transducer. Detach ECU and replace modulator.
EPRV 21 DEL SC EPRV 21 DEL OC EPRV 22 DEL SC EPRV 22 DEL OC	Internal fault with the delivery pressure transducer. Detach ECU and replace modulator.

DIAGNOSTICS/TROUBLESHOOTING

Modulators Fault Code List (cont..)	
EPRV 21 SLOW REC EPRV 22 SLOW REC	Wheels are slow to recover after brakes are released. Make sure foundation brakes are operating properly, delivery hoses not pinched, speed sensors not crossed with modulator, correct side-by-side plumbing.
RESR SC RESR OC	Internal fault with the reservoir pressure transducer. Detach ECU and replace modulator.
SUSP SC SUSP OC SUSP OUT OF RANGE	1. Check for air leaks on suspension lines 2. Make sure leveling valve is plumbed correctly 3. Internal fault with the suspension pressure transducer. Detach ECU and replace modulator.

WARNING

The Roll Stability and ABS is an electrical system. When you work on the ABS, take the same precautions that you must take with any electrical system to avoid serious personal injury. As with any electrical system, the danger of electrical shock or sparks exists that can ignite flammable substances. You must always disconnect the battery ground cable before working on the electrical system.

NOTICE

Refer to Anti-Lock Brake System Maintenance Manual for operational check and service instructions.

DIAGNOSTICS/TROUBLESHOOTING

Blink Code Diagnostics (WABCO)

There are two kinds of faults: active and stored. Active faults are those currently existing in the system, such as a broken wire. Active faults can be diagnosed through blink codes or TOOLBOXTM Software. Stored faults are faults that have occurred but do not presently exist. Active faults can be cleared only after repairs are completed. Stored faults can only be diagnosed with TOOLBOXTM Software.

The ECU signals a malfunction by lighting both the internal and external indicator lamp when a fault exists. Blink codes are activated through Ignition Power Activation.

Ignition Power Activation

Ignition Power Activation is the process of using the vehicle's ignition switch (or interrupting the power on the blue wire by some other means) to display blink codes on the trailer ABS indicator lamp located on the side of the trailer. This method is for constant power vehicles only.

NOTE: For ignition power activation, power is provided by the ignition switch.

To obtain blink codes using ignition power activation, perform the following procedure:

Turn the ignition switch on for no longer than five seconds. The ABS indicator lamp will be on.

1) Turn the ignition switch off. The ABS indicator lamp will go out.
2) Turn the ignition switch on. The ABS indicator lamp will then come on, then go out.
3) The blink code error will be displayed three times by the ABS indicator lamp on the trailer.

Blink Code Counts	Component Name
0	No failure
3	Sensor failure c
4	Sensor failure d
5	Sensor failure e
6	Sensor failure f
7	External modulator failure
9	Internal modulator failure H2
10	Internal modulator failure
11	No speed failure
12	Control pressure failure
13	Supply pressure failure
14	Power supply failure
15	ECU internal failure
16	SAE J 1708 failure
17	PLC failure
18	Generic IO failure
19	Load sensing failure
20	Roll stability system failure

WHEEL BEARINGS & SEALS

The wheel hub revolves around the axle spindle on two roller bearings. The bearings are lubricated and the hub cavity is sealed against leakage by a seal which rides around an axle ring on the spindle shoulder. Figure 14 illustrates the bearing and seal arrangement.

Check oil level and for leaks around the oil seal at least once a week. If low, refill hub to oil level line on hub cap. Heil Trailer International, Co. uses 75W90 Synthetic Gear Oil. For best results and wheel end life, use only compatible lubricant products.

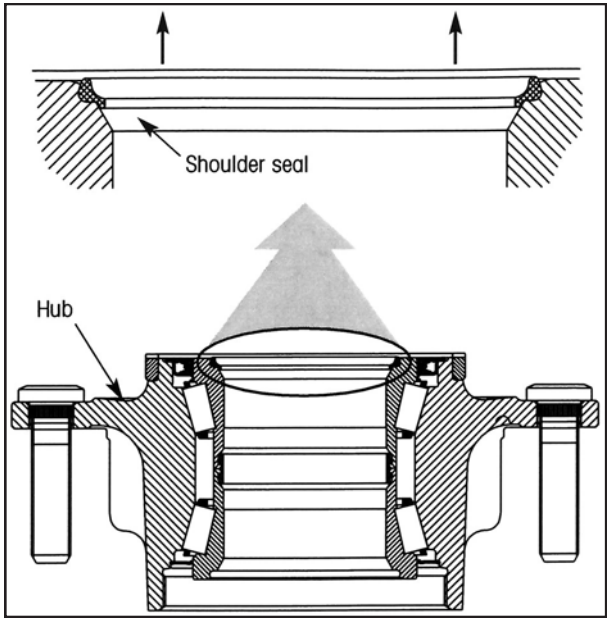


Figure 14. Cross Section View of Wheel Hub

Wheel Bearing Adjustment

Bearing adjustment should be 0.001”-0.005” end play and a minimum of pre-load. Use the following procedure:

1. Tighten inner jam nut (Figure 14) with a 12 inch wrench while turning wheel in both directions until there is a slight bind which indicates all bearing surfaces are in contact.

Wheel Bearing Adjustment (continued)

2. Back off inner jam nut 1/3 turn to allow the wheel to rotate freely.
3. Install washer and tighten outer jam nut.
4. Final bearing adjustment should be with 0.001" to 0.005" end play. Tighten nuts at this position.

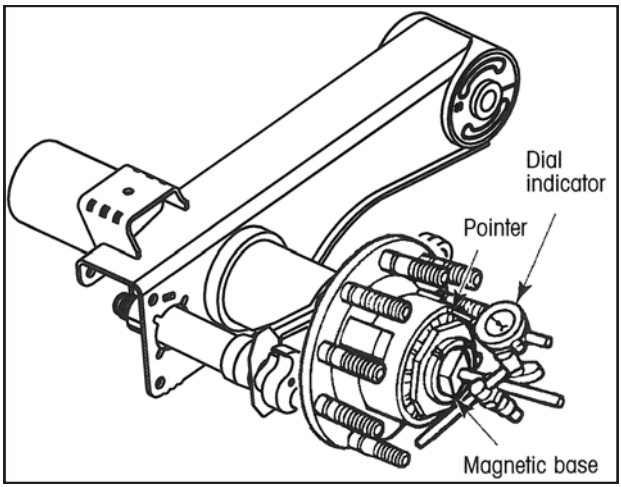


Figure 15. End Play Adjustment

Oil Seal Replacement

If oil leakage around the inner oil seal is noted, replace the oil seal (and axle ring, if required) as follows:

1. Remove wheels and hub
2. Remove and discard old seal.
3. Inspect axle ring. If pitted or worn, replace as follows:
   a. Remove old ring. Take care not to damage spindle.
   b. Clean spindle thoroughly. Shoulder area must be smooth and free from weld spatter and burrs.
   c. If shoulder is not completely smooth apply sealer No. 2 to correct any defects and ensure an oil-tight fit.
   d. Using axle tool, drive the axle ring firmly on shoulder. Edge of axle ring must be parallel and flush with shoulder face. Remove excess sealer, if used.

Oil Seal Replacement (continued)

4. Install oil seal in wheel hub as follows:

   a. Remove all burrs from inside hub bore.

   b. If seal is not pre-coated with BLU-SEAL, or if wheel hub bore is not entirely free of nicks or burrs, apply a thin coat of sealer No. 2 to the O.D. perimeter of the oil seal.

   c. Lay wheel down, brake drum up. Check to ensure that hub cavity is clear of old grease, grit and metal particles-steam clean if possible. Check bearing cones on spindle for proper slip fit. Install inner bearing in hub bore. Place seal in starting position in bore.

   d. Using hub tool and a hammer, drive seal squarely and evenly into bore. Seal should bottom evenly all around against bearing cup. DO NOT continue to hammer after seal has bottomed evenly, as damage to the seal will result.

5. Coat seal lip and inside diameter of inner bearing cone, then install wheel on axle. Take care not to damage seal during installation. If wheel does not slip back in place easily, remove and check for burrs or possible component damage.

6. Install outer bearing, jam nuts and washer. Adjust bearing preload (see Wheel Bearing Adjustment).

7. Install gasket and hub cap.

8. Refill hub with recommended oil. See Wheel Bearings and Seals. 1 to 1-1/2 pints are required per hub, depending on wheel well design. A minimum of 1 pint is required for proper lubrication. Allow plenty of time for the oil to seep through the bearings.

9. Re-install vent plug.

WHEEL & TIRE MAINTENANCE

Proper tire inflation and correct installation of rims and wheels is essential to safe, economical, trouble-free service.

Check tire pressures daily. Recommended inflation pressure is noted on VIN Data Plate. DO NOT over-inflate tires, as this is a common cause of rim failures and accidents. Never run vehicle on one tire of a dual wheel assembly. Loss of air in one tire of a dual set excessively overloads the other tire if the vehicle is operated in this condition.

When checking tire pressures, visually check studs and rim for looseness, cracks or other damage. Inspect tires for uneven wear, cuts, cracks, etc., which would render the tire unfit for further service. If the least doubt exists as to the tires' serviceability, replace the tire.

DANGER

Be extremely careful when working with tires and wheels. Tires and wheels can come apart with explosive force. Never attempt to disassemble a wheel with an inflated tire mounted on it.

Check wheel lug torques at least once a week. See Page 79 for recommended lug nut torques.

NOTICE

Insufficient mounting torque can cause rim slippage, resulting in broken valves, worn parts and damaged tires. Excessive mounting torque can cause damage by stripping studs, collapsing spacer bands or forcing rims into an out-of round condition.

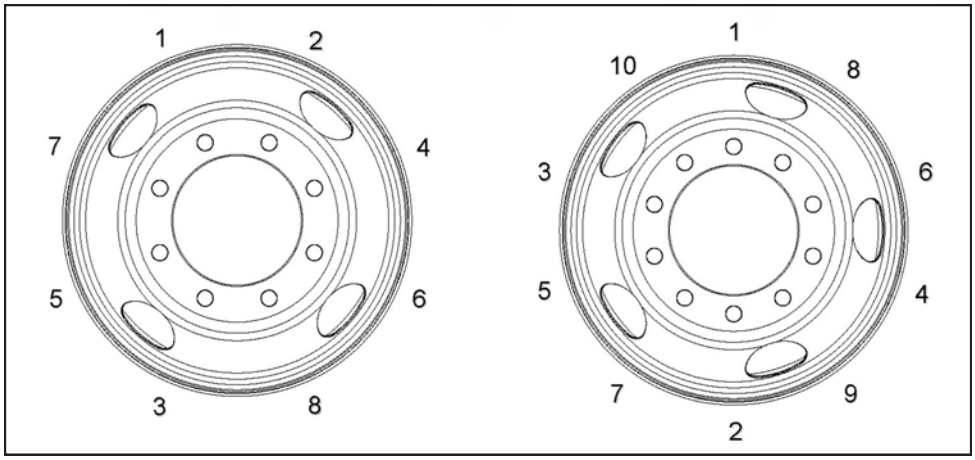


Figure 16. Disc Wheel Installation

Recommended Installation Procedure-Disc Wheels

1. Check all parts for damage, including wheels and rings. Insure that all studs, nuts and mounting faces of hub and wheels are clean and free from grease. Replace any defective parts.
2. Mount inner dual wheel over studs, being careful not to damage stud threads.
3. Mount the outer wheel, being careful not to damage stud threads and hand tighten wheel nuts.
4. Tighten nuts fully, using a crossing pattern as shown above in (Figure 16). Be sure to tighten nuts only to the recommended torque. For correct wheel lug nut torque see page 79.

NOTICE

Insufficient mounting torque can cause wheel shimmy, resulting in damage to parts and extreme tire tread wear. Excessive mounting torque can cause studs to break and discs to crack in the stud hole area.

AXLE ALIGNMENT

Improper axle alignment will cause dog-tracking and excessive tire wear. To check alignment of axles to king pin, use the following procedure:

1. Set empty trailer on level smooth surface, disconnect trailer brakes and bleed air tank.
2. Rock trailer back and forth for a distance of approximately 10 feet to relieve any binding in brakes or suspension bushings.
3. Tow trailer straight forward for a distance of approximately 30 feet. Stop trailer with tractor gears or tractor brakes only.
4. Disconnect tractor from trailer and ensure suspension ride height is properly adjusted.
5. Adjust landing legs to level trailer and set upper coupler to the correct ride height.
6. Do not remove wheels, but remove all hub caps and install axle center extensions. Use suitable kingpin jack or center extension to insure a clear path from the kingpin centerline to the axle center extensions.
7. Measure from kingpin extensions to both front axle center extensions. This distance should be the same on both sides (A = B).
8. If not, remove and install new pivot bolts leaving them loose enough to adjust axle to square with the kingpin. Make sure there are no obstacles in front of wheels during alignment.

Notice

Pivot bolts must be replaced during realignment of the suspension.

Axle Alignment (continued)

9. Measure from front axle center extensions to rear axle center extensions. This distance should be the same of both sides (C = D). If not, remove and install new pivot bolts leaving them loose enough to adjust rear axle to parallel with front axle. The suspension should now be in proper alignment with the kingpin.

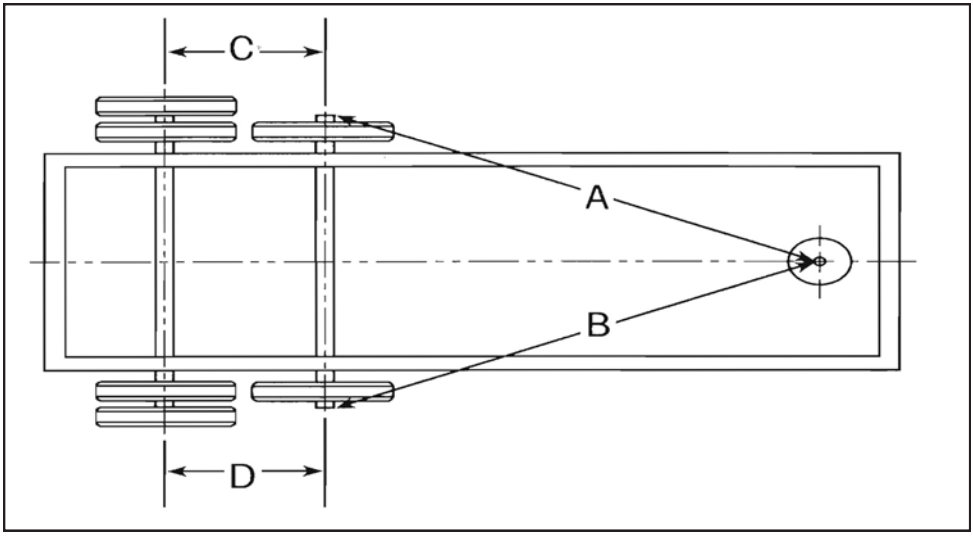


Figure 17. Trailer Alignment

10. The **QUIK-ALIGN®** style pivot connection uses two flanged collars inserted into slots on each side of the frame bracket (Figure 19). The eccentric collar on the outboard side of the frame bracket is used to adjust the position of the axle during an alignment. The alignment guides on the side of the frame bracket limit the eccentric collar to rotational movement in the frame bracket slot. Rotating the eccentric collar clockwise causes the axle to move forward. Rotating the eccentric collar counterclockwise causes the axle to move rearward (Figure 18). The maximum range of adjustment is ±45 degrees from the 12 o'clock position.

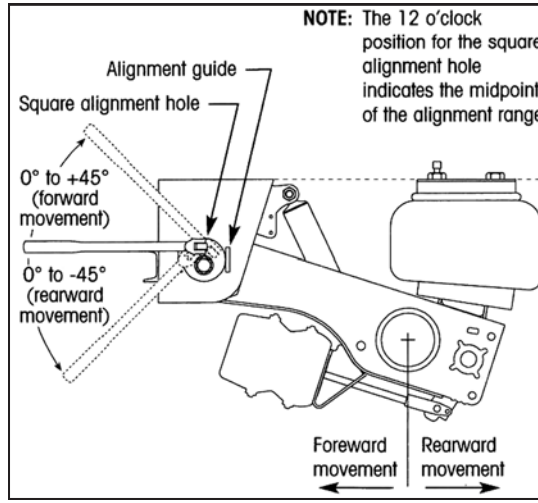


Figure 18. Quick-Align Operation

11. Using an E20 Torx socket, tighten the shear-type bolt axle pivot connection until the Torx head shears off. This ensures the proper torque of 550 ft. lbs. (±45 ft. lbs.). Pivot bolts must be replaced when trailer is aligned. **DO NOT** attempt to reuse old pivot bolts. Assembly of pivot connection shown below (Figure 19).

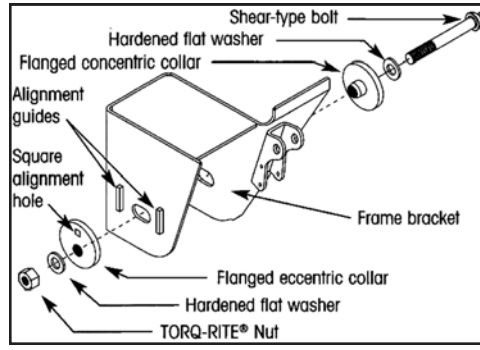


Figure 19. Pivot Connection Assembly

12. Connect tractor to trailer and connect trailer brakes on the lot. Make four or five tight figure eights and an equal number of "panic" brake stops. Bring trailer back into shop and check axle alignment. If axles are not in proper alignment, check for loose or worn bushings and bearings, loose or broken hangers, cross members, side rails or kingpin.

LIFT AXLE ALIGNMENT

Following the procedures below will provide the proper axle alignment.

Note: Does not apply to units that are pre-aligned.

1. With chassis on a flat level surface set suspension at the proper ride height with no load. Block tires on truck chassis and release brakes on auxiliary axle. This will allow tire rotation while positioning the suspension fore and aft.
2. Position one beam of the auxiliary suspension so the alignment collar is in the center of the alignment slot and tack weld the alignment collar to frame bracket side place.
3. Measure from the truck chassis front drive axle (or rear drive axle for tag type axle) to the top of kingpin housing (common point on both sides of axle). Move the free beam fore or aft until both sides are equal distance to drive spindle. A total maximum alignment tolerance of 1/8" is considered acceptable. If additional axle movement is required remove tack weld and adjust axle as required.

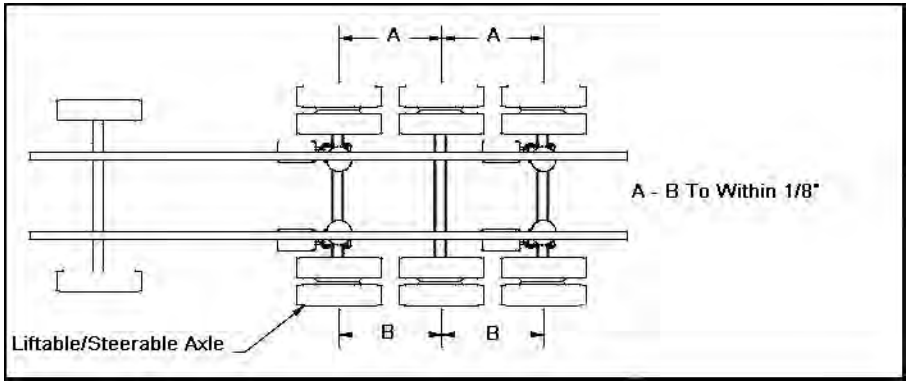


Figure 20. Alignment

NOTE: For more information reference the manufactures web literature or call their customer support.

HEIGHT CONTROL VALVE - The height control valve on the trailer air suspension automatically responds to the relative position of the axle and vehicle frame. It meters air into or out of the air springs. Variations in load or temperature only affect the adding or exhausting of air. The trailer air suspension is a mechanically stable suspension, only one height control valve is necessary.

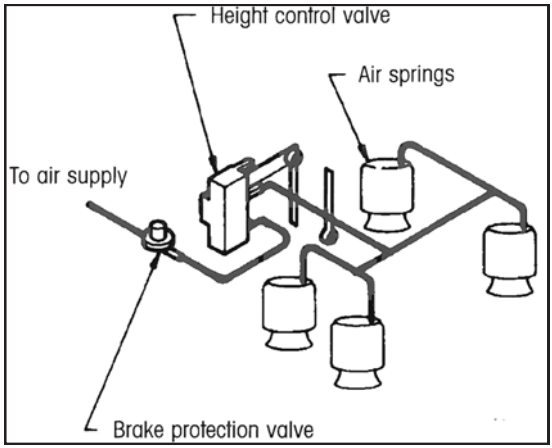


Figure 21. Suspension Height Control Valve

When the actuating lever of the height control valve moves up, the valve opens and connects the air supply to the air spring. When the actuating lever moves down, the valve shuts off the air supply and opens the exhaust port to vent excess air from the air springs. A check valve prevents the loss of air spring pressure if the air supply fails. In the central position, air does not flow in or out of the air springs.

Notice

When adjusting the height control valve, block the tires and release the trailer brakes. The axle must rotate freely to avoid a false reading.

Some height control valves have very small openings and a time delay of as much as 15 seconds. Allow sufficient time for the system to react to the adjustment. The response time will appear to be lengthy, but be patient.

The ride height can be found on the suspensions ID tag located on the inside of the curbside beam (Figure 22).

Figure 22. Suspension ID Tag

RIDE HEIGHT ADJUSTMENT

1. Connect the vehicle to a compressed air supply with approximately the pressure of the normal supply system.
2. Ensure the inflation of the air springs.
3. Measure the ride height by using this method:
    a. Measure from the underside of the trailer frame to the top of the axle as shown below (Figure 23).
    b. Add half the diameter of the axle to the measurement.

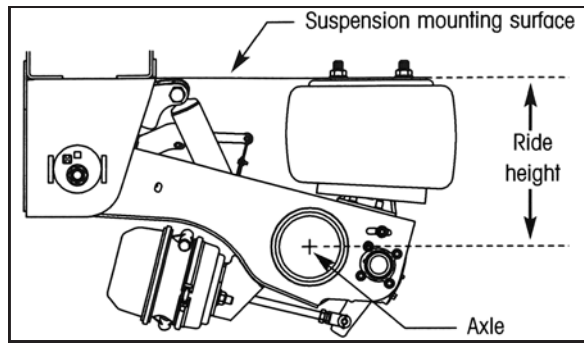


Figure 23. Ride height measurement

4. Raise or lower the trailer as necessary, so it is at the designed ride height.
5. Once the trailer is set to the correct designed ride height, set the HCV lever to the neutral (central) position.

6. Adjust the HVC linkage to fit between HVC lever and lower linkage attachment.
7. Once set to the designed ride height, test drive the trailer. After the test drive, check the ride height to assure an accurate adjustment.

AIR SPRINGS - Air springs will last almost indefinitely in most applications. However air springs will fail quickly when rubbed, scuffed, or punctured. If an air spring fails, the trailer will settle on the internal rubber bumpers, so you can proceed to the nearest service facility at a lower speed. You should try to determine the cause of a failure, so you can avoid a costly repeat of the problem.

Air Spring Replacement

To replace an air spring, follow these steps:

1. Exhaust all air from the suspension system.
2. Raise and support the vehicle in a safe manner.
3. Unbolt the air spring.
4. Disconnect air-supply lines.
5. Replace the air spring.
6. Bolt the air spring in place.
7. Connect the air-supply lines.
8. Lower the trailer to the ground.
9. Supply air to the suspension system.

SHOCK ABSORBER - Shock absorbers absorb energy to prevent suspension oscillation. Shock absorbers are also rebound stops in most air suspensions. The shock absorber limits the stroke of an air spring, which prevents the air spring from being pulled apart.

To remove a shock absorber, follow these steps:

1. Remove the end fasteners.
2. Insert the new shock absorber.
3. Secure with correct size locknut and bolts.
4. Torque fasteners to specification.

Trailer Suspension System

Components and General Maintenance Guidelines

PIVOT CONNECTION - A correct pivot connection is crucial to the life of the suspension. The pivot fastener must continually provide a sufficient clamp load through the bushing to prevent premature suspension failure. Hendrickson INTRAAX suspension systems come equipped with QUIK-ALIGN pivot connection hardware. The hardware consists of a specially plated shear bolt to ensure a proper clamp load, (550 ft-lbs, H-45 torque).

NOTICE

Failure to properly torque the pivot bolts may result in loss of warranty coverage.

TRI-FUNCTIONAL BUSHING - have unique properties that will provide years of maintenance-free service. The TRI-FUNCTIONAL BUSHING (located at the suspension pivot connection) provides a resilient connection that allows an axle to walk without excessive flexing. The TRI-FUNCTIONAL BUSHING, in conjunction with the rigid axle connection, results in a roll-stable suspension design that resists trailer lean independent of the air spring loading. Reference Hendrickson service guide L427 for bushing replacement procedures.

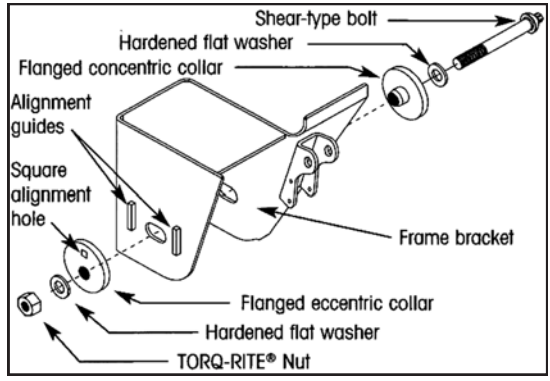


Figure 24. Pivot Connection Assembly

TORQUE SPECIFICATIONS

RECOMMENDED SUSPENSION TORQUE

COMPONENT DESCRIPTION	FT-LBS	N•m
QUIK-ALIGN Pivot Connection	505 to 595	685 to 807
Welded Pivot Connection (1 1/8 inches)	750 to 825	1017 to 1119
U-Bolts (HT Series)	475 to 525	644 to 712
Shock Bolts	210 to 235	285 to 319
Upper Air Spring Nuts	80 to 100	108 to 136
Lower Air Spring Nuts (HT Series)	40 to 50	54 to 68
Lower Air Spring Nuts (INTRAAX)	25 to 35	34 to 47
Brake Chamber Mounting Nut (INTRAAX)	100 to 110	136 to 149
S-Cam Support Bearing Mounting Nut (INTRAAX)	35 to 45	47 to 61

COMPONENT DESCRIPTION	IN-LBS	N•m
ABS Bracket Bolt and Nut (INTRAAX)	75 to 100	8 to 11
Dust Shield, Bolt-to-Spider (INTRAAX)	160 to 180	18 to 20
Dust Shield, Clamp-on (INTRAAX)	95 to 170	11 to 19

RECOMMENDED WHEEL TORQUES

Mount Type	Nut Thread	Torque Level Ft-Lb Lubricated*	Torque Level Ft-Lb Dry*
Hub piloted using two-piece flange nut	11/16" - 16 7/8 - 14 M20 x 1.5 M22 x 1.5	300-400 350-400 280-330 450-500	
Stud piloted, double cap nut standard type (7/8" radius)	3/4" - 16 1-1/8" - 16		450-500 450-500
Stud piloted, double cap nut heavy duty type (1-3/16" radius)	15/16" - 12 1-1/8" - 16 1-5/16" - 12		750-900 750-900 750-900

Notes:

REPORTING SAFETY DEFECTS

If you believe that your vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Heil Trailer International, Co.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer or Heil Trailer International, Co.

To contact NHTSA, you may either call the Auto Safety Hotline toll-free at Monday-Friday 8am to 8pm at (888) 327-4236 , TTY: (800) 424-9153, or file an online form at www.nhtsa.gov. You can also obtain other information about motor vehicle safety from the Hotline.

SOLUTIONS BUILT FOR YOU.

CORPORATE OFFICE

Heil Trailer International, Co.
1850 Executive Park Drive N.W.
Cleveland, TN 37312
Phone: (423) 745-5830

MANUFACTURING PLANTS

Heil Trailer, Athens
1125 Congress Pkwy.
Athens, TN 37303
Phone: (423) 745-5830

Heil Trailer, Texas
500 Randall Street
Rhome, TX 76078
Phone:(817) 636-2201

Heil Asia, Limited
168, Moo 16 Udomsorayut Rd.
Bang Gra-san, Bang Pa-in
Ayutthaya 13160, Thailand
[66] 35221090 Ext. 110

Heil Trailer, Juarez
Ave. de las Torres 2251
Ciudad Juarez, Chih.32574 MX
Direct Mx: +52.656.257.1530

PARTS AND SERVICE

Heil Tank Service
3808 Bells Lane
Louisville, KY 40211
Phone: (502) 778-2300

Heil Part Number: 9544-0006