Heil Trailer International, Co.

ISO 9001, ISO 14001, OSHAS 18001 - Certified

Schlumberger 1600 Guar Transport

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 cannot possibly know, evaluate, or advise anyone 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 Vacuum Pneumatic Trailer. Your trailer may or may not have the components shown in this manual.

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 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 profits 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.

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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 6/2012.

INTRODUCTION

This manual is designed to help ensure safe and efficient operation of the Heil Vacuum Pneumatic Trailer.

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.


CAUTION
Inspection of equipment, safety devices and working areas must be performed before each trip to ensure personal and operational safety, and to correct potential or actual hazards.


DANGER
Do not alter or modify any of the equipment or components provided with this tank trailer. Use of non-HEIL parts or non-OEM component parts may cause serious personal injury, including death.


WARNING
Before moving the tank trailer into a building, the tank must be free of product and checked with an approved gas analyzer to ensure it is free of hazardous and/or flammable vapors.


DANGER
Never uncouple a discharge hose until all pressure has been removed. Residual pressure can cause a hose to fly free, causing serious personal injury, including death.

IMPORTANT SAFETY MESSAGES

⚠ WARNING

Before being put into service each day, the unit should be attached to a blower and all valves throttled to ensure all hoses, piping and the tank are free of moisture.

If the unit is equipped with type "C" aeration, the ¼" drain plugs have been removed from the bottom of the aeration pads to aid in drying. These plugs must be reinstalled after the aforementioned precautions have been taken and before the unit is put into service. The plugs are located in the manual package.

⚠ CAUTION

The relief valve must be operational to maintain system pressure within safe limits.

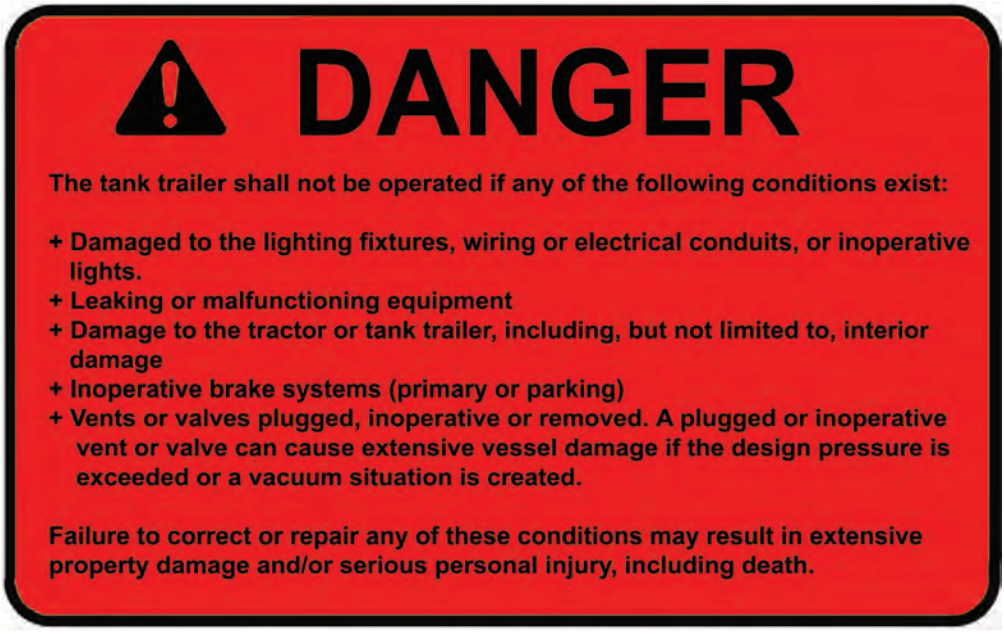
⚠ DANGER

Do not enter the tank trailer until each of the following conditions has been satisfied:

- **The pressure inside the vessel has been completely relieved**
- **The tank has been thoroughly purged and vented**
- **The tank has been degassed and/or cleaned by an authorized cleaning facility**
- **The MSDS for the last product(s) hauled has been reviewed**
- **The OSHA 1910.146 Confined Entrance Requirements are strictly complied to.**

Failure to follow any one of these instructions may result in serious personal injury, including death.

IMPORTANT SAFETY MESSAGES



IMPORTANT SAFETY MESSAGES

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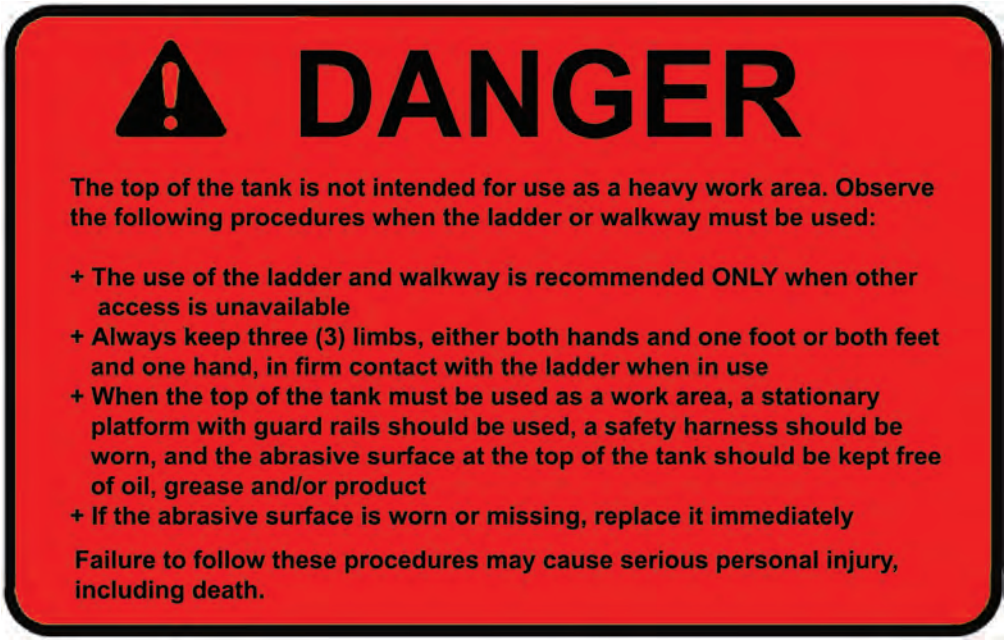


IMPORTANT SAFETY MESSAGES

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.

NOTICE

Blow down valve must be open at all times except when unloading. Equipment damage may occur.

⚠ WARNING

Could contain harmful particulates. Clean tank before entering or repairing.

WARNING

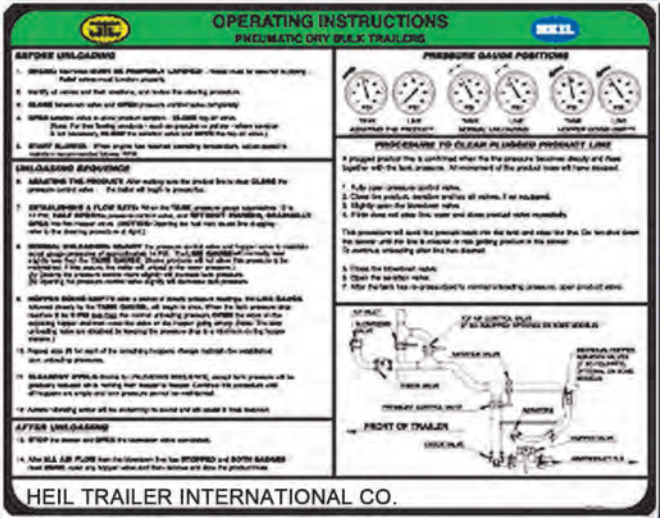
To avoid suffocation, never enter a tank containing pulverants, liquids, flammable or caustic materials. Always follow all confined space entry procedures.

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.

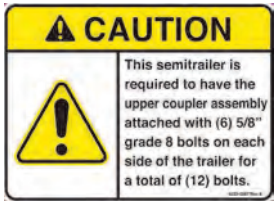


WARNING

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.

SUCTION LINE

VACUUM DUMP VALVE

WARNING

This relief valve has been factory tested and safety wired for your protection. Relief valve should be removed, cleaned, inspected, and bench tested periodically to ensure optimum performance and safe operation. Replace safety wire after reinstallation of the relief valve. Failure to follow these instructions will void the warranty and may cause property damage, potential injuries and death.

9222-0442

FILTER

13 Hg MAXIMUM TANK VACUUM

WARNING

Could contain harmful particulates. Clean tank before entering or repairing.

9222-0068

WARNING

Pressurized device.

Relieve pressure before opening, repairing, or disconnecting hoses.

9222-0065 Rev A

FRONT FILL LINE

REAR FILL LINE

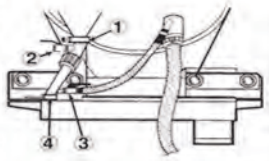
NOTICE

Valve must be closed at all times except when vacuum loading. Equipment damage may occur.

9222-0256 Rev A

OPERATING INSTRUCTIONS FOR EDUCTOR
(CLEANING COLLECTION PIPE WHILE SELF-LOADING)

A. Close top valve in collection pipe below hopper. 1
B. Open both ball valves. 2 3
C. Close ball valves when line is clear. 2 3
D. Open top valve in collection pipe. 1
E. Always leave bottom valve closed when self-loading. 4



9222-0212 Rev B

NOTICE

Clean inside of filter after each loading. Failure to do so may result in severe damage to the blower.

9222-0209 REV A

OPERATING INSTRUCTIONS
VACUUM DRY BULK TRAILERS

HEIL

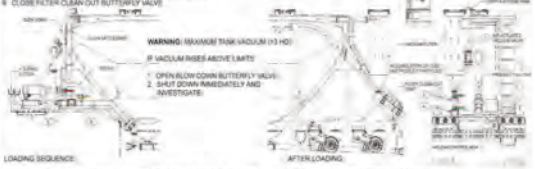
DANGER

****** MAXIMUM TANK VACUUM - 13 INCHES OF MERCURY (13" HG) ******

To prevent serious injury, open blowdown valve to reduce tank vacuum to zero before opening manholes or disconnecting hoses. The air actuated valve between the filter and the tank must be closed when pressure unloading-pressure will seriously damage filter.

BEFORE VACUUM LOADING:

1. MANHOLES MUST BE PROPERLY LATCHED. HOSES MUST BE SECURED TO RINGS AND RELIEF VALVES MUST FUNCTION.
2. IDENTIFY ALL VALVES AND HOSE CONNECTIONS FROM SCHEMATIC.
3. IF UNLOADING RAIL CAR, MAKE SURE TOP HATCH OF RAIL CAR IS OPEN.
4. CONNECT BLOWER SUCTION HOSE TO INLET SIDE OF BLOWER.
5. CONNECT BLOWER SILENCER TO EXHAUST SIDE OF BLOWER.
6. CLOSE TOP TO AIR LINE AND BLOW DOWN (BG) BUTTERFLY VALVES.
7. OPEN AIR ACTUATED VACUUM CONTROL VALVE LOCATED IN VACUUM CONTROL BOX AT REAR.
8. CONNECT PRODUCT LOADING HOSE TO RAIL CAR ADAPTER.
9. CLOSE FILTER CLEAN OUT BUTTERFLY VALVE.



LOADING SEQUENCE:

1. OPEN RAIL CAR OUTLET NOZZLE TO APPROX. 1/2 OPEN, AND OPEN BLEED AIR BALL VALVE ON RAIL CAR ADAPTER.
2. START BLOWER AND ADJUST THROTTLE TO MAINTAIN RECOMMENDED BLOWER RPM.
3. ADJUST PRODUCT FLOW WITH RAIL CAR OUTLET NOZZLE TO OBTAIN 10"-13" HG. ON TANK.
4. SMOOTH PRODUCT FLOW TO DISCOURAGE SLUGGING BY ADJUSTING BLEED AIR VALVE ON RAIL CAR ADAPTER, OR AIR BLEED BALL VALVE ON THE FILL LINE.
5. IN CASE OF EMERGENCY OR DESIRE TO SHUTDOWN LOADING SEQUENCE, OPEN BLOW DOWN BUTTERFLY VALVE AND SHUT OFF BLOWER.
6. WHEN TANK IS LOADED, CLOSE RAIL CAR NOZZLE TO CLEAR THE HOSE AND FILL LINE.
7. SHUT OFF THE BLOWER AND OPEN BLOW DOWN BUTTERFLY VALVE.

PLUGGED LOADING LINE:

1. IN CASE OF PLUGGED FILL LINE, CLOSE THE RAIL CAR OUTLET NOZZLE AND CLOSE THE BLEED AIR VALVE IF OPEN.
2. OPEN BLEED AIR VALVE ON THE RAIL CAR ADAPTER AND THE LINE SHOULD CLEAR MOMENTARILY.
3. IF LINE FAILS TO CLEAR, SHUT DOWN LOADING SEQUENCE: OPEN BLOW DOWN LINE TO DUMP VACUUM, AND TURN OFF THE BLOWER.
4. CLEAN LINES MANUALLY TO CLEAR.

AFTER LOADING:

1. CLOSE AIR ACTUATED VACUUM CONTROL VALVE.
2. REFER TO PNEU. OPERATION INSTRUCTIONS DECAL FOR PRESSURE UNLOADING.

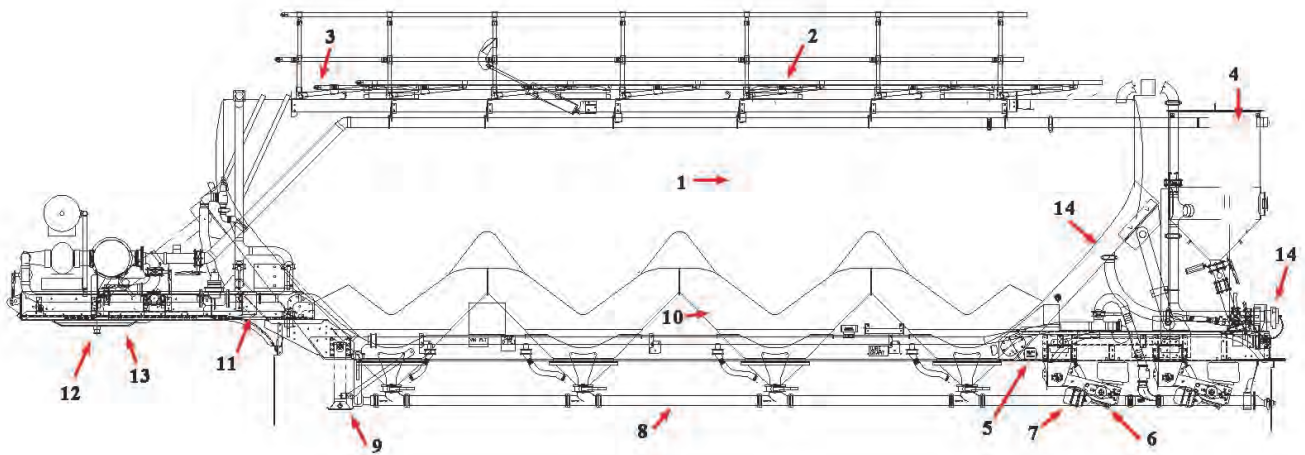
FILTER CLEANING:

1. WHEN TANK VACUUM GAUGE FAILS TO EQUALIZE (WITH THE LINE PRESSURE GAUGE (+)), TANK PRESSURE READING IS LOWER THAN THE LINE PRESSURE READING) CLEAN THE FILTERS.
2. OPEN THE FILTER CLEAN OUT BUTTERFLY VALVE DURING VACUUM LOADING OR AS REGULAR MAINTENANCE PROCEDURES AS REQUIRED.
3. PRODUCT IN THE BLOWER INDICATES TORN FILTER. *** DO NOT USE IN VACUUM SERVICE *** UNTIL REPAIRED.

CAUTION TO PREVENT BLOWER DAMAGE, CLEAN THE FILTER AFTER LOADING.

Heil Trailer International Co.

General Nomenclature

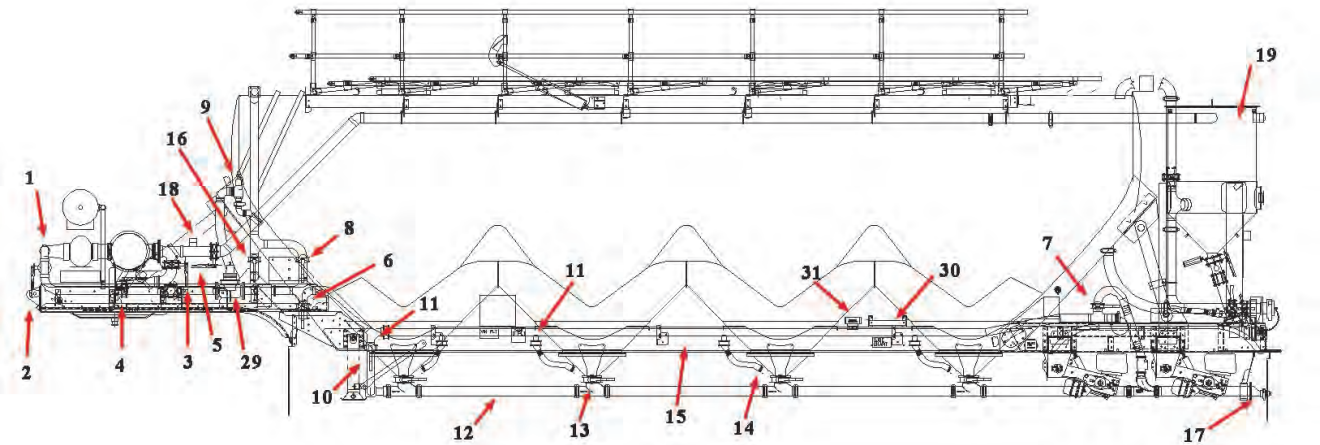


1. Tank Proper
2. Manholes
3. Ladder and Walkway
4. Vacuum/Filter/Canister
5. Rear Structure
6. Axles and Suspension
7. Brakes
8. Aeration and Discharge
9. Supports
10. Hopper
11. Front Structure
12. King Pin
13. 5th Wheel
14. Rear Load Line

GENERAL NOMENCLATURE

1. **TANK PROPER -** Aluminum, construction; 4 hopper; capacity 1600 ft^3 .
2. **MANHOLES –** Located above hopper; equipped with 6 latches, two safety latches, aluminum cams, rubber stop and self-seating gasket.
3. **LADDER** - Steps to access the top of trailer and manholes.
4. **VACUUM/FILTER/CANISTER -** A dust collection system to filter out particles, dirt, dust etc., before air returns to blower and product.
5. **REAR STRUCTURE –** High tensile steel and aluminum construction welded or bolted to tank proper.
6. **AXLES AND SUSPENSION -** Multi axle air ride and/or spring suspension.
7. **BRAKES -** Full air; drum or disc brakes, equipped with slack adjusters.
8. **AERATION AND DISCHARGE SYSTEMS -** Designed for fast product discharge. See page 26.
9. **SUPPORTS -** Manually operated two-speed raising/lowering; equipped with sand shoes.
10. **HOPPER -** Funnel shaped section of tank used to dispense granular materials through the use of gravity.
11. **FRONT STRUCTURE -** High tensile steel and aluminum construction welded or bolted to tank proper.
12. **KINGPIN** - Coupling that connects tractor to trailer.
13. **5Th WHEEL** - Pad that provides link between the transport trailer and the tractor unit.
14. **REAR LOAD LINE -** Line to load product into trailer, located at front or rear of the trailer.

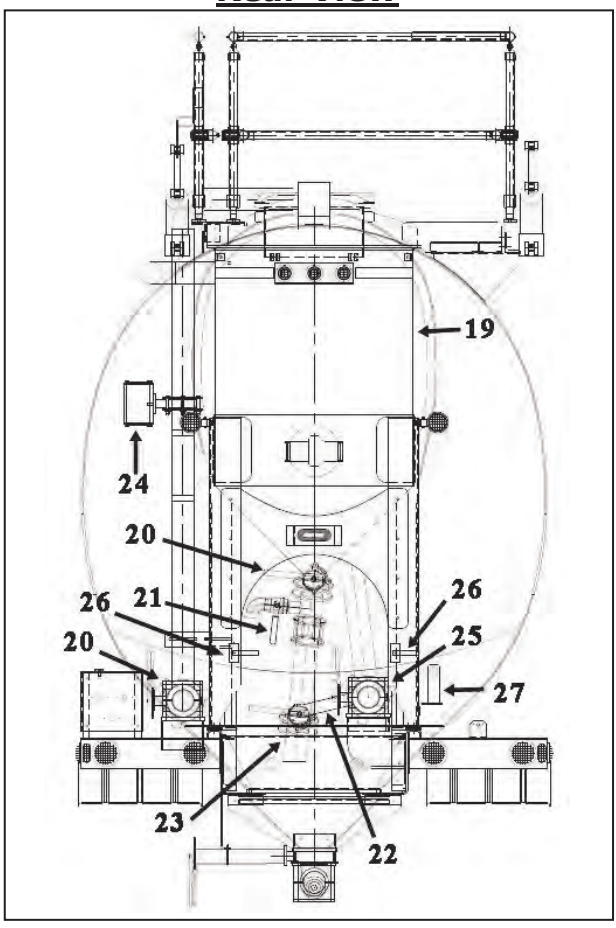
PIPING SYSTEM COMPONENTS



1. Pressure output supply
2. Blower pressure output exhaust
3. Vacuum dump/Blower air inlet valve
4. Main valve discharge pressure supply
5. Main valve vacuum loading suction supply
6. Discharge pressure air line dump valve
7. Discharge air assist control valve
8. Top air valve
9. Pressure relief valve
10. Pressure control valve
11. Aeration control valve
12. Product discharge line
13. Product discharge valve
14. Aerator
15. Aeration manifold
16. Blow down valve
17. Product discharge outlet
18. Vacuum relief valve
29. Kimray valve
30. Wheel chock holder
31. Trailer scale

PIPING SYSTEM COMPONENTS

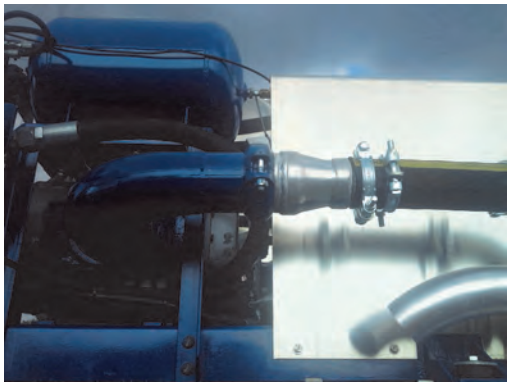
Rear View



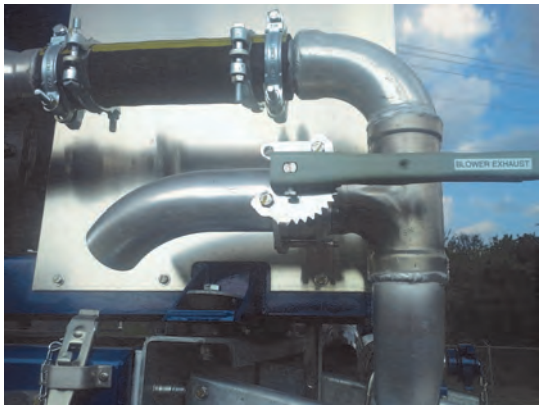
19. **Vacuum/Filter/Canister**
20. **Silo Dust Collector Suction Inlet Connection and Valve**
21. **Eductor System In-Breather Valve**
22. **Eductor Line and Valve**
23. **Clean Out and/or Vacuum Dump Valve**
24. **Control Valve (air-actuated) For Vacuum To Vessel**
25. **Load Line Connection and Valve**
26. **Filter Canister Vibrator and Aerator Controls**
27. **Static Cable Reel**

PIPING SYSTEM COMPONENT DESCRIPTIONS

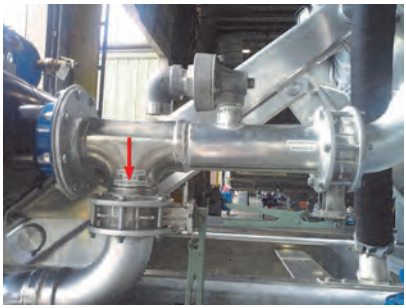
1. **BLOWER PRESSURE OUTPUT SUPPLY–** Transfers air from air supply to discharge and aeration lines.



2. **BLOWER PRESSURE OUTPUT EXHAUST VALVE -** Allows air to exhaust from blower when in vacuum loading operation.



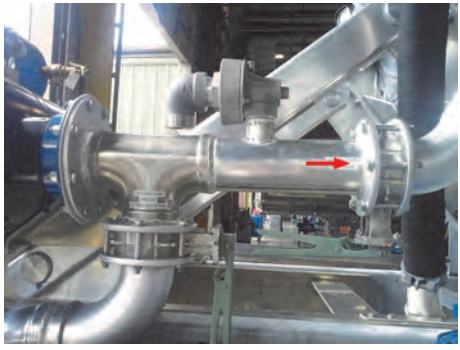
3. **VACUUM PUMP VALVE/BLOWER AIR INLET VALVE–** Allows air into blower when in pressure discharge (unloading) operation. Also controls the rate at which the vacuum is being pulled on the system.



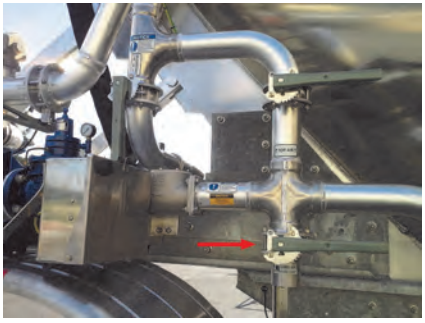
PIPING SYSTEM COMPONENT DESCRIPTIONS

4. DISCHARGE PRESSURE SUPPLY MAIN VALVE— To be opened when using on-board blower for pressure discharge (unloading) operation. To be closed when using auxiliary air inlet for pressure discharge. When closed, prevents air from alternative source from flowing upstream.

5. VACUUM LOADING SUCTION SUPPLY MAIN VALVE– To be opened when in vacuum loading operation. To be closed when in pressure discharge operation. When closed, prevents vacuum from pulling on the system.

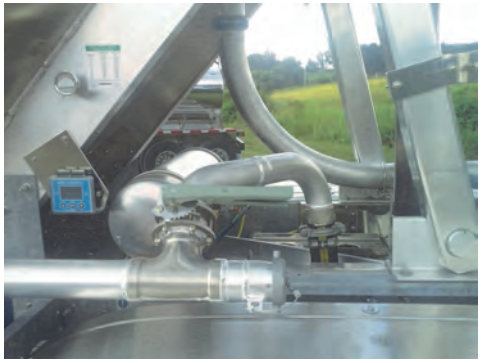


6. DISCHARGE PRESSURE AIR LINE DUMP VALVE– Controls down-stream air flow and pressure. Provides a means to reduce potential down-stream pressure.

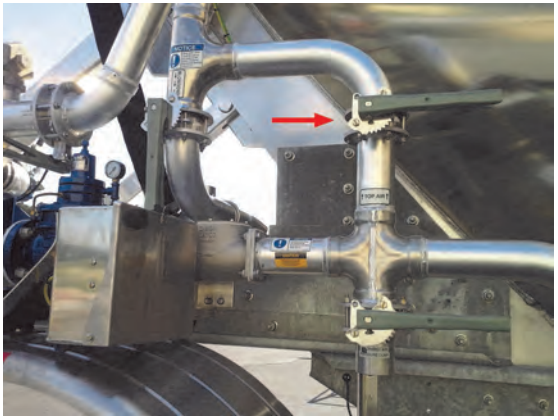


PIPING SYSTEM COMPONENT DESCRIPTIONS

7. DISCHARGE ASSIT/BOOSTER CONTROL VALVE– Allows air flow into rear discharge line to aid in pushing product out/down-stream.



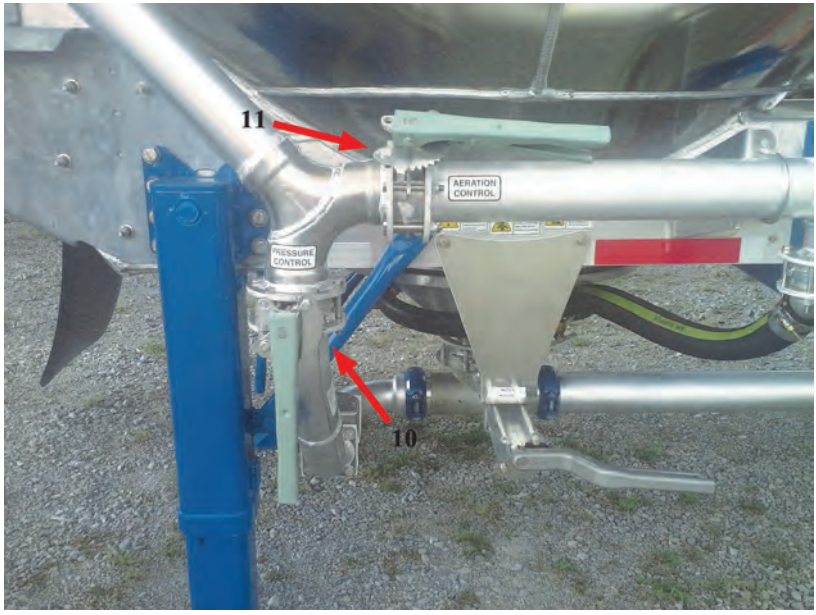
8. TOP AIR VALVE - Controls the flow air to the top of the tank. Top air is used when aeration is not required.



9. PRESSURE RELIEF VALVE - Prevents pressure inside vessel from exceeding maximum operating pressure.

PIPING SYSTEM COMPONENT DESCRIPTIONS

10. PRESSURE CONTROL VALVE - Controls product line pressure. Used to pressurize product line to discharge product from line to silo/receiver vessel.

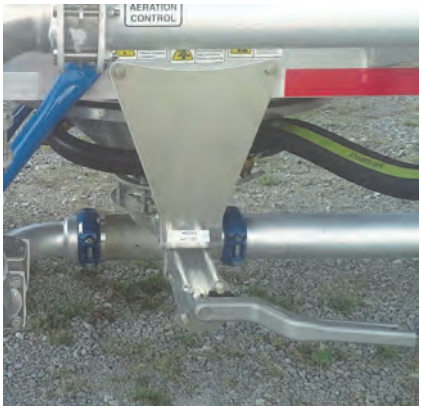


11. AERATION CONTROL VALVE– Controls main air supply line pressure. Used to control air to aerators.

12. PRODUCT DISCHARGE LINE - Facilitates pneumatic discharge of materials from hoppers.

PIPING SYSTEM COMPONENT DESCRIPTIONS

13. **PRODUCT DISCHARGE VALVE -** Regulates the flow of aerated material from the hopper to the product tee.

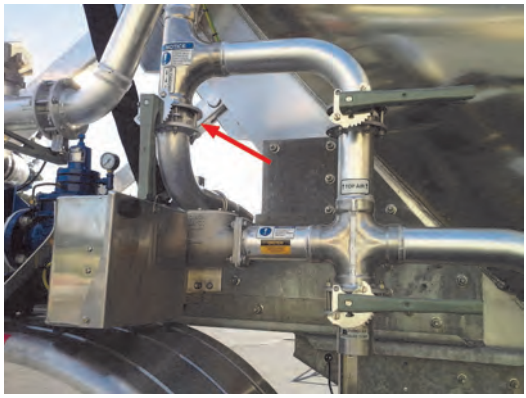


14. **AERATION -** Induces air into hopper to aerate product and make it flowable. See Figure 10 for identification of aeration units. Refer to Aeration System Operation on page 28 for detailed description.

15. **AERATION MANIFOLD -** Directs supply air to individual aeration line.

PIPING SYSTEM COMPONENT DESCRIPTIONS

16. **BLOW DOWN VALVE -** Opens and closes blow-down line to atmosphere, exhausts tank.

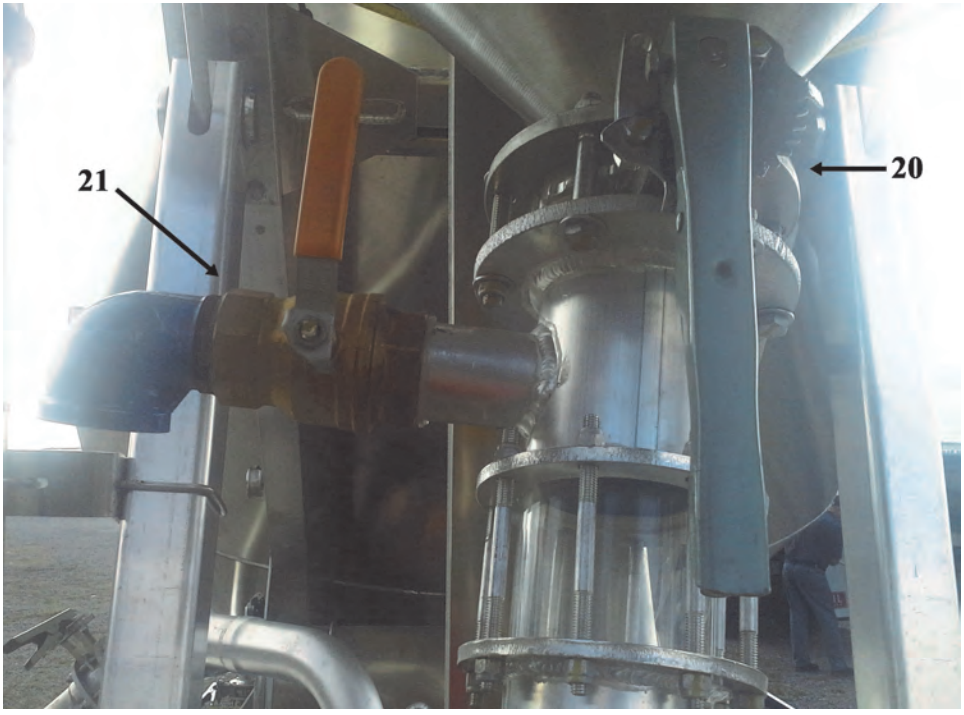


17. **PRODUCT DISCHARGE OUTLET -** Extension of product line to rear of trailer. Used to connect vessel to silo/receiving vessel.

18. **VACUUM RELIEF VALVE -** Prevents exceeding maximum vacuum pressure.

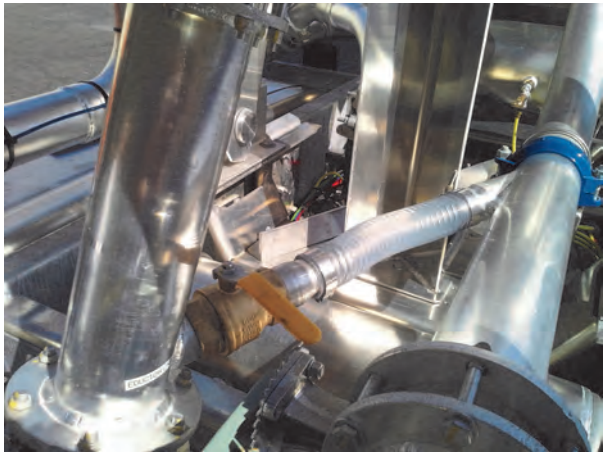
19. **VACUUM/FILTER/CANISTER -** A dust collection system. Air is suctioned into filter from tank and then returned back to the blower.

20. **CLEAN OUT VALVE -** Valve that allows filtered product to be sent to educator line to be put back in trailer.

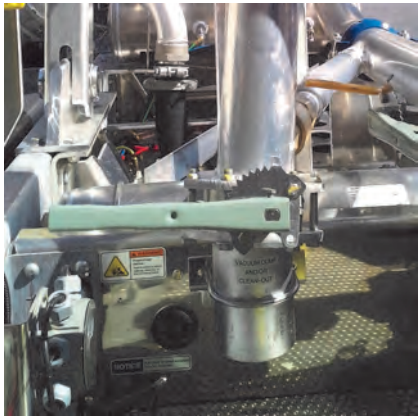


21. **EDUCATOR SYSTEM IN-BREATHER VALVE -** Allows air into product trap tube so the educator line can suck product back into load line.

22. **EDUCTOR LINE -** Returns filtered product back to the product load line to be returned to tank.



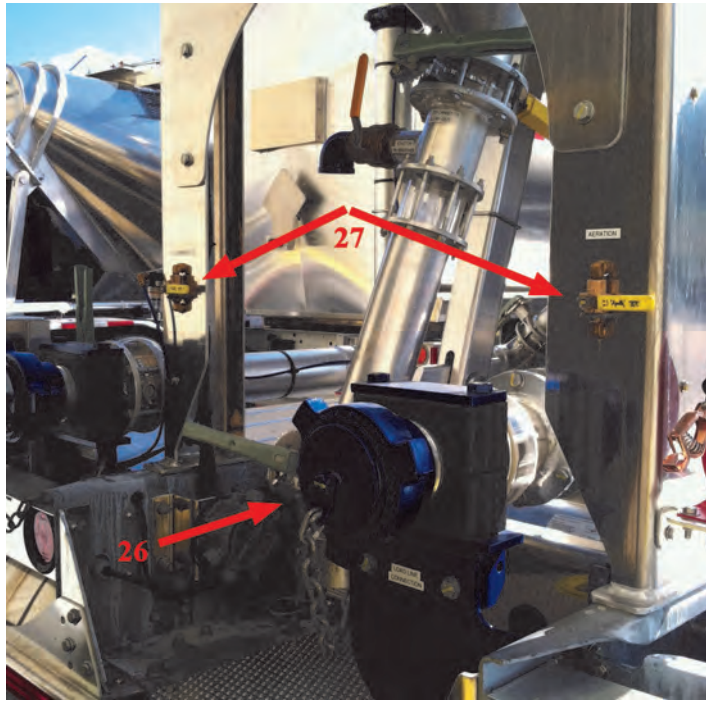
23. **VACUUM DUMP VALVE -** Relieves pressure from vacuum filter and suction line to atmosphere. Also used for emptying residual product from bottom canister.



24. **CONTROL VALVE FOR VACUUM TO VESSEL–** Air-actuated valve which allows vacuum to be pulled on main vessel.

25. SILO DUST COLLECTOR SUCTION INLET CONNECTION AND VALVE - Valve that allows air to flow into vacuum from silo dust collector.

26. LOAD LINE CONNECTION AND VALVE - Connection point for vacuum loading product into vessel.



27. FILTER CANISTER VIBRATOR AND AERATOR CONTROLS - To assist in cleaning loose product from interior walls of canister.

28. STATIC CABLE REEL - Contains static grounding cable.

AERATION SYSTEM OPERATIONAL DESCRIPTION

In the aeration system, compressed air is injected at the base of each hopper and filters upward to aerate the cargo and make it flow-able. If the cargo does not require aeration, the tank is pressurized through the top air line. When sufficient pressure is built up in the tank, the operator opens the pressure control valve and the individual hopper discharge valves so that the air-borne product flows through the discharge line into the storage facility.

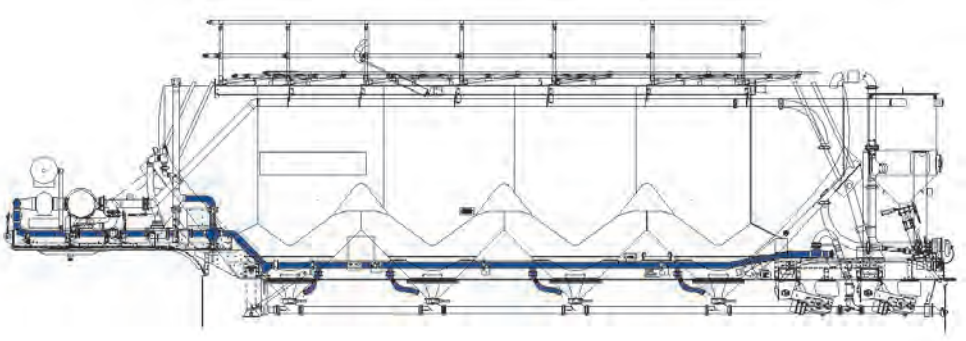


Figure 2. Simplified Aeration System Diagram

AERATION UNITS

Aerators are flexible neoprene diffusing collars designed to fluidize pulverants, granular, and wet cargoes such as slurries. Figure 3 illustrates air flow through the aerator.

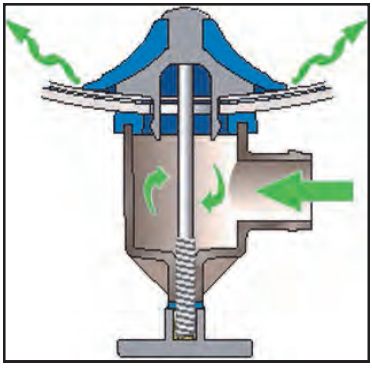


Figure 3. Aerator Air Flow

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.

Vacuum Operation

INTRODUCTION

The Heil Tube Dust Collection System is displayed in Figure 4. Contaminated air is brought in through the bottom of the filter assembly from the top of the tank. The air flows through porous plastic tubes with millions of tiny holes which allows clean air to escape through the top of the filter tube assembly. As the clean air is directed back to the blower, the bottom of the filter tube assembly fills with residual particles. They can be emptied through on eductor system that will funnel them into a collection line by means of gravity and a two valve system that allows gravity cleaning without shutting down the blower. The systems will let the operator know when it needs cleaning by raising the back pressure on the blower. When this happens, the tubes can be cleaned with high pressure. There is no need to replace the tubes unless they are damaged in some way.

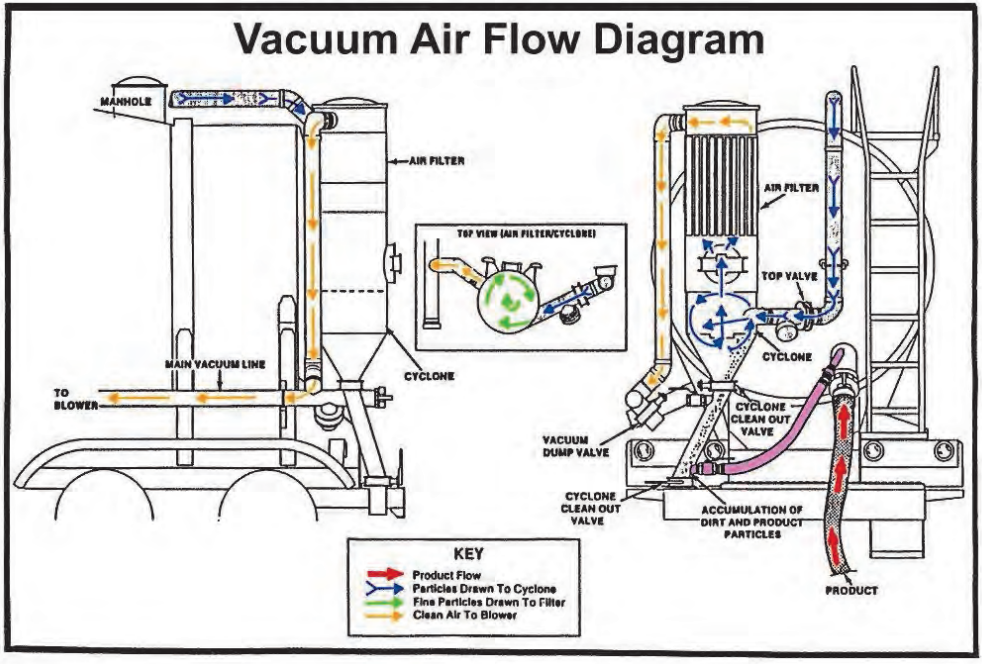


Figure 4. Vacuum Operation

Vacuum Operation Diagram

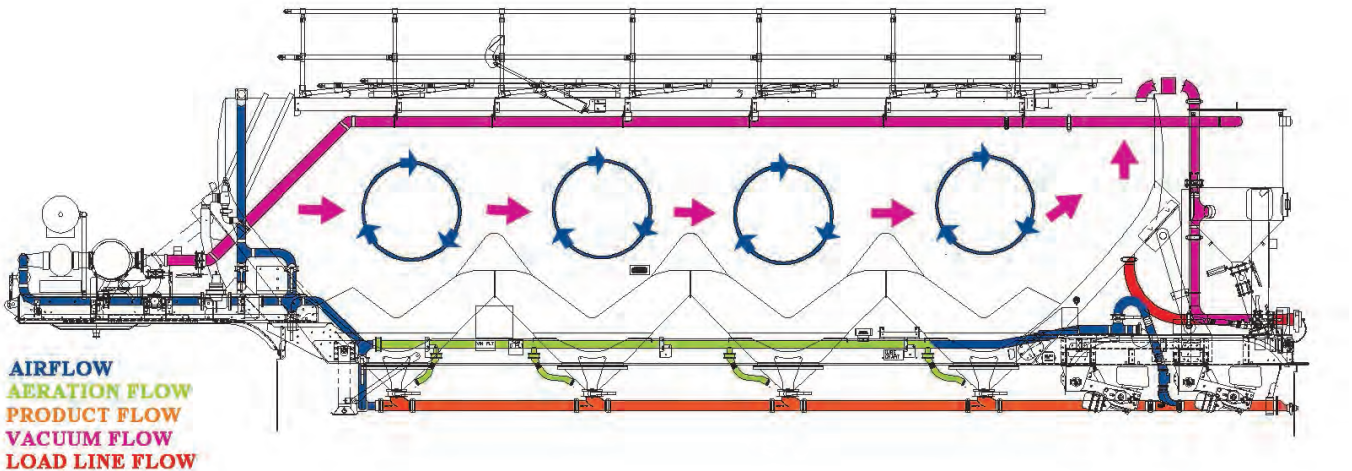


Figure 5. Flow Operation

Vacuum loading of pneumatic trailers is most commonly accomplished through the use of a tractor or trailer mounted blower. A blower is a device that is used to move large quantities of atmospheric air at a high speed and moderate pressure. Typically, the blower is used to pressurize the vessel by forcing ambient air into the trailer. Note that the air in the pressure scenario is the atmosphere. However, when the blower is used to create a vacuum, the air which enters the blower is drawn from the inside of the tank rather than the atmosphere.

Vacuum Operation

Pre-Loading Instructions

1. Refer to page 36 for general loading instructions.
2. Ensure all manholes are properly latched.
3. Ensure all hoses are secured to piping.
4. Identify all valves and their location from Figure 4.
5. If unloading unpressurized rail car, open rail car's manhole.
6. Open blower exhaust valve.
7. Open the air actuated vacuum valve to the filter canister and close all other valves.
8. Ensure the cyclone and air filter are clean.
9. If unloading from rail car, ensure the manhole of the rail car is open.
10. Close clean out valve.

Loading Sequence

1. Start the blower and after allowing it to warm up, adjust the throttle to maintain the recommended blower rpm.
2. Open the outlet nozzle of the storage container or adjust to hose probe to attain 8-10" HG on the tank.
3. Smooth product flow to discourage slugging by adjusting bleed air valve on rail car adapter.
4. In case of emergency or desire to shutdown loading sequence, open blow-down valve and shut off blower.
5. When the tank is loaded, close the load line valve.
6. Open the vacuum dump valve.
7. Shut off the blower and open the blow-down valve.
8. Close the top valve between the tank and the filter canister.

DANGER

Relieve Vacuum and/or Pressure Before Removing Piping Cap.

Vacuum/Filter Maintenance

See Page 55.

SAFETY CHECK

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

START-UP

DANGER

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

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 when loading from silo or rail car.

TOP LOADING

1. Close all valves except the blow-down before loading and while in transit.
2. Position trailer properly for most efficient loading.
3. Ensure all manholes are closed properly after loading.

Vacuum Loading a Vacuum Pneumatic Trailer From Standard Railcar or Silo

1. Position trailer so the hoses will have the least amount of bends for most efficient loading.
2. Close the blow-down valve and top air valve.
3. Connect the product transfer hose to the rail car or silo's product discharge line and the tank's pneumatic loading line.
4. Open the valve between tank and the vacuum filter.
5. Close the vacuum dump valve on the vacuum suction line.
6. Open manhole of the rail car or vent line of silo to prevent rail car from collapsing.
7. Start blower to desired RPM.
8. Open opposite side discharge on rail car or vent on silo.
9. Open product valve on rail car or silo, allowing product to flow to trailer.
10. Shut down blower after trailer is loaded.
11. Open vacuum dump valve, gauge will return to 0.
12. Disconnect piping and lines.
13. Open the blow-down valve.

NOTICE

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

WARNING

If vacuum 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 49 for testing Relief Valve.

Vacuum Loading From Pressure Differential Rail Car

A pressure differential car allows for the most efficient loading. A "PD" car is pressurized by a blower which creates a push-pull loading process when loaded with a vacuum pneumatic trailer. This this greatly minimizes the load time.

1. Position trailer for most efficient loading.
2. Close the blow-down valve and top air valve.
3. Connect the air supply line from the blower to the rail car's aeration supply line.
4. Connect the product transfer hose to the rail car's product supply line and the tank's pneumatic loading line.

WARNING

The Vacuum relief valve MUST be bench tested periodically to ensure it opens at vacuum pressure specified on valve, to ensure safe vacuum operation. See Page 49 for testing Relief Valve.

5. Open the valve between tank and the vacuum filter.
6. Close the vacuum dump valve on the vacuum suction line.
7. Open manhole of the rail car to prevent rail car from collapsing.
8. Open the rail cars aeration valve.
9. Start blower to desired RPM.
10. Close pressure supply valve on rail car, directing all air to aeration line.
11. When the tank's vacuum gauge reaches 10" HG, crack pressure supply valve on the rail car directing air into the tank.
12. Open product valve on rail car, allowing product to flow to trailer.
13. When trailer is full, close all product valves and open pressure supply valve on rail car 100%.
14. Shut down blower.
15. Open vacuum dump valve, gauge will return to 0.
16. Disconnect piping and lines.
17. Close the top air valve and open the blow-down valve.

UNLOADING

1. Position trailer for optimum unloading.
2. Open vacuum dump/blower air inlet valve. See silo dust collection on page 33 if using dust suction feature on trailer
3. Close blower pressure output valve.
4. Close air operated valve between tank and filter canister, at rear.
5. Retrieve discharge hose and connect it to the discharge line. Attach opposite end of hose to storage facility fill line.
6. Open the pressure control valve.
7. Engage blower or compressor.
8. 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.

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.

9. When unit has reached operating pressure open the proportioning valve ½ to ¾ of full open.
10. SLOWLY open discharge valve on rear hopper.
11. Adjust the pressure control valve to maintain maximum operating pressure and slight movement of discharge hose.
12. Close the individual hopper aeration control valves, to hoppers 1,2 and 3 on units so equipped.
13. When tank pressure begins to drop rapidly, close rear discharge valve.
14. Open aeration valve on one of the center hoppers.
15. SLOWLY open the discharge valve on that hopper.
16. Close the aeration valve on rear hopper.

17. Readjust pressure control valve if necessary.

18. When tank pressure begins to drop rapidly, close hopper discharge valve.

NOTICE

When pressurizing unit, look for air leaks. If any are found, shut down immediately and repair the leak.

19. Open aeration valve on the other center hopper.

20. SLOWLY open discharge valve on that hopper.

21. Close aeration valve on adjacent center hopper that just completed unloading.

DANGER

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

22. When tank pressure begins to drop rapidly, close hopper discharge valve.

23. Open aeration valve on front hopper.

23. SLOWLY open front hopper discharge valve.

25. Close aeration valve on adjacent center hopper that just completed unloading.

26. When tank pressure begins to drop rapidly, close front hopper discharge valve.

27. 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.

28. Open blow-down line to return unit to atmospheric pressure.

29. Disengage blower or compressor.

DANGER

Always relieve pressure in discharge hose before disconnecting it.

30. Disconnect and stow discharge hose.

31. 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

The Heil Vacuum Pneumatic Trailer is designed with one of the fastest vacuum discharges in the industry. 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.

NOTE: The most efficient unloading is when your tank and line pressures are equal.

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.

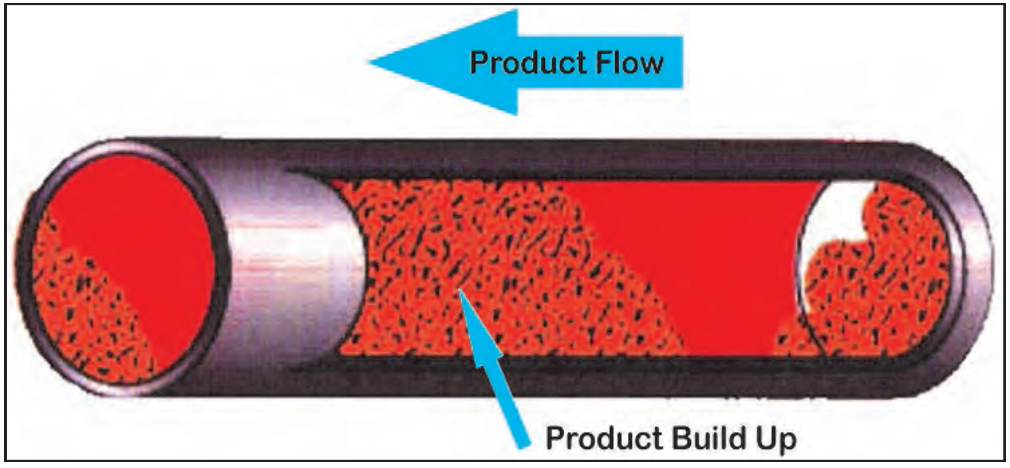


Figure 6. Product Flow and Build Up

When 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.

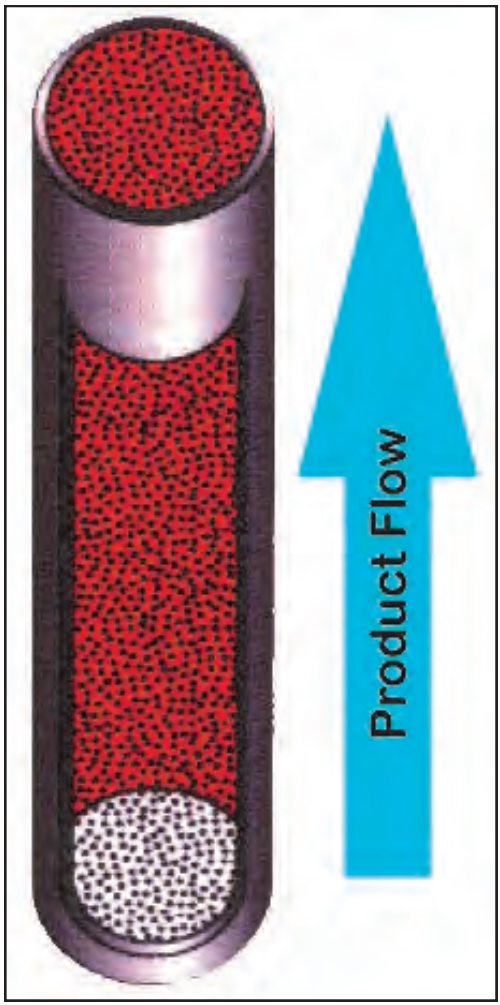


Figure 7. Vertical Product Flow

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.

MINIMIZING UNLOADING TIME (CON'T.)

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.

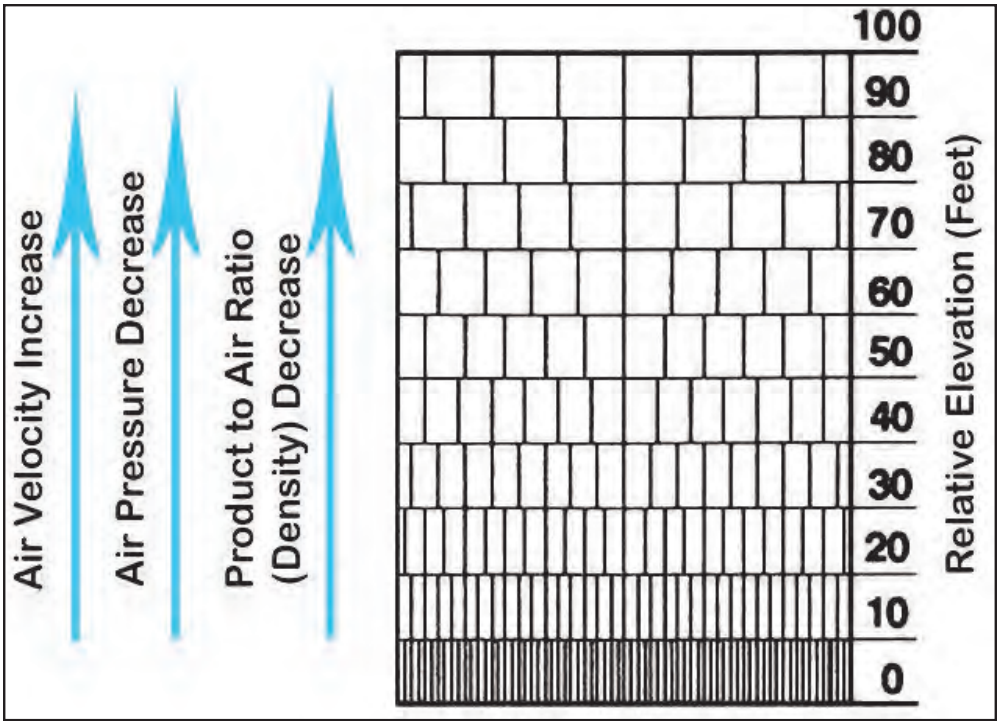


Figure 8. Relative Density at Various Elevations

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.

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.

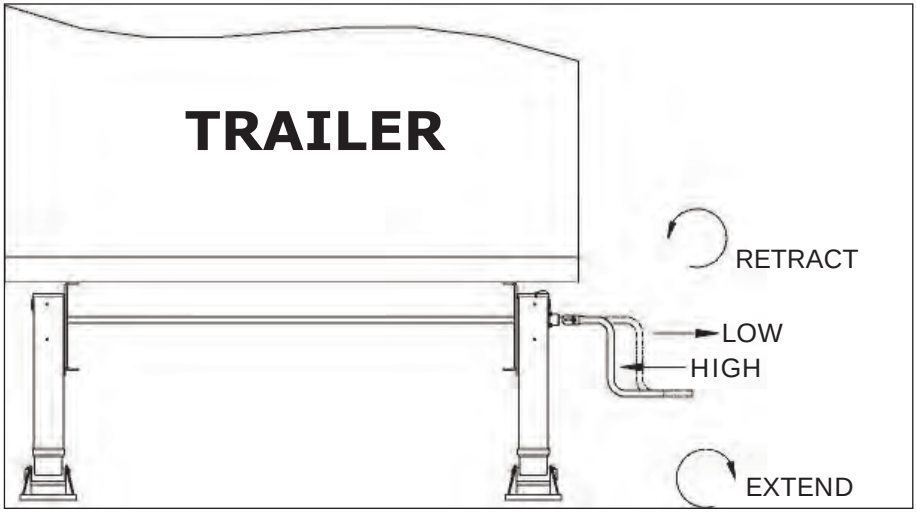


Figure 9. Landing Gear

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

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

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

1635 Blower Skid Operation

1. Install hydraulic hoses to unit.
2. Open trailer un-loading valve.
3. Idle engine to warm up blower at zero pressure.
4. Slowly increase engine speed to 1600RPM at zero blower pressure.
5. Close trailer un-loading valve.
6. Unit is operational at this time.

Lock Valve Operation

1. Lock valve is designed to protect over pressuring of the oil cooler and other low pressure components. If return oil pressure exceeds 250 PSI valve blocks oil on pressure line.
2. If at any time compressor stops when PTO is engaged over pressuring has occurred. At this time disengage PTO and resolve issue with return oil pressure. (Check quick couplers, return oil filters, etc...)
3. To unlock system rotate twist knob on top of 3625 lock valve and then system is operational.

Maintenance

1. Shaft coupling- inspect every 50 hrs.
2. Air Filter– inspect and change as needed every 75 hrs.
3. Compressor– refer to enclosed Gardner Denver manual.

1635 Blower Skid Operation

1635 Blower Skid Parts List

Description	Part Number	Quantity
Oil Cooler	ASA 0256AH12	1
Hyd Un-loader Valve	Doering 44H7372773	1
Hyd Un-loader Ram	HR9-4410-04	1
Hyd Un-loader Gate Valve Bracket	SK1600MGVB	1
Hyd Needle Valve	NDV25S-20 1 1/4	1
Hyd Needle Valve	NDV12N 1/2	1
Hyd Motor	M5100A767ADNK20-00	1
Air Un-loader Valve	RCL-HU Conrader	1
Gardner Denver Blower	4512	1
Drive Coupling	REXNORD 730025E10 ELEMENT 7300350 10 HSB 1 1/4″ HUB 73010105201 10 HSB 1 5/8″	1
Lock Valve	3625	1
Cooler Kit	3625-250	1
Air Filter	PA2831 Baldwin	1
Skid Isolator Mount	60035	4
Air Intake Hose 90 deg	51490	1
Skid Base Assembly	SK1600	1
Blower Mount Plate	SK1600MPB	1
Hyd Motor Mount	SK1600MM	1
Coupling Mount Plate	SK1600MC	1

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 pre-caution, 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

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

Axle Camshafts.....Lubricate all grease fittings

90 DAYS

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

PREVENTIVE MAINTENACNE SCHEDULE

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.

Brake.....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. 50)				X		
Inspect slack adjusters, brake linings and brake chambers					X	
Free up brake shoes and anchor pins (Pg. 50)					X	
Check condition of walkways and toe rails		X				
Check suspension bolt torque (Pg. 77)				X		
Check tires for damage and wear (Pg. 67)	X					
Check axle alignment to king pin (Pg. 70)				X		
Check lubricant level and oil seals on the axles (Pg. 64)		X				
Check ladder bolt tightness		X				
Check the operation of pressure relief device (Pg. 49)	X					
Inspect aeration system (Pg. 54)	X					
Lubricate grease fittings on axle camshafts			X			
Check wheel bearings (Pg. 64)				X		
Check lug nut torque (Pg. 77)					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 56. (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 77 for torque chart.
6. **Tires-**(Daily)-Check for proper inflation, cuts or other damage. See page 67.
7. **Axles-**(Weekly)- Check oil level and for leakage around oil seals, see page 65. 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 70. Do not mix oil with grease.
8. **Wheels-**(Weekly)-Check lug nuts or bolts for proper torque, see page 62. (Every 10,000 to 25,000 miles) Check wheel bearings. Tighten or replace as required. See page 65.
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.

LUBRICATION AND SERVICE (CONTINUED)

14. **Upper 5th Wheel-**(Every 5000 miles) Lubricate with multipurpose 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**

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 49 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.

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.

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.

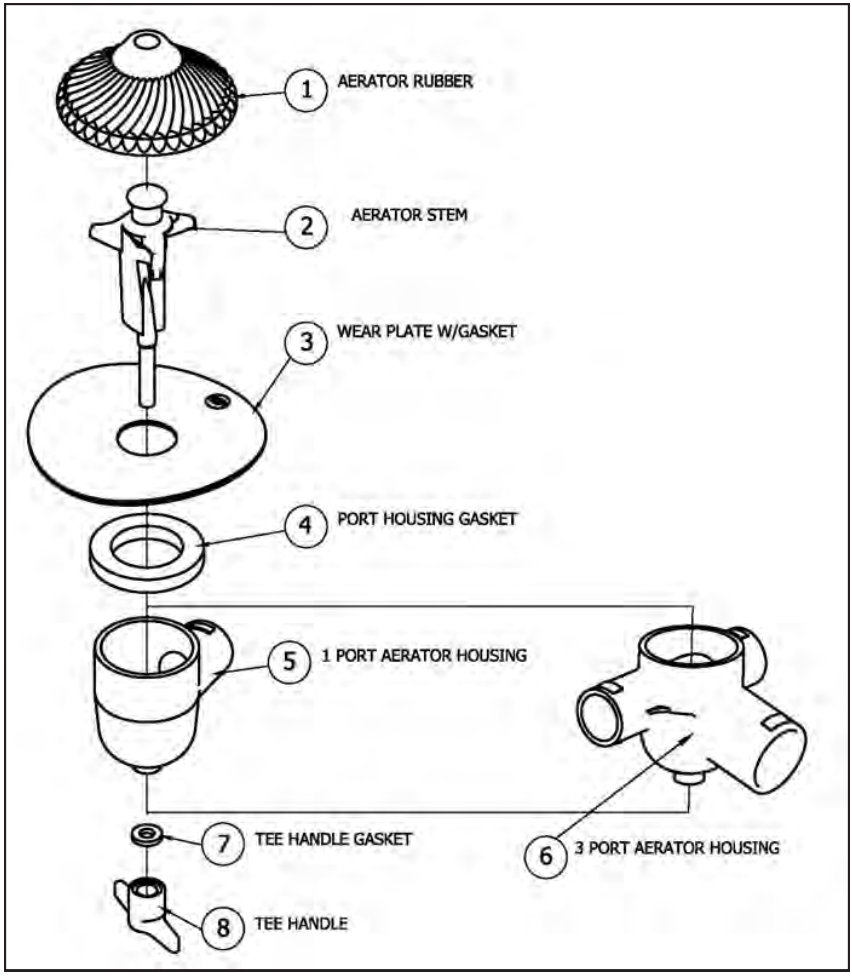


Figure 10. Exploded View of Aerator

Vacuum/Filter Maintenance

Cleaning Instructions

1. Close the top cyclone cleanout valve (bottom valve should remain closed).
2. Open both cleanout ball valves and allow the line to clear.
3. Close the cleanout ball valves.
4. Open the bottom cyclone cleanout valve.

Filter System Maintenance

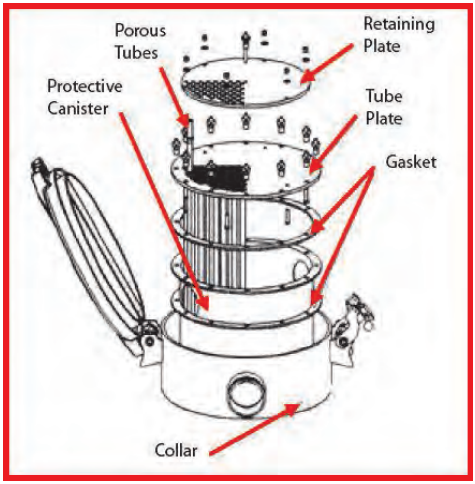
Normal maintenance suggested for all filters is a three part process:

Backflushing	Every load / unload cycle	Reverse the flow of blower air from clean side to filtered side to "flush" loose filtered particles from the filter element and improve performance.
Inspection	Every 2 months	Remove filter retainer plate. Randomly remove and visual inspection filter elements for damage.
Cleaning	Every 6 months	Backflush filter elements with an air nozzle. Wash with warm water (max 80°C/175°F) and mild household detergent. Upon reassembly run blower air through filter to dry the elements.

For inspection, cleaning and ease of handling, the filter assembly can be removed by removing the (12) 3/8" locknuts on the outside radius and then using the lift handle in the center of the filter to remove.

The retaining is removed by the inner radius of locknuts.

Note: Install rubber grommet with each element and be sure it is seated in the plate prior to reassembly.



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.

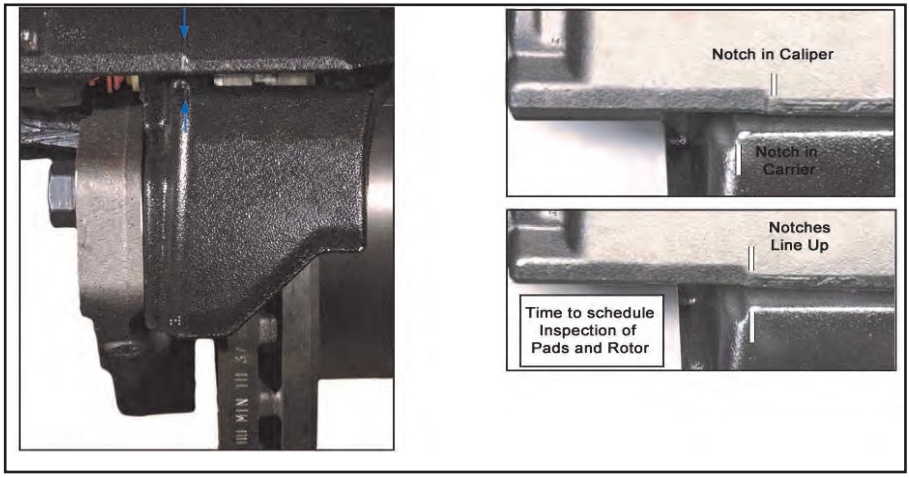


Figure 11. Pad Indicators

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)

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 (if so equipped)

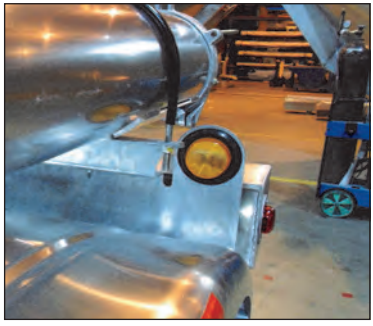


Figure 13. ABS indicator Lamp

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

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 H1
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.

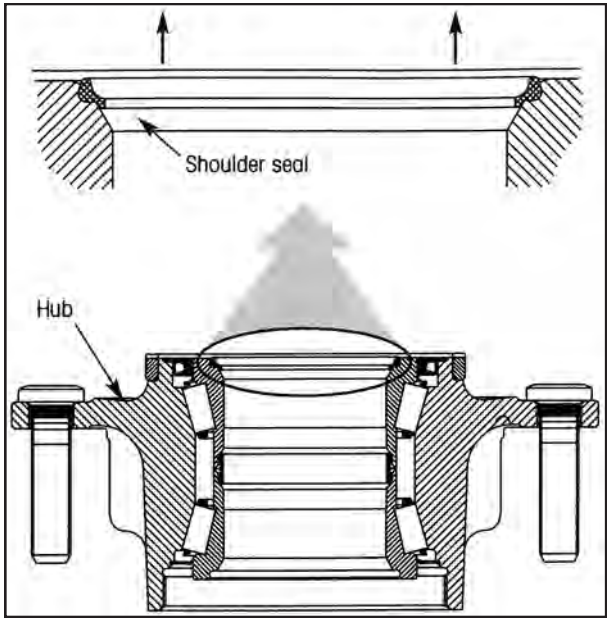


Figure 14. Cross Section View of Wheel Hub

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.

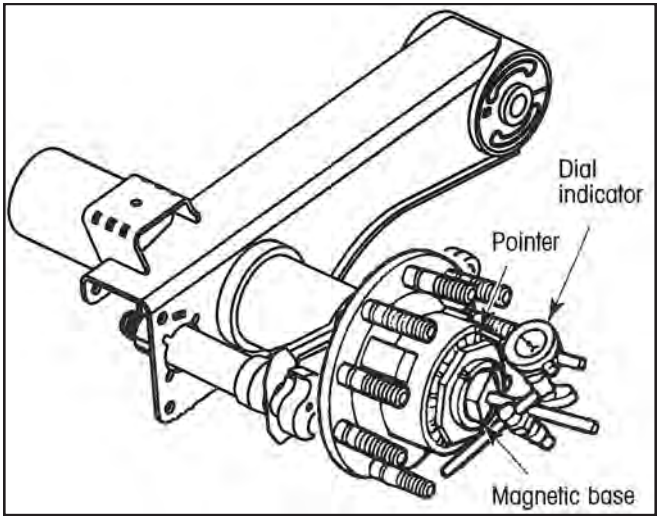


Figure 15. End Play Adjustment

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.

Oil Seal Replacement (continued)

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.

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.

⚠ CAUTION

Replace gaskets when they are broken, crushed, swollen or no longer provide an adequate seal. Use only HEIL or OEM replacement parts.

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.

Check wheel lug torques at least once a week. See Page 77 for recommended lug nut torques.

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.

NOTICE

Insufficient mounting torque can cause rim slip, 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.

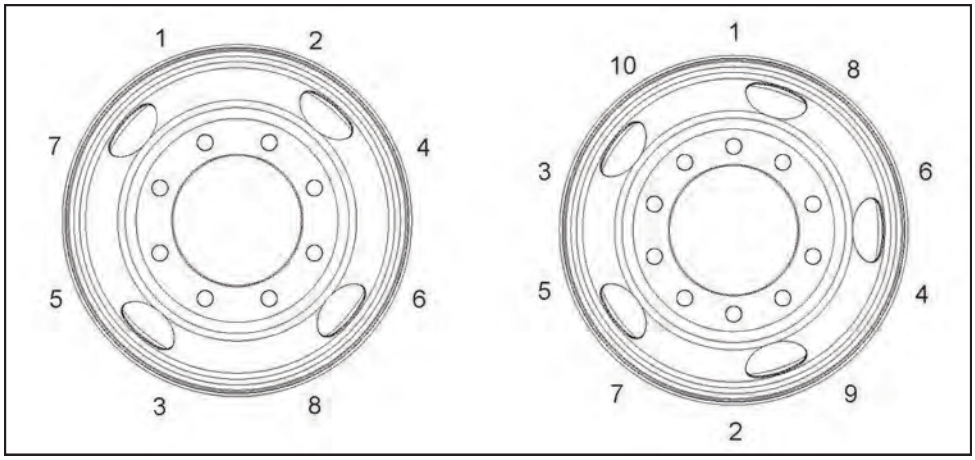


Figure 16. Disc Wheel Installation

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 77.

AXLE ALIGNMENT

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.

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.

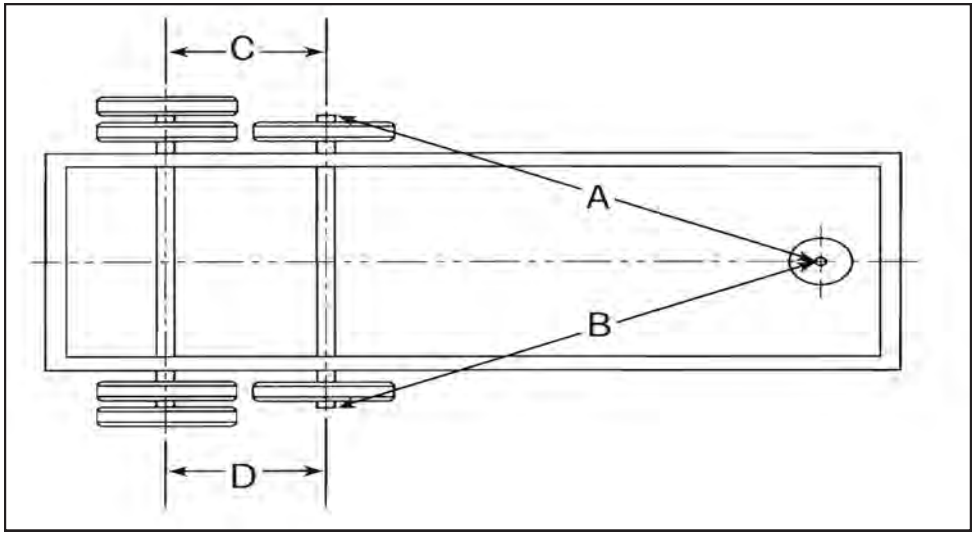


Figure 17. Trailer Alignment

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.

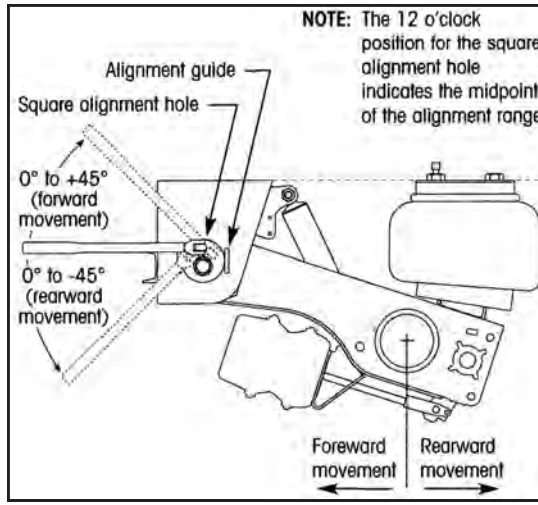


Figure 18. Quick-Align Operation

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).

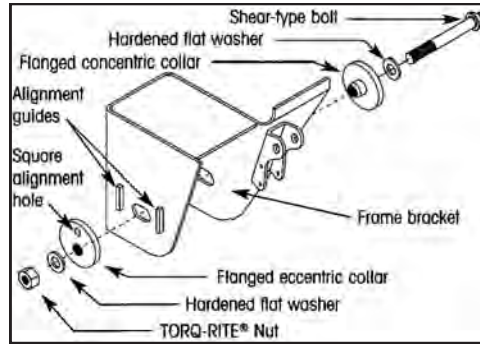


Figure 19. Pivot Connection Assembly

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

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.

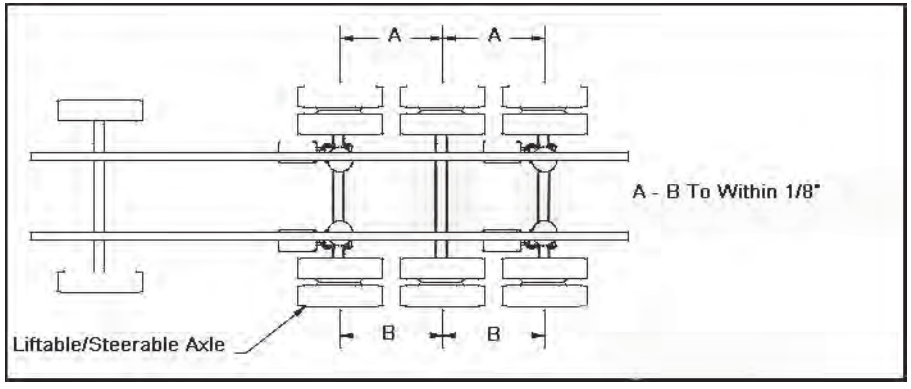


Figure 20. Alignment

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.

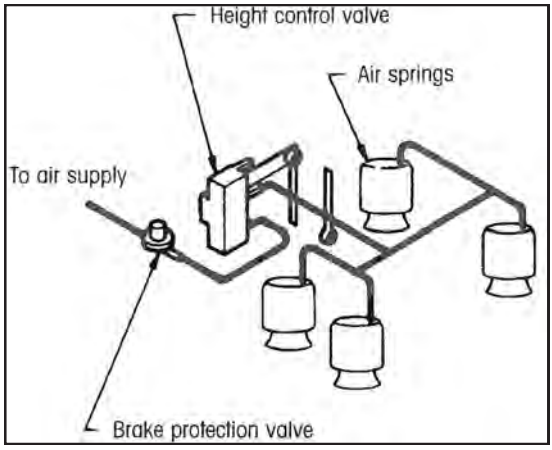


Figure 21. Suspension Height Control Valve

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 also 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.

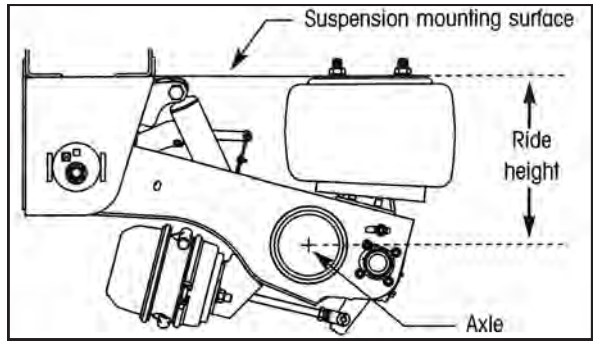


Figure 23. Ride Height Measurement

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 HCV linkage to fit between HCV 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.

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.

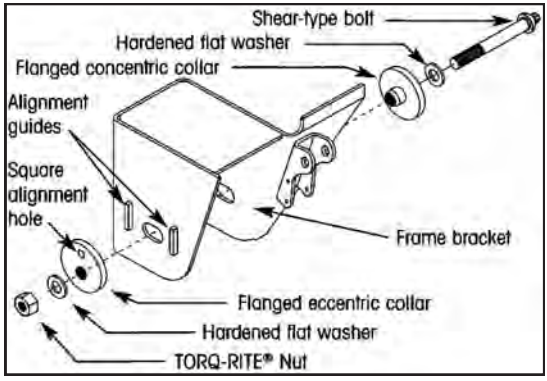


Figure 24. Pivot Connection Assembly

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.

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