TECHNICAL PROCEDURE

COMPOSILITE® EXS:

STEERABLE AUXILIARY AXLE SUSPENSION SYSTEMS

SUBJECT: OWNER'S MANUAL

LIT NUMBER: H819
DATE: January 2024 **REV:** E

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HENDRICKSON
The World Rides On Us®

SECTION 1
INTRODUCTION

Hendrickson Technical Publication TP-H819 is intended as a product overview covering installation, operation and preventive maintenance for Hendrickson's COMPOSILITE® EXS Steerable, Auxiliary Lift Axle Suspension Systems for truck and trailer applications. In the interest of simplicity, consistency and clarity, throughout this publication the term "Lift Axle" will serve in place of the full product description of "COMPOSILITE® EXS Steerable, Auxiliary Lift Axle Suspension System". "Lift axle" is to be understood as the entire lift axle system as shipped from the factory, not simply the axle beam or any other interpretation.

IMPORTANT!

INSTALLATION, OPERATION AND PREVENTIVE MAINTENANCE OF A LIFT AXLE REQUIRES A CERTAIN DEGREE OF EXPERTISE AND OFTEN SPECIALIZED TOOLING AND EQUIPMENT; INEXPERIENCED AND NON-QUALIFIED INDIVIDUALS SHOULD NOT UNDERTAKE THE PROCEDURES DESCRIBED IN THIS PUBLICATION. THE QUALIFIED INSTALLER/OWNER OPERATOR MUST READ TECHNICAL PUBLICATION TP-H819 THOROUGHLY BEFORE PROCEEDING WITH ANY INSTALLATION, OPERATION, OR PREVENTIVE MAINTENANCE PROCEDURES. REFER TO HENDRICKSON PUBLICATION TP-H825 (INSTALLATION INSERT) FOR DIMENSIONS USED DURING PRE-INSTALLATION AND INSTALLATION PROCEDURES.

⚠ WARNING

BEFORE BEGINNING THE INSTALLATION PROCESS, VERIFY THAT YOUR LIFT AXLE MEETS THE REQUIREMENTS OF YOUR INTENDED VEHICLE AND APPLICATION: ACTUAL PRODUCT PERFORMANCE MAY VARY DEPENDING UPON VEHICLE CONFIGURATION, OPERATION, SERVICE AND OTHER FACTORS. ALL APPLICATIONS MUST COMPLY WITH APPLICABLE HENDRICKSON SPECIFICATIONS AND MUST BE APPROVED BY THE RESPECTIVE VEHICLE MANUFACTURER WITH THE VEHICLE IN ITS ORIGINAL, AS-BUILT CONFIGURATION. ANY LIFT AXLE'S WEIGHT RATING IS LIMITED BY THE LOWEST RATING OF ANY CONSTITUENT COMPONENT INSTALLED INTO OR ONTO THAT LIFT AXLE. THE TIRE AND RIM SPECIFICATIONS, ORIENTATION AND LOAD LOCATION CAN ALSO AFFECT THE RATING OF THE HUBS AND HENCE THE LIFT AXLE'S RATING AS A WHOLE. IT IS THE INSTALLER'S RESPONSIBILITY TO ENSURE THAT THE LIFT AXLE'S RATING (WHICH MAY BE REDUCED, AS INDICATED ABOVE) IS NOT EXCEEDED. FAILURE TO DO THIS CAN RESULT IN DAMAGE TO THE LIFT AXLE. A PARTICULAR CONCERN IS THE POSSIBLE "DE-RATING" OF SUSPENSION CAPACITY WHEN USING OFFSET (DISHED-OUT OR DISHED-IN) WHEELS, A SITUATION THAT CAN PUT AN EXCESSIVE LOAD ON THE BEARINGS AND SPINDLE, WHICH CAN LEAD TO REDUCED SERVICE LIFE AND MECHANICAL FAILURES. WHEN UTILIZING HUBS, WHEELS OR BEARINGS NOT SUPPLIED BY OR RECOMMENDED BY HENDRICKSON OR WHEN REPLACING HENDRICKSON-SUPPLIED HUBS AND/OR BEARINGS WITH COMPONENTS NOT SUPPLIED BY HENDRICKSON, IT IS THE BUYER'S RESPONSIBILITY TO CONSULT WITH THE SUPPLIERS OF THOSE COMPONENTS AND ALL ASSOCIATED SUPPLIER LITERATURE TO ASSURE THAT THE RATED CAPACITY OF THE LIFT AXLE OR ITS SUB-ASSEMBLIES WILL NOT BE EXCEEDED.

Contact Hendrickson Customer Service for additional details regarding specifications, applications, capacities,operation, service and maintenance: 800-660-2829 (toll-free in US and Canada), 740-929-5600, or liftaxle@hendrickson-intl.com.

All parts being considered in any warranty claim are subject to return to Hendrickson for evaluation.

The latest revision of Technical Publication TP–H818 and other Hendrickson publications are available online at https://www.hendrickson-intl.com/Auxiliary.

SECTION 2

PRODUCT DESCRIPTION

COMPOSILITE® EXS is Hendrickson's next generation of more durable steerable auxiliary lift axle suspension systems. A number of technological advancements enabled Hendrickson to take this concept from theory to the road. Inset lower beams help optimize lateral stiffness and eliminates the need for V-rods. Zero-torsion rubber bushings provide increased bushing life and help lower cost of ownership with less downtime. Bolt-on axle seats make for easier serviceability, while adding to lower cost of ownership. In addition, the upper aluminum beams help reduce weight without sacrificing durability. A 7-year structural limited warranty accompanies the COMPOSILITE® EXS Auxiliary Lift Axle System. See Hendrickson publications H624 Hendrickson Auxiliary Lift Axle Suspension Suspensions: Limited Warranty and H800 Hendrickson Warranty Claim Request Form, which are available at www.hendrickson-intl.com.

TABLE 2-1: COMPOSILITE® EXS SPECIFICATIONS

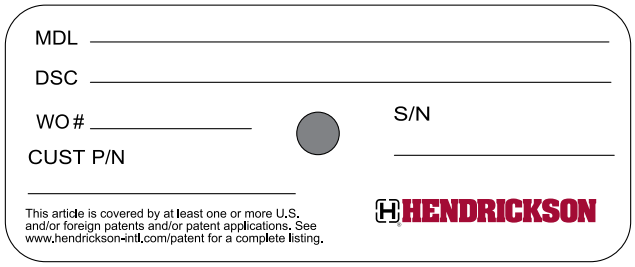
SUSPENSION	CAPACITY
TRUCK APPLICATIONS:	
EXS	8K, 10K, 13.5K, 20K (FF-spindle)
	13.5K (FF-spindle Bendix ADB22x Air Disc; Meritor EX225H201/202ADB)
EXS: Roll-off	13.5K (FF-spindle)
	13.5K (FF-spindle Bendix ADB22x Air Disc; Meritor EX225H201/202ADB)
TRAILER APPLICATIONS:	
EXS: Weld-on	13.5K (FF/N-spindles) 13.5K (FF-spindle Bendix ADB22x Air Disc; Meritor EX225H201/202ADB)
EXS: Bolt-on	13.5K (FF/N-spindles) 13.5K (FF-spindle Bendix ADB22x Air Disc; Meritor EX225H201/202ADB)

IDENTIFYING YOUR LIFT AXLE SUSPENSION

The Serial Number Plate shown in Figure 2-1 is a stainless steel tag attached to the frame of the auxiliary lift–axle suspension system. It includes a Model Number (sometimes called "Part Number" in other Hendrickson publications) and a Serial Number that is unique to that particular suspension. These two numbers are important to have when contacting Hendrickson Customer Service for replacement parts, warranty claims, and regarding other inquiries.

Figure 2-1 below shows the latest format (as of September 2020) of the Hendrickson Serial Number Plate.

FIGURE 2-1: HENDRICKSON SERIAL NUMBER PLATE



SECTION 3

IMPORTANT SAFETY NOTICE

Proper installation, maintenance, service, and repair is important for the reliable operation of the lift axle. The procedures recommended by Hendrickson and described in this technical publication are methods of performing such installation, maintenance, service and repair.

All safety-related information should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper installation, maintenance, service or repair may damage the vehicle, cause personal injury, render it unsafe in operation, or void the manufacturer's warranty.

Failure to follow the safety precautions in this manual can result in personal injury and/or property damage. Carefully read and understand all safety-related information within this publication, on all decals, and in all such materials provided by the vehicle manufacturer before conducting any installation, maintenance, service or repair.

EXPLANATION OF SIGNAL WORDS

Hazard "Signal Words" (Danger! Warning! Caution!) appear in various locations throughout this publication. Information accented by one of these signal words must be observed to help minimize the risk of personal injury to service personnel, or possibility of improper service methods which may damage the vehicle or render it unsafe.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

Additional Notes or Service Hints are utilized to emphasize areas of procedural importance and provide suggestions for ease of repair. The following definitions indicate the use of these signal words as they appear throughout the publication.

DANGER INDICATES AN IMMINENTLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, WILL RESULT IN SERIOUS INJURY OR DEATH.

WARNING INDICATES A POTENTIAL HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, CAN RESULT IN SERIOUS INJURY OR DEATH.

CAUTION INDICATES A POTENTIAL HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, MAY RESULT IN MINOR OR MODERATE INJURY.

NOTE: AN OPERATING PROCEDURE, PRACTICE CONDITION, ETC., WHICH IS ESSENTIAL TO EMPHASIZE.

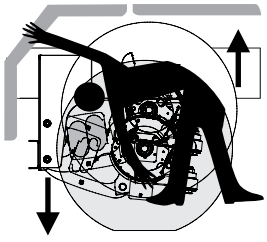
SERVICE HINT: A HELPFUL SUGGESTION THAT WILL MAKE THE SERVICE BEING PERFORMED A LITTLE EASIER AND / OR FASTER.

The torque symbol alerts you to tighten fasteners to a specified torque value. Refer to the Torque Specifications section of this publication.

SAFETY PRECAUTIONS

WARNING

LIFT AXLE RAPID MOVEMENT



LIFT AXLE RAPID MOVEMENT CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

IF LIFT AXLE IS OPERATED BY AN AUTOMATIC OR SEMI-AUTOMATIC LIFT AXLE CONTROL SYSTEM, SUCH SYSTEM MAY CAUSE LIFT AXLE TO RAISE OR LOWER AUTOMATICALLY UNDER DIFFERENT CONDITIONS.

LIFT AXLE ACTIVATION AND MOVEMENT MAY VARY DEPENDING ON THE BRAND, CONFIGURATION, AND OPERATING CONDITION OF THE LIFT AXLE CONTROL SYSTEM AND/OR OTHER FACTORS. READ, UNDERSTAND, AND COMPLY WITH ALL APPLICABLE OPERATING INSTRUCTIONS AND SAFETY INFORMATION PROVIDED BY THE LIFT AXLE CONTROL SYSTEM MANUFACTURER AND VEHICLE MANUFACTURER. ENSURE ALL PERSONNEL ARE CLEAR OF LIFT AXLE BEFORE AND DURING VEHICLE LOADING AND LIFT AXLE ACTIVATION UP OR DOWN.

CAUTION

LIFT AXLE ACTIVATION

DO NOT LOWER THE LIFT AXLE WHILE THE VEHICLE IS MOVING IN REVERSE OR TRAVELING FORWARD AT MORE THAN 15 MPH. FAILURE TO COMPLY WITH THIS RULE CAN CAUSE COMPONENT DAMAGE.

CAUTION

NAVIGATING A 90 DEGREE CURVE OR TURN

TO MINIMIZE PREMATURE TIRE WEAR OR POSSIBLE DAMAGE TO NON-STEERABLE LIFT AXLE COMPONENTS (IF APPLICABLE), THE LIFT AXLE MAY BE RAISED TO THE UP POSITION PRIOR TO NAVIGATING A 90 DEGREE OR TIGHTER CURVE OR TURN. COMPLY WITH ALL FEDERAL, STATE / PROVINCIAL AND / OR LOCAL WEIGHT, DIMENSION AND CONFIGURATION REGULATIONS UNDER LOADED AND UNLOADED CONDITIONS.

WARNING

LOAD CAPACITY

ADHERE TO THE PUBLISHED CAPACITY RATINGS FOR THE AUXILIARY LIFT AXLE. ADD-ON AXLE ATTACHMENTS (I.E. SLIDING FIFTH WHEELS) AND OTHER LOAD TRANSFERRING DEVICES CAN INCREASE THE AUXILIARY AXLE LOAD ABOVE THE RATED AND APPROVED CAPACITIES WHICH CAN RESULT IN FAILURE AND ADVERSE VEHICLE HANDLING, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

CAUTION

DAILY / PRE-TRIP OPERATOR INSPECTION

DAILY (AND BEFORE EACH TRIP) INSPECT ALL LIFT AXLE COMPONENTS FOR PROPER OPERATING CONDITION AND PROPER INSTALLATION TO THE TRUCK / TRAILER FRAME. THIS ESSENTIAL DAILY / PRE-TRIP OPERATOR INSPECTION MUST ALSO INCLUDE A VISUAL INSPECTION OF ALL WHEEL SEALS AND GASKETS FOR LEAKS, A VERIFICATION OF PROPER OIL LEVEL IN THE HUBS (IF APPLICABLE), INSPECTION OF ALL LIFT AND RIDE AIR SPRINGS FOR WEAR, AND INSPECTION OF ALL TIRES FOR PROPER INFLATION AND ABNORMAL WEAR PATTERNS. IDENTIFY AND REPAIR / REPLACE ANY LOOSE, DAMAGED OR IMPROPERLY INSTALLED COMPONENTS. FOR ADDITIONAL SERVICE, REPAIR AND REBUILD INSTRUCTIONS, REFER TO THE CURRENT VERSION OF OTHER HENDRICKSON PUBLICATIONS THAT APPLY TO YOUR PARTICULAR LIFT AXLE SUSPENSION. SUCH PUBLICATION NUMBERS MAY INCLUDE, BUT ARE NOT LIMITED TO OM-H757, WHICH IS AVAILABLE ONLINE AT WWW.HENDRICKSON-INTL.COM.

WARNING

REPAIR AND RECONDITIONING

THE REPAIR OR RECONDITIONING OF LIFT AXLE AXLE COMPONENTS THAT ARE BENT, DAMAGED OR OUT OF SPECIFICATION IS NOT ALLOWED. ANY LIFT AXLE COMPONENTS FOUND TO BE DAMAGED OR OUT OF SPECIFICATION MUST BE REPLACED. LIFT AXLE COMPONENTS CANNOT BE BENT, WELDED, HEATED, OR REPAIRED WITHOUT REDUCING THE STRENGTH OR LIFE OF THE COMPONENT. FAILURE TO FOLLOW THESE GUIDELINES CAN CAUSE ADVERSE VEHICLE HANDLING, POSSIBLE PERSONAL INJURY, DEATH OR PROPERTY DAMAGE AND WILL VOID APPLICABLE WARRANTIES.

WARNING

PERSONAL PROTECTIVE EQUIPMENT

ALWAYS WEAR PROPER EYE PROTECTION AND OTHER REQUIRED PERSONAL PROTECTIVE EQUIPMENT TO HELP PREVENT PERSONAL INJURY WHEN YOU PERFORM VEHICLE MAINTENANCE, REPAIR OR SERVICE.

CAUTION

PROCEDURES AND TOOLS

A MECHANIC PERFORMING A SERVICE PROCEDURE OR USING A TOOL THAT HAS NOT BEEN RECOMMENDED BY HENDRICKSON MUST FIRST ASSURE HIMSELF THAT NEITHER HIS SAFETY NOR THE VEHICLE'S SAFETY WILL BE JEOPARDIZED BY THE METHOD OR TOOL SELECTED. INDIVIDUALS DEVIATING IN ANY MANNER FROM THE INSTRUCTIONS PROVIDED ASSUME ALL RISKS OF POTENTIAL PERSONAL INJURY OR DAMAGE TO EQUIPMENT INVOLVED.

WARNING

FASTENERS

DISCARD USED FASTENERS. ALWAYS USE NEW FASTENERS TO COMPLETE A REPAIR. FAILURE TO DO SO COULD RESULT IN FAILURE OF THE PART OR MATING COMPONENTS, ADVERSE VEHICLE HANDLING, PERSONAL INJURY OR PROPERTY DAMAGE. LOOSE OR OVER-TORQUED FASTENERS CAN CAUSE COMPONENT DAMAGE, ADVERSE VEHICLE HANDLING, PROPERTY DAMAGE OR SEVERE PERSONAL INJURY. MAINTAIN CORRECT TORQUE VALUE AT ALL TIMES. CHECK TORQUE VALUES ON A REGULAR BASIS AS SPECIFIED, USING A REGULARLY CALIBRATED TORQUE WRENCH. TORQUE VALUES SPECIFIED IN THIS TECHNICAL PUBLICATION ARE FOR HENDRICKSON-SUPPLIED FASTENERS ONLY. IF NON-HENDRICKSON FASTENERS ARE USED, FOLLOW TORQUE SPECIFICATIONS FROM THE FASTENER MANUFACTURER.

⚠ WARNING

MODIFYING COMPONENTS

DO NOT MODIFY OR REWORK PARTS WITHOUT AUTHORIZATION FROM HENDRICKSON. DO NOT SUBSTITUTE REPLACEMENT COMPONENTS NOT AUTHORIZED BY HENDRICKSON. USE OF MODIFIED, REWORKED, SUBSTITUTE OR REPLACEMENT PARTS NOT AUTHORIZED BY HENDRICKSON MAY NOT MEET HENDRICKSON'S SPECIFICATIONS AND CAN RESULT IN FAILURE OF THE PART, ADVERSE VEHICLE HANDLING, POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE AND WILL VOID APPLICABLE WARRANTIES. USE ONLY HENDRICKSON-AUTHORIZED REPLACEMENT PARTS.

THE VEHICLE MANUFACTURER SHOULD BE CONSULTED BEFORE MAKING ANY CHANGES TO THE VEHICLE'S FRAME. TYPICALLY, CUTTING OR ALTERING THE VEHICLE'S FRAME OR SIDE RAIL IS NOT PERMITTED AND MAY AFFECT THE MANUFACTURER'S WARRANTY COVERAGE.

ANY INSTALLATION DEVIATIONS MUST BE APPROVED IN WRITING BY HENDRICKSON'S PRODUCT ENGINEERING DEPARTMENT. FAILURE TO COMPLY WITH ANY OF THE ABOVE WILL VOID APPLICABLE WARRANTIES.

⚠ WARNING

DAMAGED AXLE COMPONENTS

IF A VEHICLE EQUIPPED WITH A HENDRICKSON LIFT AXLE IS INVOLVED IN A CRASH, A THOROUGH INSPECTION OF THE LIFT AXLE MUST BE PERFORMED NOTING THE CONDITION OF THE AXLE BEAM, KINGPINS, AND KNUCKLE ASSEMBLIES, INCLUDING THE AREAS OF AXLE-TO-KINGPIN INTERFACE, FOR ANY DAMAGE, GAPS, KINGPIN MOVEMENT OR PLAY. IF ANY COMPONENT APPEARS DAMAGED, OR THE KINGPINS APPEAR TO CONTAIN ANY DAMAGE, GAPS, MOVEMENT OR PLAY, THE COMPLETE AXLE ASSEMBLY MUST BE REPLACED.

IN ADDITION, IN THE EVENT A CRASH RESULTS IN EXCESSIVE SIDE LOAD DAMAGE TO ADJACENT PARTS, SUCH AS A BENT WHEEL, HUB, OR SPINDLE, IT IS STRONGLY RECOMMENDED TO REPLACE SUCH ADJACENT PARTS AND THE COMPLETE LIFT AXLE ASSEMBLY.

CONTACT HENDRICKSON TECHNICAL SERVICES DEPARTMENT WITH ANY QUESTIONS. FAILURE TO REPLACE ANY DAMAGED COMPONENTS CAN CAUSE ADVERSE VEHICLE HANDLING, POSSIBLE PERSONAL INJURY, DEATH OR PROPERTY DAMAGE AND WILL VOID ANY APPLICABLE WARRANTIES.

⚠ WARNING

LIFT AXLE CAMBER

UNAUTHORIZED WELDING OR MODIFICATIONS CAN CAUSE CRACKS OR OTHER LIFT AXLE STRUCTURAL DAMAGE AND RESULT IN ADVERSE VEHICLE HANDLING, SEVERE PERSONAL INJURY OR DEATH. DO NOT BEND, WELD OR MODIFY AXLE WITHOUT AUTHORIZATION FROM HENDRICKSON. AXLE CAMBER IS NOT ADJUSTABLE. DO NOT CHANGE THE AXLE CAMBER ANGLE OR BEND THE AXLE BEAM. BENDING THE AXLE BEAM TO CHANGE THE CAMBER ANGLE CAN DAMAGE THE AXLE AND REDUCE AXLE STRENGTH, CAN CAUSE ADVERSE VEHICLE HANDLING, POSSIBLY CAUSING PERSONAL INJURY OR PROPERTY DAMAGE AND WILL VOID APPLICABLE WARRANTIES.

⚠ WARNING

IMPROPER JACKING METHOD

IMPROPER JACKING METHOD CAN CAUSE STRUCTURAL DAMAGE AND RESULT IN ADVERSE VEHICLE HANDLING, SEVERE PERSONAL INJURY OR DEATH. DO NOT USE AXLE BEAM OUTBOARD OF AXLE SPRING SEATS. REFER TO VEHICLE MANUFACTURER FOR PROPER JACKING INSTRUCTIONS.

⚠ WARNING

SUPPORT THE LIFT AXLE PRIOR TO SERVICING

PLACE THE VEHICLE/TRAILER ON A LEVEL FLOOR AND CHOCK THE WHEELS TO HELP PREVENT THE VEHICLE/TRAILER FROM MOVING. PRIOR TO SERVICING A LIFT AXLE IN THE RAISED POSITION, (1) PROPERLY SUPPORT THE LIFT AXLE WITH SAFETY STANDS, AND (2) RELEASE ALL AIR PRESSURE IN LIFT AXLE'S AIR SPRINGS AND RIDE SPRINGS. DO NOT WORK AROUND OR UNDER A RAISED LIFT AXLE SUPPORTED ONLY WITH FLOOR JACKS OR OTHER LIFTING DEVICES. FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY OR DAMAGE TO COMPONENTS.

⚠ WARNING

SUPPORT THE VEHICLE PRIOR TO SERVICING

PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO HELP PREVENT THE VEHICLE FROM MOVING. PRIOR TO SERVICING A VEHICLE IN THE RAISED POSITION, PROPERLY SUPPORT THE VEHICLE WITH SAFETY STANDS. DO NOT WORK AROUND OR UNDER A RAISED VEHICLE SUPPORTED ONLY WITH FLOOR JACKS OR OTHER LIFTING DEVICES, FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY OR DAMAGE TO COMPONENTS.

⚠ WARNING

AIR SPRINGS

AIR SPRING ASSEMBLIES MUST BE DEFLATED PRIOR TO LOOSENING ANY ADJACENT HARDWARE. UNRESTRICTED AIR SPRING ASSEMBLIES CAN VIOLENTLY SHIFT. DO NOT INFLATE AIR SPRING ASSEMBLIES WHEN THEY ARE UNRESTRICTED. AIR SPRING ASSEMBLIES MUST BE RESTRICTED BY SUSPENSION OR OTHER ADEQUATE STRUCTURE. DO NOT INFLATE BEYOND PRESSURES RECOMMENDED BY AIR SPRING MANUFACTURER. CONTACT HENDRICKSON TECHNICAL SERVICES FOR DETAILS. IMPROPER USE OR OVER INFLATION MAY CAUSE AIR SPRING ASSEMBLIES TO BURST, CAUSING PROPERTY DAMAGE AND / OR SEVERE PERSONAL INJURY.

⚠ WARNING

AIR SPRINGS

EXHAUST ALL PRESSURE IN THE LIFT AXLE'S AIR SPRINGS AND VEHICLE AIR SYSTEM BEFORE WORKING ON OR AROUND THE LIFT AXLE. FAILURE TO DO SO CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

⚠ WARNING

AIR SPRINGS

PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA. FAILURE TO DO SO CAN CAUSE SEVERE PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ CAUTION

AIR SPRINGS

INFLATE THE SUSPENSION'S AIR SPRINGS SLOWLY AND MAKE SURE THE RUBBER BLADDER OF THE AIR SPRING INFLATES UNIFORMLY AND IS NOT BINDING. FAILURE TO DO SO CAN CAUSE DAMAGE TO THE AIR SPRING AND / OR MOUNTING BRACKETS AND WILL VOID APPLICABLE WARRANTIES.

⚠ WARNING

OFF ROADWAY TOWING

HENDRICKSON DOES NOT RECOMMEND TOWING A VEHICLE BY THE LIFT AXLE. DOING SO WILL DAMAGE THE AXLE AND WILL VOID APPLICABLE WARRANTIES.

⚠ WARNING

PARTS CLEANING

SOLVENT CLEANERS CAN BE FLAMMABLE, POISONOUS, AND CAUSE BURNS. TO HELP AVOID SERIOUS PERSONAL INJURY, CAREFULLY FOLLOW THE MANUFACTURER'S PRODUCT INSTRUCTIONS AND GUIDELINES AND THE FOLLOWING PROCEDURES:

1. WEAR PROPER EYE PROTECTION.
2. WEAR CLOTHING THAT PROTECTS YOUR SKIN.
3. WORK IN A WELL VENTILATED AREA.
4. DO NOT USE GASOLINE OR SOLVENTS THAT CONTAIN GASOLINE. GASOLINE CAN EXPLODE.
5. HOT SOLUTION TANKS OR ALKALINE SOLUTIONS MUST BE USED CORRECTLY. FOLLOW THE MANUFACTURER'S RECOMMENDED INSTRUCTIONS AND GUIDELINES CAREFULLY TO HELP PREVENT PERSONAL ACCIDENT OR INJURY.

DO NOT USE HOT SOLUTION TANKS OR WATER AND ALKALINE SOLUTIONS TO CLEAN GROUND OR POLISHED PARTS. DOING SO WILL CAUSE DAMAGE TO THE PARTS AND VOID APPLICABLE WARRANTIES.

SECTION 4
SPECIAL TOOLS

The following tools / materials are needed when installing and servicing Hendrickson COMPOSILITE® EXS steerable systems:

Bushing Inspection

- Two jack stands
- Small bottle jack
- Block of wood
- Magnetic base dial indicator

Steering Knuckle Disassembly

- ½" Impact
- Wrench or socket – 7/16" and 1 5/16"
- 15/16" Box wrench
- Deep well socket – 15/16" and 1 1/8"
- Brake spring tool or notched screw driver
- Needle nose pliers

Kingpin Inspection and Replacement

- Cleaning solvent and emery cloth (220 grit or higher)
- 1"- 2" Micrometer measuring device
- 1 1/16" Socket and impact gun
- 3/8" Punch
- Hammer
- Portable hydraulic (5-10 ton) press

Bushing Housing Replacement

- Hydraulic shop press with a minimum force capacity of 5 tons
- Bushing driver
- Magnetic base dial indicator

Steering Knuckle Assembly

- 15/16" Box wrench and deep well socket
- Brake spring tool or notched screw driver
- Wrench or socket – 7/16", 1 5/16"
- Two 0.010" feeler gauges
- Magnetic base dial indicator
- Needle nose pliers
- Torque wrench capable of 500 foot pounds

Kingpin Lubrication

- Multipurpose NLGI-2 grease
- Grease gun

Integrated Brake Replacement

- Brake spring tool or notched screw driver

Steering Stabilizer Inspection and Replacement

- 1 1/8" Wrench and socket
- Torque wrench
- Digital protractor or equivalent device

Steer Ahead and Toe Setting

- 15/16" Wrench and socket
- ½" Impact
- Can of white spray paint
- Torque wrench capable of 60 foot pounds and 500 foot pounds
- Straight blade screwdriver for scribing line in tire Linear measuring instrument (tape measure or scales)
- Jack stand

Lubrication

- Hand or pneumatic grease gun
- NLGI-1 or NLGI-2 grease

Miscellaneous

- Wheel chocks

SECTION 5
PRE-INSTALLATION CHECK LIST

The first step to a successful installation is to verify that the lift axle you ordered and received corresponds by type and quantity to your needs and requirements. Contact the Hendrickson Customer Service if any components are missing or damaged or to receive additional information: 800-660-2829 (toll–free in US and Canada), 740-929-5600 or liftaxle@hendrickson-intl.com.

LITERATURE: EVERY HENDRICKSON LIFT AXLE IS SHIPPED WITH A "PARTS BOX" CONTAINING A "LITERATURE PACK" OF TECHNICAL PUBLICATIONS, LABELS, INCLUDING TP-H825 (AN ASSEMBLY & INSTALLATION INSERT), WHICH PROVIDES DIMENSIONS FOR CURRENT HENDRICKSON AUXILIARY LIFT AXLE SUSPENSIONS.

IMPORTANT! REGARDLESS OF THE MODEL AND CONFIGURATION OF YOUR LIFT AXLE, HENDRICKSON RECOMMENDS THAT YOU REVIEW THIS SECTION THOROUGHLY BEFORE BEGINNING ANY INSTALLATION PROCEDURES.

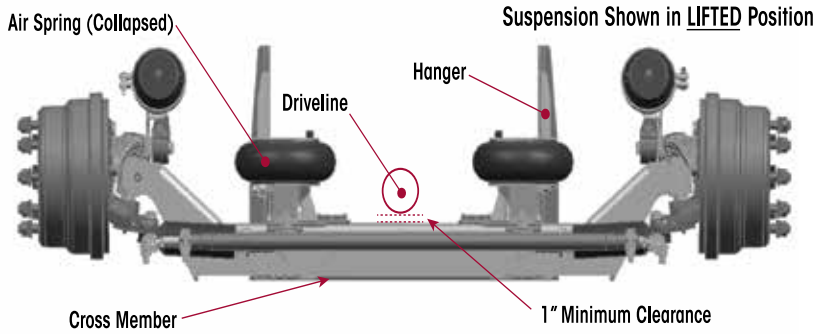
- The truck / trailer manufacturer should be consulted before making any changes to the truck / trailer's frame or other components. Typically, cutting or altering the frame or side rail is not permitted and may affect the vehicle manufacturer's warranty coverage.
- It is the responsibility of the installer to determine the correct location of the suspension in order to provide the proper load distribution. The load carried by each axle must not exceed the rated capacity of the components involved.
- It is the responsibility of the installer to ensure that proper clearances exist between the following: the drive shaft (driveline) and the lift axle suspension system; tires (laterally, fore / aft, and vertically); air springs and adjacent components (based on the springs' maximum inflated diameter).
- No welding of any of the lift axle's components is permitted except where specified by Hendrickson. Alteration of lift axle components is not permitted.
- Prior to any installation, all safety-related information should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper installation may damage the vehicle, render it unsafe in operation, void manufacturer's warranty or cause personal injury.

DRIVELINE CLEARANCE

IMPORTANT! **FOR TRUCK INSTALLATIONS, REFER TO HENDRICKSON TECHNICAL PUBLICATION H854! PRIOR TO INSTALLATION, VERIFY DRIVELINE CLEARANCE BY MEASURING THE DISTANCE FROM THE BOTTOM OF THE TRUCK RAIL TO THE BOTTOM OF THE FULLY ARTICULATED DRIVELINE. IMPROPER MEASUREMENT CAN LEAD TO DAMAGE TO YOUR VEHICLE AND LIFT AXLE!**

Figure 5-1 below shows a COMPOSILITE® EXS lift axle. In the lifted position, there must be at least 1" of clearance between the vehicle's driveline and the top of the suspension's axle beam.

FIGURE 5–1: DRIVELINE CLEARANCE



LIFT AXLE LOCATION

In determining the location for an auxiliary lift axle suspension on a truck or trailer, U.S.-based vehicle owners and / or lift axle installers are responsible for reading and understanding the United States Federal Bridge Formula and Weights Regulation along with their local state laws; it is recommended to work with your state DOT to understand their requirements. Those in other countries and jurisdictions must follow the appropriate local regulations and formulas. General Information: https://www.hendrickson-intl.com/Bridge-Laws

Truck or Trailer Lift Axle Applications:

a. Verify that the axle spacing conforms to U.S. Federal Bridge Formula and Weights Regulations and all other applicable regulations.

b. Verify that the lift axle's location is based on:
   - Vehicle wheel-base
   - Maximum recommended lift axle spacing

c. Verify that the vehicle will have the proper load distribution after installation.

d. Verify that there is sufficient fore / aft frame rail clearance to mount the lift axle(s).

Additional Considerations (refer to TP-H825):

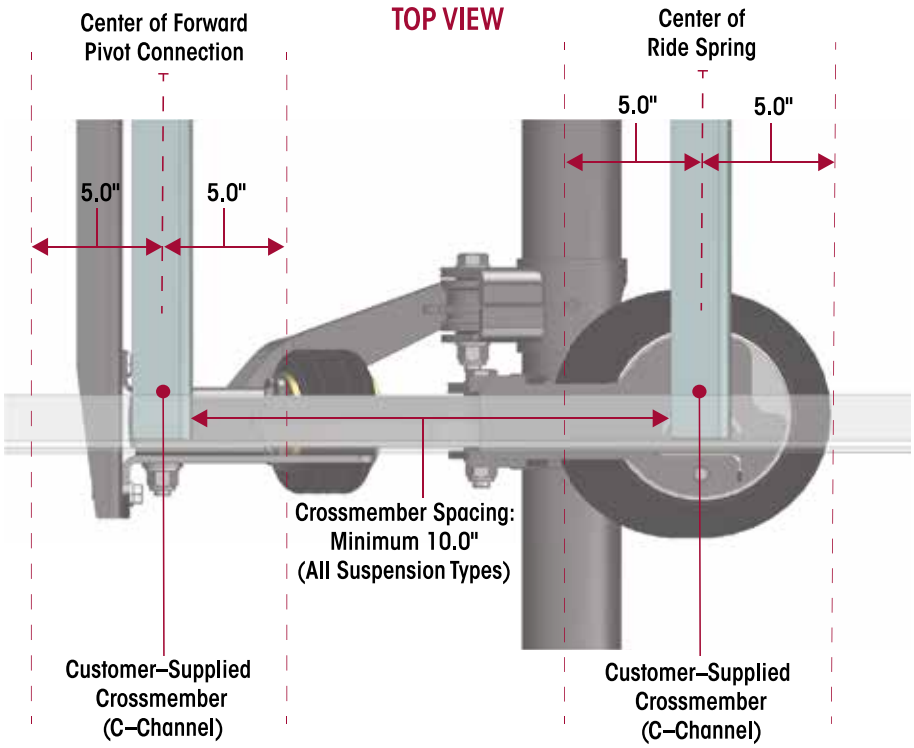
a. Verify that the frame width is within the allowable mounting range of the lift axle.

b. Mark the location of the lift axle's side rails on the frame rails. Check for interferences with any existing brackets or mounting bolts.

c. Verify that the vehicle / trailer crossmembers and backing plates are correctly positioned for proper support of the lift axle (Refer to Figure 5-2 below).

IMPORTANT!

DETERMINE THE LOCATION FOR THE LIFT AXLE ACCORDING TO THESE CRITERIA: VEHICLE CROSSMEMBERS MUST BE POSITIONED WITHIN FIVE (5) INCHES FORE OR AFT OF THE SUSPENSION'S FORWARD PIVOT CONNECTIONS AND WITHIN FIVE (5) INCHES FORE OR AFT OF THE CENTER OF THE AIR SPRINGS. MAINTAIN A MINIMUM OF 10 INCHES BETWEEN CROSSMEMBERS.



RIDE HEIGHT & FRAME WIDTH

Correct ride height is critical for the safe and efficient operation of your lift axle. For best results, ride height is determined by of the distance from the bottom of the vehicle's frame rail to the ground when the vehicle is fully loaded. This ensures the most accurate ride height calculation. However, your measurement might have been calculated based on an unloaded vehicle. In those cases, Hendrickson determines your ride height using a formula to estimate the sag of your specific suspension type.

For a fully loaded vehicle, a correct installation results in the installed suspension's measured ride height being within a tolerance of + / – one inch of the specified ride height.

COMPOSILITE® EXS lift axles are available "factory-ready" with customer-specified ride heights and frame widths for easy, standardized installation for a specific vehicle. COMPOSILITE® EXS "adjustable" suspensions allow the customer to buy lift axles suited for an undetermined vehicle; these adjustable suspensions utilize spacers to accommodate varying vehicle requirements.

If during the installation process you have questions about your suspension's ride height or frame width, please contact Hendrickson Customer Service: 800-660-2829 (TOLL-FREE in US and Canada), 740-929-5600, or liftaxle@hendrickson-intl.com.

SERVICE HINT: DO NOT DRILL HOLES IN THE SUSPENSION'S SIDE RAILS (HANGERS), UPPER AIR-SPRING PLATES, OR THE VEHICLE'S FRAME RAIL UNTIL THE RIDE HEIGHT OF YOUR SUSPENSION IS DETERMINE TO BE OPTIMAL!

The COMPOSILITE® EXS adjustable product line can accommodate frame widths of 33.5, 34.0 or 34.5 inches. This suspension option ships with the frame width set to 34.0 inches with two .25" "K" spacers already installed; two additional .25" frame-width "K" spacers are shipped with your suspension in the Hendrickson Parts Box. Twelve ride-height spacers are also included in the Parts Box: 1-inch and 2-inch versions of all three types (See Figures 5-3 and 5-4).

SERVICE HINT: YOUR ADJUSTABLE LIFT AXLE'S FRAME-WIDTH ADJUSTMENT IS ACHIEVED BY REMOVING OR INSERTING THE "K" SPACERS BETWEEN THE SIDE RAILS AND THE BUSHING SADDLES. THE AIR-SPRINGS ("RIDE BAGS") DO NOT REQUIRE FRAME-WIDTH SPACERS OR RE-POSITIONING; THE DESIGN SPECIFICATIONS ALLOW FOR THESE TOLERANCES.

FIGURE 5-3: RIDE HEIGHT & FRAME WIDTH SPACERS

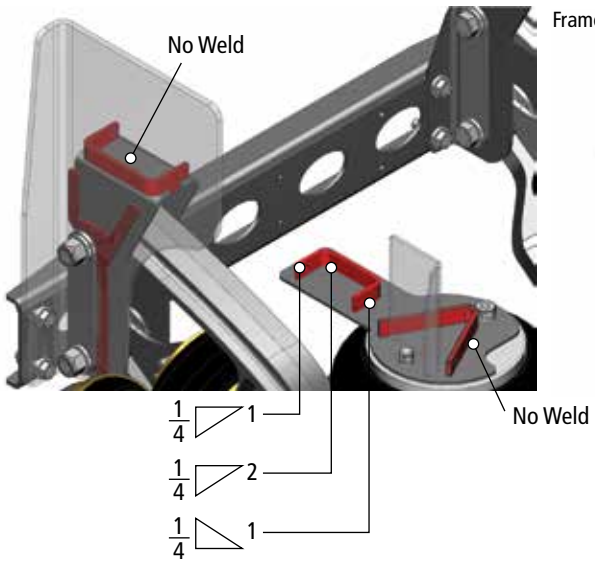
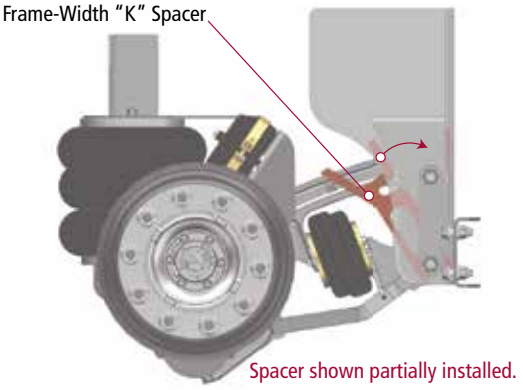


FIGURE 5-4: FRAME WIDTH "K" SPACER



SECTION 6
INSTALLATION

ENGINEERING NOTE: ANY CHANGES TO THE INSTALLATION PROCEDURES INDICATED HEREIN REQUIRE THE WRITTEN PERMISSION OF HENDRICKSON ENGINEERING.

FASTENERS: HENDRICKSON DOES NOT SUPPLY FASTENERS FOR THE INSTALLATION OF YOUR LIFT AXLE TO THE TRUCK RAIL OR TRAILER SUB-FRAME. HENDRICKSON DOES REQUIRE THAT YOU SELECT ¾" 16 SAE GRADE-8 BOLTS, HARDENED FLAT WASHERS, AND IFI* ¾" GRADE-8 PREVAILING-TORQUE TYPE, STEEL HEX FLANGE NUTS. TORQUE SPECIFICATIONS VARY DEPENDING ON THE MANUFACTURER; THEREFORE, THE INSTALLER AND / OR THE OWNER-OPERATOR MUST FOLLOW TORQUE GUIDELINES FOR THE SPECIFIC FASTENERS SELECTED FOR INSTALLATION (*Industrial Fasteners Institute).

TRUCK INSTALLATION

The following instructions cover the installation of Hendrickson COMPOSILITE® EXS lift axles for Truck Applications. This section assumes that the correct lift axle was selected based on your individual requirements, including, but not limited to, ride height, frame width, and driveline clearance, and that all other pre–installation issues were thoroughly reviewed during the ordering process or in review of the pre-installation topics outlined in this publication. Once you are sure that you have selected and received the proper suspension, you may proceed with the installation process.

SERVICE HINT: AN AFTERMARKET LIFT AXLE'S MOUNTING SURFACES MUST BE FLUSH WITH THE BOTTOM OF THE TRUCK FRAME RAILS (OR INSTALLED SPACERS). FAILURE TO COMPLY WITH THIS RULE WILL VOID THE SUSPENSION WARRANTY. OEM INSTALLATIONS ARE EXEMPT FROM THIS REQUIREMENT AS CORRECT OEM-SPECIFIC PRE-DRILLED HOLE PATTERNS IN THE SIDE RAIL AND UPPER AIR-SPRING PLATES ASSURE PROPER INSTALLATION POSITION.

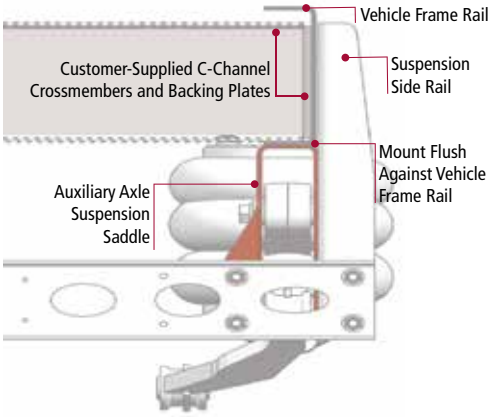
⚠ CAUTION BEFORE PROCEEDING, INSPECT THE TRUCK'S FRAME RAILS FOR ANY OBSTRUCTIONS (FUEL LINES, WIRING HARNESSES, BRAKE LINES, ETC.) THAT MIGHT BE LOCATED ON THE BACK SIDE OF THE TRUCK'S FRAME RAILS. ADJUST ACCORDINGLY BEFORE DRILLING.

1. It is critical that the truck be located on a flat, level surface during the installation process.
2. Set the parking brake and chock the wheels of the truck.
3. Determine the location for the suspension (axle center point) on the truck by following rules stipulated by applicable National / State / Provincial, and / or Local Bridge Formula Weights Regulations.
4. Additionally, determine the location for the suspension on the truck's frame rail according to structural criteria (See Figure 5-2 in the previous section):
   - Vehicle crossmembers must be positioned within five (5) inches fore or aft of the center of the suspension's forward pivot connections and within five (5) inches fore or aft of the center of the air springs.
   - Maintain a minimum of 10 inches between crossmembers.
5. Mark the location for the center line of the axle on the outside of the vehicle's frame rails (Remember: this is determined by applicable National, State, Provincial, and / or Local Bridge Formula Weights Regulations and the location of the truck's crossmembers).
6. Mark the locations on one of the truck's frame rails for the suspension's side rail (hanger) and the upper air spring plate. Verify again that there is no obstruction or interference on the inside of the rail where these mounting locations are marked.

⚠ WARNING FAILURE TO SAFELY RAISE, POSITION, AND CLAMP THE LIFT AXLE INTO PLACE CAN RESULT IN DAMAGE TO THE TRUCK AND LIFT AXLE AND CAN LEAD TO PERSONAL INJURY AND DEATH.

7. Raise and position the auxiliary suspension into place by using as guides the vehicle's crossmembers, the marked axle center line, and the marked locations of the suspension's side rail (hanger) and upper air spring plate.
8. Securely clamp the side rail (hanger) and upper air-spring plate with customer-supplied backing plates to the truck's rail (See Figure 6–2).
9. Next, clamp the other side rail (hanger) and upper air-spring plate with customer-supplied backing plates to the truck's other frame rail while verifying that the suspension is in the desired position, is centered on the truck's frame rails, and that the perpendicularity of the suspension has been verified.

FIGURE 6-2: CUSTOMER-SUPPLIED CROSSMEMBERS & BACKING PLATES



10. Verify again that there are no obstructions on inside of the truck's frame rails.
11. Next, mark the hole locations on the side rails (hangers) and upper air-spring plates by punch–marking the hole centers locations as indicated in Figures 6–3 and 6-4.

TECHNICAL NOTE: FIGURES 6-3 SHOW A SUGGESTED (TYPICAL) BOLT PATTERN; YOUR BOLT PATTERN MAY VARY DUE TO A NUMBER OF STRUCTURAL FACTORS UNIQUE TO YOUR TRUCK'S FRAME RAILS AND OTHER VEHICLE FEATURES.

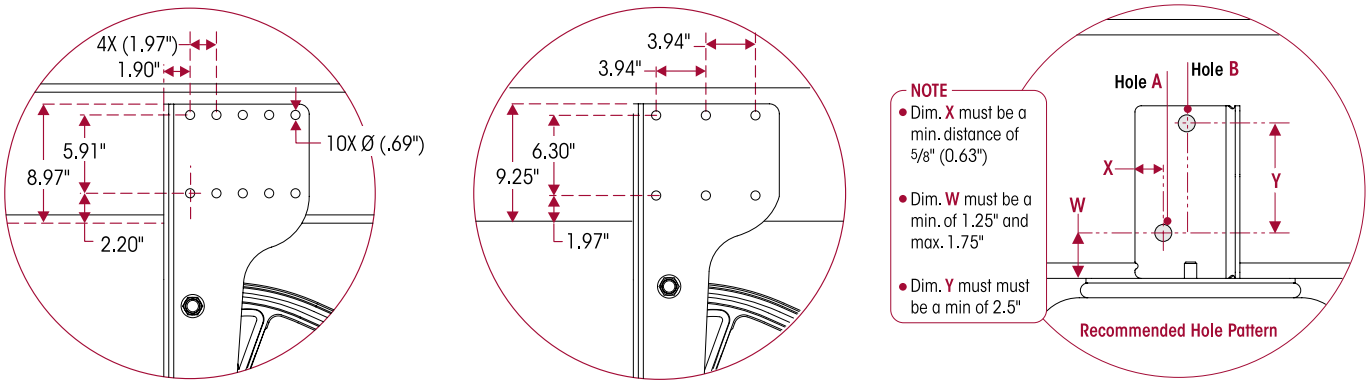
12. Drill* the first $^{13}/_{16}$"diameter hole through the auxiliary suspension's side rail (hanger), the vehicle's frame rail, and the customer-supplied backing plate. Inspect the suspension for proper position and install the first ¾"-16 SAE Grade-8 bolt**, one hardened flat washer** and one IFI (Industrial Fasteners Institute) ¾" Grade-8 prevailing-torque type steel hex flange nut**. "Snug" the hex-flange nut. DO NOT perform final torque yet!

TECHNICAL NOTE: FOR PRE-DRILLED SIDE RAILS AND AIR SPRING MOUNTS, USE ALL BOLT HOLES SUPPLIED WITH CORRECTLY SIZED FASTENERS.

TECHNICAL NOTE: *DO NOT DRILL OR BOLT THROUGH THE BOTTOM FLANGE OF THE SUSPENSION'S SIDE RAIL (HANGER).

TECHNICAL NOTE: **REFERENCED MOUNTING FASTENER SETS ARE NOT SUPPLIED BY HENDRICKSON.

FIGURES 6–3: SUGGESTED BOLT-HOLE PATTERNS



13. Drill the remaining five (5) holes in the side rail (hanger) and two (2) holes in the upper air-spring plate and install the seven (7) remaining fastener sets. "Snug" tighten the hex flange nuts only. DO NOT perform final torque at this time!
14. Again, inspect the suspension for the perpendicularity and parallelism between the vehicle frame rails and the suspension side rails (hangers). Repeat steps for the opposite side of the suspension.
15. Once you are sure of the suspension's perpendicularity and parallelism between the vehicle frame rail and the suspension side rails, torque all 16 mounting bolts on both sides of the suspension according to the specifications of the fastener manufacturer.
16. Once you are sure of the lift axle's perpendicularity and parallelism, torque all 8 mounting bolts on each side of the lift axle (16 total) according to the fastener manufacturer's specifications (Review the note regarding fasteners on page 13).

⚠ WARNING FAILURE TO FOLLOW THESE PROCEDURES AND INSTRUCTIONS REGARDING THE INSTALLATION OF HENDRICKSON EXS AUXILIARY LIFT AXLE SUSPENSIONS CAN RESULT IN PREMATURE FAILURE AND LOSS OF WARRANTY COVERAGE.

FINAL ASSEMBLY CHECKLIST

1. Install any remaining miscellaneous hardware.
2. Verify the torque values on all assembly bolts (See Section 11 Torque Specifications).
3. Verify the torque values on all of the lift axle's mounting fasteners (according to fastener supplier's specifications).
4. Install the air controls and plumbing per Hendrickson or other supplier's instructions (Refer to Hendrickson publication "OM-H817: Air Control Kit Owner's Manual", available online at www.hendrickson-intl.com/Auxiliary).
5. Install wheels and lug nuts; tighten to proper torque (according to fastener supplier's specifications).
6. Ensure there is lubrication in the wheel-end by using the necessary inspection methods. Refer to the Wheel-End Lubrication section in the Technology & Maintenance Council's "Recommended Maintenance Practices Manual" (TMC RP 631).
7. Install the air lines for the lift axle's brakes according to the manufacturer's specifications.
8. Inspect the brakes and adjust if necessary.

NOTE: LIFT AXLES PURCHASED FROM HENDRICKSON SPECIALTY PRODUCTS - AUXILIARY AXLE REQUIRE BRAKE ADJUSTMENT FOR SYSTEMS EQUIPPED WITH AUTOMATIC SLACK ADJUSTERS (REFER TO THE BRAKE MANUFACTURER FOR PROCEDURES).

TRAILER INSTALLATION (BOLT-ON)

ENGINEERING NOTE: ANY CHANGES TO THE INSTALLATION PROCEDURES INDICATED BELOW REQUIRE THE WRITTEN PERMISSION OF HENDRICKSON ENGINEERING. THE FOLLOWING INSTRUCTIONS ARE FOR THE BOLT-ON INSTALLATION OF YOUR HENDRICKSON COMPOSILITE® EXS LIFT AXLE FOR TRAILER APPLICATIONS. THIS SECTION ASSUMES THAT THE CORRECT LIFT AXLE WAS SELECTED BASED ON YOUR INDIVIDUAL REQUIREMENTS, INCLUDING, BUT NOT LIMITED TO, RIDE HEIGHT, FRAME WIDTH, AND DRIVELINE CLEARANCE, AND THAT ALL OTHER PRE-INSTALLATION ISSUES WERE THOROUGHLY REVIEWED DURING THE ORDERING PROCESS OR DURING THE PRE-INSTALLATION PROCESS OUTLINED IN THIS PUBLICATION. ONCE YOU ARE SURE THAT YOU HAVE SELECTED AND RECEIVED THE PROPER LIFT AXLE, YOU MAY PROCEED WITH THE INSTALLATION PROCESS.

FIGURE 6-4: BOLT–ON TRAILER SUSPENSION

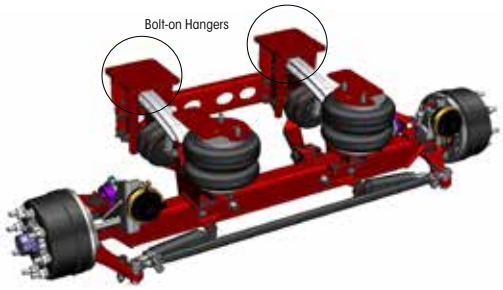
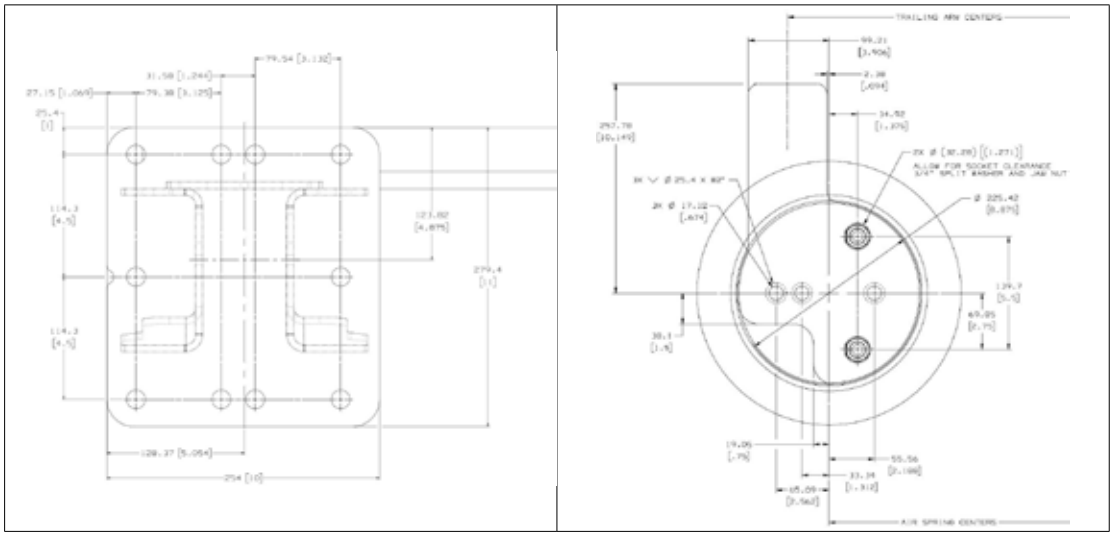


FIGURE 6-5: BOLT-ON TRAILER MOUNTING DETAIL (SEE SECTION 14 FOR LARGER IMAGES)



SERVICE HINT: ON SOME TRAILERS, A SUB-FRAME MAY BE REQUIRED BETWEEN THE LIFT AXLE'S MOUNTING SURFACES AND THE TRAILER'S FRAME TO ACHIEVE THE REQUIRED INSTALLED RIDE HEIGHT. IT IS THE RESPONSIBILITY OF THE LIFT AXLE INSTALLER TO CONSULT WITH THE TRAILER MANUFACTURER TO ENSURE THAT THE TRAILER HAS AN ADEQUATE SUB-FRAME DESIGN AND CROSSMEMBER SUPPORT IN THE MOUNTING AREA FOR THE LIFT AXLE.

SERVICE HINT: THE TRAILER'S RAILS / SUB-FRAME MUST ACCOMMODATE THE BOLT PATTERN OF THE LIFT AXLE'S MOUNTING SURFACES: MOUNTING PADS AND UPPER AIR-SPRING PLATES (SEE FIGURE 6-5).

⚠ CAUTION

INSPECT TRAILER FRAME AND CROSSMEMBERS FOR ANY OBSTRUCTION (WIRING HARNESSES, BRAKE LINES, ETC.) THAT MIGHT INTERFERE WITH THE INSTALLATION PROCESS. ADJUST ACCORDINGLY BEFORE INSTALLATION.

1. It is critical that the trailer be located on a flat, level surface during the installation process.
2. Chock the wheels of the trailer.
3. Determine the location for the lift axle (axle spindle center point) on the trailer by following rules stipulated by applicable National / State / Provincial, and / or Local Bridge Formula Weights Regulations.
4. Additionally, determine the location for the lift axle on the trailer's frame rail according to these structural criteria:
   - Trailer crossmembers must be positioned within five (5) inches fore or aft of the center of the suspension's forward pivot connections and within five (5) inches fore or aft of the center of the air springs.
   - Maintain a minimum of 10 inches between crossmembers.

5. Mark the location of the center line of the axle on the outside of the trailer's frame rail.
6. Refer to Hendrickson Publication TP-H825 for lift axle dimensions to assist with determining the boundary locations of the mounting surfaces.
7. Allowances should be made at this time for correcting any interferences that may occur between the lift axle's mounting surfaces and any existing bolts or brackets (located in the marked boundary areas) on the trailer's frame rails or sub-frame.

⚠ WARNING

FAILURE TO SAFELY RAISE, POSITION, AND CLAMP THE LIFT AXLE INTO PLACE CAN RESULT IN DAMAGE TO THE TRAILER AND LIFT AXLE AND CAN LEAD TO PERSONAL INJURY AND DEATH.

8. Raise and position the lift axle into place by using the trailer's crossmembers, the marked axle center line, and the marked boundary areas as locators.
9. Verify that the lift axle is centered side-to-side on the trailer's rails / sub-frame! This is a critical difference between trailer and truck application installation procedures. Whereas the truck's rails serve as a default centering guide, lift axles on trailers must be centered on the rails / sub-frame without this built-in "guide". You must verify as well that the lift axle is parallel and perpendicular to the trailer's rails and / or sub-frame.
10. Clamp the lift axle's mounting surfaces to the trailer's rails and / or sub-frame.
11. Mark the locations for the centers of the mounting bolt holes.
12. Verify accuracy of the hole locations and then punch–mark the centers for the holes.
13. Drill the first 13/16"-diameter hole through the auxiliary suspension's mounting plate and the trailer's frame rail. Inspect the suspension for proper position and install the first ¾" 16 SAE Grade-8 bolt*, one hardened, flat washer* and one IFI (Industrial Fasteners Institute) ¾" Grade-8 prevailing-torque type steel hex-flange nut*. "Snug"-tighten the hex-flange nut. Do not perform final torque at this time!

NOTE: *THESE REQUIRED MOUNTING FASTENERS ARE NOT SUPPLIED BY HENDRICKSON.

14. Drill the remaining holes and install the remaining fastener sets. "Snug" tighten the hex-flange nuts. Do not perform final torque at this time!
15. Inspect the opposite side of the suspension for perpendicularity and parallelism between the trailer's frame rail and the suspension. Repeat steps for the opposite side of the suspension.
16. Once you are sure of the suspension's perpendicularity and parallelism between the trailer's frame rail and the suspension, torque all mounting bolts on both sides of the suspension according to the fastener manufacturer's specifications.

FINAL ASSEMBLY CHECKLIST

1. Install any remaining miscellaneous hardware.
2. Verify the torque values on all suspension mounting bolts and assembly bolts (Refer to Section 11 Torque Specifications of this publication).
3. Install the air controls and plumbing per Hendrickson or other supplier's instructions (Refer to Hendrickson publication "OM H817: Air Control Kit Owner's Manual", available online at www.hendrickson-intl.com).
4. Install wheels and lug nuts, tighten to proper torque. Refer to the Section 11 Torque Specification of this publication.
5. Ensure there is lubrication in the wheel-end by using the necessary inspection methods. Refer to the Wheel-End Lubrication section in the Technology & Maintenance Council's "Recommended Maintenance Practices Manual" (TMC RP 631).
6. Inspect the brakes and adjust if necessary.

NOTE: SUSPENSIONS PURCHASED FROM HENDRICKSON SPECIALTY PRODUCTS - AUXILIARY AXLE REQUIRE BRAKE ADJUSTMENT FOR SYSTEMS EQUIPPED WITH AUTOMATIC SLACK ADJUSTERS (REFER TO THE BRAKE MANUFACTURER FOR PROCEDURES).

TRAILER INSTALLATION (WELD-ON)

ENGINEERING NOTE: ANY CHANGES TO THE INSTALLATION PROCEDURES INDICATED BELOW REQUIRE THE WRITTEN PERMISSION OF HENDRICKSON ENGINEERING.

The following instructions are for the WELD-ON installation of your Hendrickson COMPOSILITE® EXS suspension for Trailer Applications. This section assumes that the correct auxiliary lift axle suspension system was selected based on your individual requirements, including ride height, frame width, and driveline clearance, and that all other pre-installation issues were thoroughly reviewed during the ordering process or during the pre-installation process outlined in this publication. Once you are sure that you have selected and received the proper suspension, you may proceed with the installation process.

FIGURE 6–6: WELD-ON TRAILER SUSPENSION

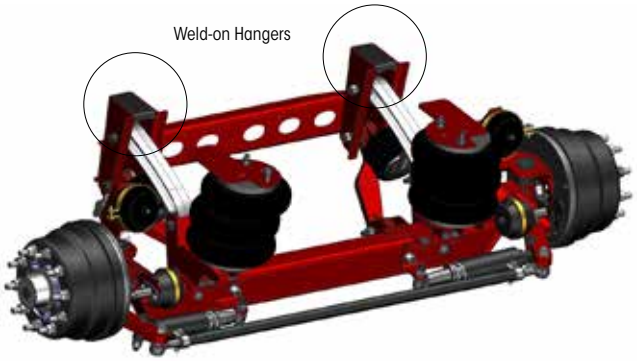
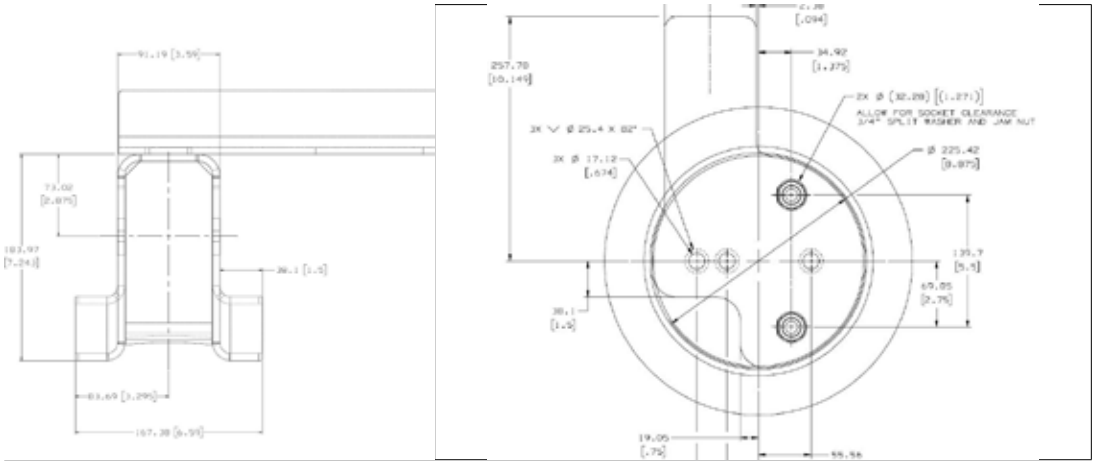


FIGURE 6-7: WELD-ON TRAILER MOUNTING DETAIL (SEE SECTION 14 FOR LARGER IMAGES)



SERVICE HINT: ON SOME TRAILERS, A SUB-FRAME MAY BE REQUIRED BETWEEN THE LIFT AXLE'S MOUNTING SURFACES AND THE TRAILER'S FRAME TO ACHIEVE THE REQUIRED INSTALLED RIDE HEIGHT. IT IS THE RESPONSIBILITY OF THE LIFT AXLE INSTALLER TO CONSULT WITH THE TRAILER MANUFACTURER TO ENSURE THAT THE TRAILER HAS AN ADEQUATE SUB-FRAME DESIGN AND CROSSMEMBER SUPPORT IN THE MOUNTING AREA FOR THE LIFT AXLE.

SERVICE HINT: THE TRAILER'S RAILS / SUB-FRAME MUST ACCOMMODATE THE LIFT AXLE'S WELD-ON MOUNTING SURFACES: MOUNTING PADS AND UPPER AIR-SPRING PLATES (SEE FIGURE 6-7).

⚠ CAUTION

THE TRAILER'S RAILS / SUB-FRAME MUST ACCOMMODATE THE LIFT AXLE'S WELD-ON MOUNTING SURFACES: MOUNTING PADS AND UPPER AIR SPRING PLATES (SEE FIGURE 6-7).

1. It is critical that the trailer be located on a flat, level surface during the installation process.
2. Chock the wheels of the trailer.
3. Determine the location for the suspension (axle center point) on the trailer by following rules stipulated by applicable National / State / Provincial, and / or Local Bridge Formula Weights Regulations.

4. Additionally, determine the location for the lift axle on the trailer's frame rails / sub-frame according to these structural criteria:
   - Trailer crossmembers must be positioned within five (5) inches fore or aft of the center of the lift axle's forward pivot connections and within five (5) inches fore or aft of the center of the air springs.
   - Maintain a minimum of 10 inches between crossmembers.
5. Mark the location of the center line of the axle spindle on the outside of the trailer's frame rail.
6. Refer to Hendrickson Technical Publication TP-H825 for lift axle dimensions to assist with determining the boundary locations of the mounting surfaces.
7. Allowances should be made at this time for correcting any interferences that may occur between the lift axle's mounting surfaces and any existing bolts or brackets.

⚠ WARNING FAILURE TO SAFELY RAISE, POSITION, AND CLAMP THE LIFT AXLE INTO PLACE CAN RESULT IN DAMAGE TO THE TRAILER AND LIFT AXLE AND CAN LEAD TO PERSONAL INJURY AND DEATH.

8. Raise and position the auxiliary lift axle suspension into place by using the trailer's crossmembers, the marked axle center line, and the marked boundary areas as locators.
9. Verify that the suspension is centered on the trailer's frame.
10. Clamp the suspension's mounting surfaces to the trailer's rails / subframe.
11. Mark the locations for mounting surfaces.
12. Inspect the opposite side of the suspension for perpendicularity and parallelism between the trailer's frame rail / subframe and the suspension. Repeat steps for the opposite side of the suspension.
13. Once you are sure of the suspension's proper position, its perpendicularity and parallelism, weld the suspension's weld mounts to the frame / subframe.

FINAL ASSEMBLY CHECKLIST

1. Install any remaining miscellaneous hardware.
2. Verify the torque values on all suspension mounting bolts and assembly bolts (Refer to Section 11 Torque Specifications).
3. Install the air controls and plumbing per Hendrickson or other supplier’s instructions (Refer to Hendrickson publication "OM H817: Air Control Kit Owner's Manual", available online at www.hendrickson-intl.com).
4. Install wheels and lug nuts, tighten to proper torque (Refer to the Section 11 Torque Specifications).
5. Ensure there is lubrication in the wheel-end by using the necessary inspection methods. Refer to the Technology & Maintenance Council's Wheel-End Lubrication section in the "Recommended Maintenance Practices Manual" (TMC RP 631).
6. Install the air lines for the lift axle's brakes according to the brake manufacturer’s specifications and instructions. Contact Hendrickson Customer Service with any questions.
7. Inspect the brakes and adjust as needed.

NOTE: SUSPENSIONS PURCHASED FROM HENDRICKSON SPECIALTY PRODUCTS - AUXILIARY AXLE REQUIRE BRAKE ADJUSTMENT FOR SYSTEMS EQUIPPED WITH AUTOMATIC SLACK ADJUSTERS (REFER TO THE BRAKE MANUFACTURER FOR PROCEDURES).

SECTION 7

LIFT AXLE OPERATION

INSIDE/OUTSIDE-MOUNTED AIR CONTROL KITS

1. If vehicle is already running, please proceed to the appropriate section below.
2. Set the vehicle's parking brake.
3. Turn vehicle's ignition to ON position.
4. Press ignition START switch and release when engine is started.
5. Allow the vehicle to idle until the vehicle's air system pressure has reached the compressor cut-out point (typically 120 psi).

RAISING THE LIFT AXLE

1. Where are the lift axle controls mounted?
   - Inside the vehicle cab: move the control panel mechanism (pull to lift) to the UP position.
   - Outside the vehicle cab: ensure vehicle is stopped and parking brake is set. Exit vehicle, go to and open air control enclosure. Move the control panel mechanism to the UP position.
2. Visually confirm that the lift axle is lifting.

NOTE: AIR SYSTEM PRESSURE MAY DROP DURING SUSPENSION **LIFTING** PROCESS.

3. Lift axle should be completely lifted when air system pressure returns to the air compressor cut-out point (typically 120 psi).

LOWERING THE LIFT AXLE

⚠ CAUTION

DO NOT LOWER LIFT AXLE WHILE VEHICLE IS MOVING IN REVERSE OR TRAVELING MORE THAN 15 MPH. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE.

1. Where are the lift axle controls mounted?
   - Inside the vehicle cab: move the control panel mechanism (push to lower) to the "axle down" position.
   - Outside the vehicle cab: ensure the vehicle is stopped and parking brake is set. Exit vehicle, go to and open air control enclosure. Move the control panel mechanism to the "axle down" position.
2. Using the regulator, adjust air system pressure on the gauge to appropriate air pressure for vehicle load conditions.

NOTE: AIR SYSTEM PRESSURE MAY DROP DURING SUSPENSION **LOWERING** PROCESS.

3. Lift axle should be completely lowered and supporting pre-determined load when air system pressure returns to the air compressor cut-out point (typically 120 psi).

NAVIGATING A 90 DEGREE CURVE OR TURN

⚠ CAUTION

TO MINIMIZE PREMATURE TIRE WEAR OR POSSIBLE DAMAGE TO LIFT AXLE COMPONENTS, THE LIFT AXLE MAY BE RAISED TO THE UP POSITION PRIOR TO NAVIGATING A 90-DEGREE OR TIGHTER CURVE OR TURN. COMPLY WITH ALL NATIONAL / STATE / PROVINCIAL AND / OR LOCAL WEIGHT, DIMENSION AND CONFIGURATION REGULATIONS UNDER LOADED AND UNLOADED CONDITIONS.

SECTION 8
AIR PRESSURE LOAD INFORMATION

The air pressure load chart(s) on the following pages are intended to assist vehicle owners, operators, and fleet managers (i) to estimate the lift axle air system pressure necessary to support a particular target lift axle load, and (ii) to meet applicable National / State / Provincial and / or local vehicle weight regulations.

The air pressure load chart(s) list estimated lift axle air system pressure requirements:

1. Ride air-spring extension measurements (refer to Figure 8-1);
2. Axle lift measurements (refer to Figure 8-1); and
3. Target lift axle loads.

The estimated lift axle air system pressure requirements listed in the air pressure load chart(s) are applicable to a range of lift axle ride heights and tire sizes intended for Hendrickson non-steerable lift axle applications. The actual lift axle air system pressure needed to support a particular target lift axle load may vary depending upon the above-referenced parameters, as well as vehicle and lift axle configuration, operation, payload, service and other factors. If necessary, vehicle operators should use appropriate truck / trailer weight scale equipment to measure actual lift axle loads.

NOTE: ANY/ALL PENALTIES INCURRED FROM IMPROPERLY LOADED VEHICLES OR IMPROPERLY INSTALLED, MODIFIED, OPERATED, SERVICED OR MAINTAINED LIFT AXLE SYSTEMS ARE THE SOLE RESPONSIBILITY OF THE VEHICLE OWNER, OPERATOR, AND / OR FLEET MANAGER. HENDRICKSON AUXILIARY AXLE SYSTEMS SHALL NOT BE RESPONSIBLE FOR ANY SUCH PENALTIES OR ANY DAMAGE OR OTHER ADVERSE EFFECTS ON VEHICLE AND/OR LIFT AXLE FORM, FIT, OR FUNCTION DUE TO ANY SUCH IMPROPER ACTIVITY.

NOTE: IT IS THE RESPONSIBILITY OF THE VEHICLE OWNER, OPERATOR, AND / OR FLEET MANAGER TO ENSURE THE VEHICLE AND LIFT AXLE(S) COMPLY WITH ALL APPLICABLE NATIONAL / STATE / PROVINCIAL AND / OR LOCAL WEIGHT, DIMENSION AND CONFIGURATION REGULATIONS UNDER LOADED AND UNLOADED CONDITIONS. CONSULT YOUR APPROPRIATE REGULATORY AND / OR LAW ENFORCEMENT AUTHORITIES TO DETERMINE HOW SUCH REGULATIONS MAY (I) VARY BY OPERATING LOCATION, AND (II) APPLY TO YOUR PARTICULAR VEHICLE, LIFT AXLE(S), AND APPLICATIONS.

⚠ WARNING PRIOR TO AND DURING DEFLATION AND INFLATION OF THE AIR SUSPENSION SYSTEM, ENSURE THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR FROM UNDER THE VEHICLE AND AROUND THE SERVICE AREA, FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE.

FIGURE 8–1

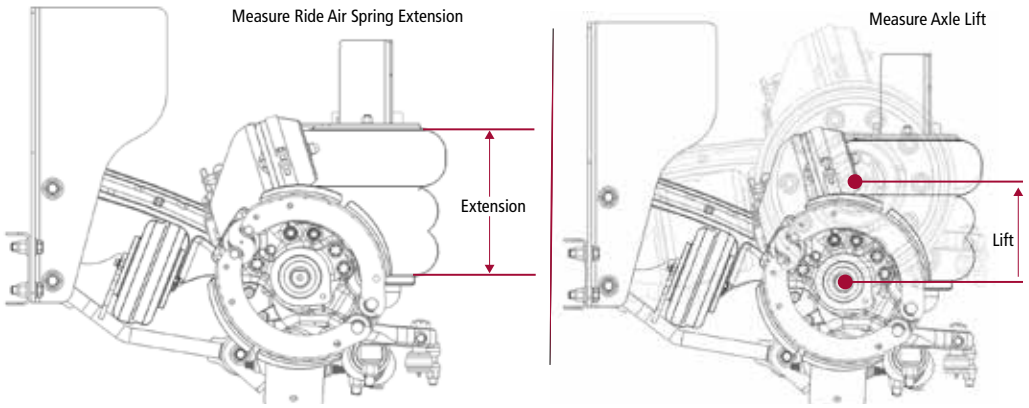


TABLE 8-1: COMPOSILITE EXS 8K &10K: TRUCK, TRAILER (BOLT-ON & WELD-ON)

	*RIDE AIR SPRING EXTENSION (in inches)	10.5"	11.0"	11.5"	12.0"	12.5"	13.0"	13.5"	14.0"	14.5"	
	*AXLE LIFT (in inches)	6.0"	6.5"	7.0"	7.5"	8.0"	8.5"	9.0"	9.5"	10.0"	
AXLE LOAD (in pounds)	5,000	31	32	33	34	35	37	39	41	44	ESTIMATED AIR SYSTEM PRESSURE REQUIREMENTS (in PSI)
	5,500	34	35	37	38	40	41	43	46	49	
	6,000	38	39	41	42	44	46	48	51	54	
	6,500	42	43	44	46	48	50	52	55	59	
	7,000	45	47	48	50	52	54	57	60	64	
	7,500	49	50	52	54	56	59	61	65	68	
	8,000	53	54	56	58	60	63	66	69	73	
	8,500	56	58	60	62	64	67	70	74	78	
	9,000	60	62	64	66	68	71	74	78	82	
	9,500	63	65	67	70	72	75	79	83	87	
	10,000	67	69	71	74	76	79	83	87	91	

TABLE 8-2: COMPOSILITE EXS 13K: TRUCK, TRAILER (BOLT-ON & WELD-ON)

	*RIDE AIR SPRING EXTENSION (in inches)	10.5"	11.0"	11.5"	12.0"	12.5"	13.0"	13.5"	14.0"	14.5"	
	*AXLE LIFT (in inches)	6.0"	6.5"	7.0"	7.5"	8.0"	8.5"	9.0"	9.5"	10.0"	
AXLE LOAD (in pounds)	5,000	31	32	33	35	36	38	40	42	45	ESTIMATED AIR SYSTEM PRESSURE REQUIREMENTS (in PSI)
	5,500	35	36	37	39	40	42	44	47	50	
	6,000	39	40	41	43	44	46	49	51	55	
	6,500	42	44	45	47	49	51	53	56	59	
	7,000	46	47	49	51	53	55	58	61	64	
	7,500	49	51	53	55	57	59	62	65	69	
	8,000	53	55	56	59	61	63	66	70	74	
	8,500	57	58	60	63	65	68	71	74	78	
	9,000	60	62	64	66	69	72	75	79	83	
	9,500	64	66	68	70	73	76	79	83	88	
	10,000	67	69	72	74	77	80	84	88	92	
	10,500	71	73	75	78	81	84	88	92	97	
	11,000	75	77	79	82	85	88	92	96	101	
	11,500	78	80	83	86	89	92	96	101	106	
	12,000	82	84	87	90	93	96	100	105	110	
	12,500	85	88	90	93	97	100	104	109	114	
	13,000	89	91	94	97	101	104	109	113	119	
	13,500	92	95	98	101	104	108	113	118	123	

TABLE 8-3: COMPOSILITE EXS 20K: TRUCK, TRAILER (BOLT-ON & WELD-ON)

	*RIDE AIR SPRING EXTENSION (in inches)	10.5"	11.0"	11.5"	12.0"	12.5"	13.0"	13.5"	14.0"	14.5"	
	*AXLE LIFT (in inches)	6.0"	6.5"	7.0"	7.5"	8.0"	8.5"	9.0"	9.5"	10.0"	
AXLE LOAD (in pounds)	6,000	22	23	23	24	25	26	27	28	30	ESTIMATED AIR SYSTEM PRESSURE REQUIREMENTS (in PSI)
	7,000	27	28	28	29	30	31	32	34	37	
	8,000	31	33	33	34	35	37	38	40	43	
	9,000	36	38	38	39	40	42	44	46	49	
	10,000	41	43	43	44	46	48	49	52	56	
	11,000	45	47	47	49	51	53	55	58	62	
	12,000	50	52	52	54	56	58	61	64	68	
	13,000	55	57	57	59	61	64	66	70	75	
	14,000	59	62	62	64	66	69	72	76	81	
	15,000	64	67	67	69	72	75	78	82	87	
	16,000	68	72	72	74	77	80	83	88	94	
	17,000	73	77	77	79	82	86	89	94	100	
	18,000	78	82	81	84	87	91	95	100	106	
	19,000	82	86	86	89	92	97	100	106	112	

SECTION 9
PREVENTIVE MAINTENANCE

DAILY/PRE-TRIP OPERATOR INSPECTION

Daily (and before each trip) inspect all lift axle components for proper operating condition and proper installation to the truck / trailer frame. This essential Daily / Pre-Trip Operator Inspection must also include a visual inspection of all wheel seals and gaskets for leaks, a verification of proper oil level in the hubs (if applicable), inspection of all lift and ride air-springs for wear, and inspection of all tires for proper inflation and abnormal wear patterns. Identify and repair / replace any loose, damaged or improperly installed components.

NOTE: REPLACE ANY SAFETY DECALS THAT ARE FADED, TORN, MISSING, ILLEGIBLE, OR OTHERWISE DAMAGED. CONTACT HENDRICKSON TO ORDER REPLACEMENT LABELS.

GENERAL INSPECTION

Following appropriate inspection procedures is important to help ensure the proper maintenance and operation of the lift axle and that component parts function to their highest efficiency.

- Fasteners: inspect for any loose or damaged fasteners on the entire lift axle. Make sure all fasteners are tightened to the specified torque. Refer to the Torque Specifications Section of this publication if fasteners are supplied by Hendrickson. For non-Hendrickson fasteners, refer to the vehicle manufacturer. Use a calibrated torque wrench to check torque in a tightening direction. As soon as the fastener starts to move, record the torque. Correct the torque if necessary. Replace any worn or damaged fasteners.
- Air springs; visually inspect lift axle for any debris rubbing against air springs or signs of chaffing. Clear debris and/or replace air springs with Hendrickson Genuine Parts as needed.

It is important to conduct appropriate inspection procedures regularly to help ensure the proper operation and service life of the lift axle and its components. Hendrickson recommends that your COMPOSILITE® EXS lift axle be inspected upon receipt (pre–installation), at the first in–service inspection interval, and at regular preventive maintenance intervals thereafter. Inspection must include the following items and other components referenced in this section.

TABLE 9-1: HENDRICKSON-RECOMMENDED INSPECTION INTERVALS

COMPONENTS / SUB-ASSEMBLIES	FIRST IN-SERVICE INSPECTION	PREVENTIVE MAINTENANCE
Wheel Bearings: verify end play is between 0.001" and 0.005". Adjust and lubricate as required	Within the first 3,000 Miles	8,000 Miles or every 3 months, whichever comes first
Tie Rod Ends: inspect for leaking and lubricate as required		10,000 Miles or every 6 months, whichever comes first
Kingpin Bushings: check for wear and grease as required		10,000 Miles or every 6 months, whichever comes first
Pivot Connections: verify torque		5,000 Miles or as needed
Stabilizers: check for leaking and adequate return		
Brake Assembly Components: inspect for leaks and component wear	3,000 Miles	20,000 Miles or every 10 months, whichever comes first

COMPONENT INSPECTION

- Air Spring — Look for chaffing or any signs of spring or component damage
- Fasteners — Look for any loose or damaged fasteners on the entire axle assembly. Ensure all fasteners are tightened to the specified torque. Use a calibrated torque wrench to check torque in a tightening direction. As soon as the fastener starts to move, record the torque. Correct the torque if necessary. Replace any worn or damaged fasteners.
- Operation — All steering components must move freely through the full range of motion from axle stop to axle stop
- Steering pivot points — Check for looseness at all pivot points. Inspect and lubricate all pivot points
- Tire wear — Inspect tires for wear patterns that may indicate suspension damage or misalignment. See Tire Inspection in this section
- Wear and damage — Inspect all parts of axle for wear and damage. Look for bent or cracked parts. Replace all worn or damaged parts

See vehicle manufacturer's applicable publications for other preventive maintenance requirements.

NOTE: DEFECTIVE COMPONENTS ARE TO BE RETURNED TO THE HENDRICKSON CUSTOMER SERVICE DEPARTMENT IN EXCHANGE FOR REPLACEMENT COMPONENTS, PROVIDED PRODUCT WARRANTY CONDITIONS ARE MET.

LUBRICATION INTERVALS

Regular lubrication intervals should be followed to help prevent premature wear to the kingpin bushings and tie rod ends. See Table 9-2:

TABLE 9-2: GREASING AND LUBRICATION SPECIFICATIONS

COMPONENT	GREASING INTERVAL	GREASE
Kingpin Break-in	5,000 miles or as needed	NLGI-1 or NLGI-2
Kingpin Bushing	10,000 miles or every 6 months	
Taper Tie Rod End		

KINGPIN LUBRICATION

On Hendrickson COMPOSILITE EXS suspensions, the kingpin grease fittings are located on the top and bottom of the kingpin grease caps.

1. Prior to greasing the kingpins, the axle must be on the ground in a loaded condition.
2. Clean off all the grease fittings with a clean shop towel prior to lubrication.

FIGURE 9-1

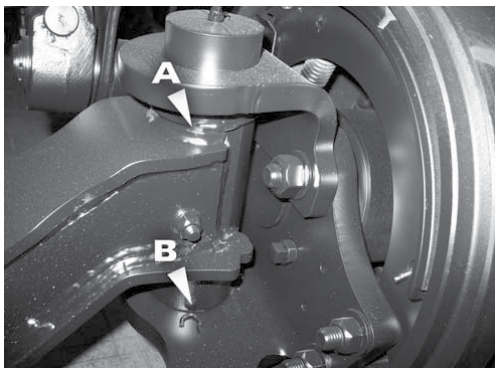
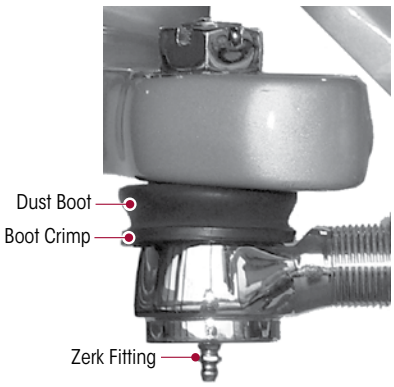


FIGURE 9-2



3. Lubricate the kingpins through the grease fittings on the top and bottom of the steering knuckle.
4. Force the required lubricant into the upper and lower kingpin grease fittings until new lubricant flows from locations A and B (see Figure 9-1).

NOTE: GREASING AT THE LOWER ZERK SHOULD PURGE GREASE FROM THE THRUST BEARING SHELL.

TORQUE SPECIFICATIONS

***HENDRICKSON-RECOMMENDED TORQUE SPECIFICATIONS (ORDERED BY SIZE OF FASTENER):**

NO.	DESCRIPTION	SIZE (in inches)	TORQUE VALUE (in foot pounds)
1	Air Spring Bolt (Lower)	3/8"	28 ± 2
2	Air Spring Nut (Upper)	1/2"	48 ± 2
3	Air Spring Bolt (Lower)	1/2"	28 ± 2
4	Shift Chamber Attachment	7/16"	45 ± 5
5	Shift Chamber Yoke Attachment	7/16"	80 ± 10
6	Brake Bolts	9/16"	100 ± 10
7	Bolt-on Brake Attachments	5/8"	170 ± 10
8	Compliant Tie Rod (CTR) Adjustment	5/8"	185 ± 5
9	Heavy-duty (HD) Tie Rod Adjustment	5/8"	185 ± 5
10	Round Tube Tie Rod Adjustment	5/8"	48 ± 2
11	Shift Chamber Attachment	5/8"	140 ± 10
12	Shift Chamber Yoke Attachment	5/8"	40 ± 5
13	Suspension Crossmember Bolt	5/8"	170 ± 10
14	Air Spring Nut (Upper)	3/4"	48 ± 2
15	Stabilizer Shock Bolt	3/4"	100 ± 25
16	Compliant Tie Rod (CTR) Attachment	7/8"	450 ± 25
17	Heavy Duty (HD) Compliant Tie Rod Attachment	7/8"	450 ± 25
18	Pivot Bolt Connections	7/8"	On the nut: 575 / On the bolt: 475
19	Round Tube Tie Rod Attachment	7/8"	153 ± 27
20	Radius Rod Bolt	7/8"	450 ± 25
21	U-bolts	7/8"	473 ± 22
22	Turn Angle Jam Nut	1/2"	25 ± 5
23	Frame Attachment Bolts	3/4"	Note[1] below
24	Wheel Flange Nuts	M22 x 1.5	Note[2] below

*IMPORTANT: TORQUE VALUES SHOWN ABOVE APPLY ONLY TO HENDRICKSON-SUPPLIED FASTENERS. USE ONLY HENDRICKSON GENUINE PARTS WHEN SERVICING THIS SUSPENSION SYSTEM. CONTACT HENDRICKSON CUSTOMER SERVICE FOR ASSISTANCE WITH ORDERING COMPOSILITE® EXS PARTS.

NOTE[1]: HENDRICKSON DOES NOT SUPPLY FASTENERS FOR THE INSTALLATION OF YOUR LIFT AXLE TO THE TRUCK RAIL OR TRAILER SUB-FRAME. HENDRICKSON DOES REQUIRE THAT YOU SELECT 3/4" 16 SAE GRADE–8 BOLTS, HARDENED FLAT WASHERS, AND IFI (INDUSTRIAL FASTENERS INSTITUTE) 3/4" GRADE–8 PREVAILING–TORQUE TYPE, STEEL HEX FLANGE NUTS. TORQUE SPECIFICATIONS VARY DEPENDING ON THE MANUFACTURER; THEREFORE, THE INSTALLER AND / OR THE OWNER-OPERATOR MUST FOLLOW TORQUE GUIDELINES FOR THE SPECIFIC FASTENERS SELECTED FOR INSTALLATION.

NOTE[2]: CONTACT WHEEL MANUFACTURER FOR TORQUE SPECIFICATIONS.

TIE ROD END LUBRICATION

LUBRICATION PROCEDURE

1. Wipe the grease zerk and grease gun tip with clean shop towels.
2. Wipe the seal / boot clean with shop towels.
3. Attach a grease gun to the grease zerk. Either a hand or pneumatic grease gun is acceptable. If air operated grease gun is used, system air pressure should not exceed 150 psi (1035 kPa).

⚠ CAUTION

EXCEEDING THE MAXIMUM AIR PRESSURE TO THE GREASE ZERKS CAN CAUSE DAMAGE TO THE DUST BOOT AND COMPONENT FAILURE.

4. Dirt, water, and discolored old grease should flow from the relief vents or purge holes near the boot crimp or bellows area (see Figure 9-2). Continue to purge grease until fresh grease flows from the purge area.
5. If the tie rod end is designed for lube service and it will not accept grease proceed as follows:
   a. Remove the grease zerk.
   b. Inspect the threaded grease zerk hole in the tie rod end and remove any obstructions.
   c. Install a new grease zerk.
   d. Continue the lubrication procedure.
   e. If the tie rod end will not accept grease following this procedure it will be necessary to replace the tie rod end, see Tie Rod End replacement in the Component Replacement Section of this publication.
6. Apply grease until all the old grease is purged from the boot.

TIE ROD STRUCTURAL INSPECTION

Periodic inspection of the lift axle, including its tie rod, is strongly recommended. Cleaning the lift axle and tie rod prior to the inspection will improve the ability to see the condition of all structural components.

INSPECTION PROCEDURE

Before beginning this inspection procedure, the entire system must be unloaded.

⚠ CAUTION

DO NOT GREASE THE TIE ROD ASSEMBLY BEFORE PERFORMING THE INSPECTION. DOING SO CAN INHIBIT EFFORTS TO DETERMINE ACTUAL WEAR.

⚠ CAUTION

REPLACE THE ENTIRE TIE ROD END IF THE BOOT IS TORN OR MISSING; FAILURE TO DO SO CAN CAUSE PREMATURE WEAR OF THE TIE ROD END.

1. Chock the rear wheels of vehicle.
2. Set the parking brake.
3. Raise the lift axle and support with jack stands.
4. Check that the boots are in place and completely installed over the tie rod ends.
5. Check for cracking or tears in the boots. Also check the boot seals for damage. Replace the entire tie rod end if the boot is damaged.

⚠ WARNING

THE CORRECT COTTER PIN MUST BE INSTALLED THROUGH THE TIE ROD END WITH THE CASTLE NUT TIGHTENED TO THE PROPER TORQUE SPECIFICATION IN ORDER TO SECURELY ATTACH THE TIE ROD. A MISSING COTTER PIN CAN CAUSE THE TIE ROD END NUT TO BECOME LOOSE AND CAUSE ADVERSE AUXILIARY AXLE PERFORMANCE.

6. Check that the tie rod end nut is installed and secured with a cotter pin. If the cotter pin is missing, check the nut torque specification and then install a new cotter pin. Always tighten the castle nut to specified torque when setting the cotter pin. DO NOT back off the nut to insert cotter pin.

⚠ WARNING

IT IS CRITICAL TO CHECK THE 5/8" TIE ROD CLAMP BOLT HEAD LOCATION TO VERIFY THE CLAMP FASTENERS HAVE SUFFICIENT CLEARANCE AWAY FROM THE LOWER STABILIZER MOUNT AT FULL WHEEL CUT. THE FASTENERS MUST NOT CONTACT THE LOWER STABILIZER MOUNT. FAILURE TO DO SO CAN CAUSE ONE OR MORE COMPONENTS TO FAIL CAUSING ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

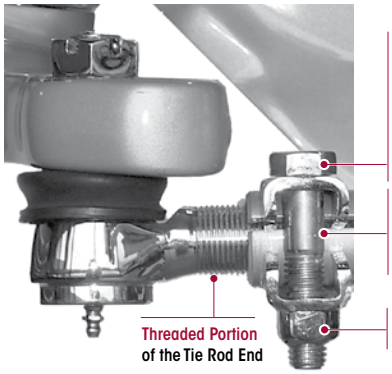
7. Verify the 5/8" tie rod clamp bolt head does not contact the lower shock mount at full wheel cut, see Figure 9-3.

⚠ WARNING

THE THREADED PORTION OF THE TIE ROD END MUST EXTEND PAST THE SLOTS INTO THE TIE ROD CROSS TUBE, SEE FIGURE 10–3. FAILURE TO DO SO CAN CAUSE COMPONENT DAMAGE, ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

8. Check that the tie rod end is threaded correctly into the tie rod cross tube and is engaged deeper than the end of the tie rod cross tube slot. The tie rod end must be visible the entire length of the tie rod cross tube slot (see Figure 9–3).
9. Check that grease zerks are installed. Replace a damaged grease zerk with a new one.

FIGURE 9-3



⚠ CAUTION

DO NOT USE THE FOLLOWING ITEMS OR METHODS TO CHECK FOR MOVEMENT OF THE TIE ROD ASSEMBLY, WHICH CAN CAUSE DAMAGE TO COMPONENTS:

- A CROW BAR, PICKLE FORK, OR 2 x 4
- ANYTHING OTHER THAN HANDS USED TO GRASP AND ROTATE THE TIE ROD CROSS–TUBE ASSEMBLY CAN RESULT IN DAMAGE TO THE TIE ROD CROSS TUBE
- EXCESSIVE PRESSURE OR FORCE APPLIED TO THE TIE ROD ENDS OR THE JOINTS OF THE ASSEMBLY

10. By hand rotate the tie rod cross tube toward the front of the vehicle and then toward the rear. After rotating, center the tie rod cross tube. If the tie rod cross tube will not rotate in either direction, replace both tie rod ends.

FIGURE 9-4

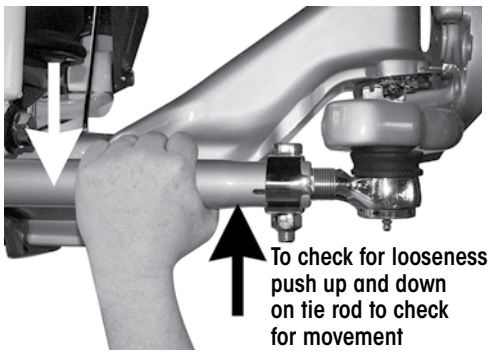


FIGURE 9-5

11. Position yourself directly below the tie rod end. Using both hands, grab the assembly end as close to the tie rod end as possible (no more than 6" or 152.4 mm). Apply hand pressure with reasonable human effort vertically up and down in a push-pull motion several times (using approximately 50 to 100 pounds of force). Check for any movement or looseness at both tie rod end locations (See Figure 9-4).
12. If there is any movement in the tie rod assembly, install a magnetic based dial indicator on the Ackermann arm (See Figure 9-5).
13. Set the dial indicator to zero.
14. Apply hand pressure with reasonable human effort vertically up and down in a push-pull motion several times (using approximately 50 to 100 pounds of force). Observe the reading on the dial indicator.
15. If the reading is more than 0.060", replace both tie rod ends at the next service interval.
16. If a tie rod end exhibits 0.125" of movement by hand, the vehicle should be removed immediately from use and the tie rod end must be replaced.
17. Remove jack stands and lower the lift axle.
18. Remove wheel chocks.

TIE ROD TOE-SETTING

This publication is intended to assist maintenance personnel with toe inspection and toe setting for (1) the Compliant Tie Rod (CTR), (2) the Heavy-Duty Compliant Tie Rod (HD-CTR), or (3) the standard round-tube tie rod equipped on various Hendrickson auxiliary lift axle suspension models.

The following field inspections and service are required to ensure the proper performance of vehicles equipped with such Hendrickson auxiliary lift axle suspensions. Ensure that your vehicle is properly set up for service work and that safety procedures are adhered to during service.

⚠ CAUTION

A TECHNICIAN USING A SERVICE PROCEDURE OR TOOL WHICH HAS NOT BEEN RECOMMENDED BY HENDRICKSON MUST FIRST SATISFY HIMSELF THAT NEITHER HIS SAFETY NOR THE VEHICLE'S SAFETY WILL BE JEOPARDIZED BY THE METHOD OR TOOL SELECTED. INDIVIDUALS DEVIATING IN ANY MANNER FROM THE INSTRUCTIONS PROVIDED WILL ASSUME ALL RISKS OF CONSEQUENTIAL PERSONAL INJURY OR DAMAGE TO EQUIPMENT INVOLVED.

⚠ WARNING

IMPROPER JACKING METHOD CAN CAUSE STRUCTURAL DAMAGE AND RESULT IN LOSS OF VEHICLE CONTROL, SEVERE PERSONAL INJURY OR DEATH. DO NOT USE AXLE BEAM OUTBOARD OF AXLE SPRING SEATS. REFER TO VEHICLE MANUFACTURER FOR PROPER JACKING INSTRUCTIONS.

YOU WILL NEED:

- Well sockets and box/open ended wrenches – 1⅛" and 15⁄16" deep, 1 5⁄16" swivel
- Torque wrench capable of – 500 foot pounds and 60 foot pounds
- ½" or ¾" impact or pneumatic impact gun
- Can of paint, jack stands, tape measure, screwdriver
- Optional - Trammel bar

DEFINITIONS

Toe: the relationship of the distance between the front of the tires and the distance between the rear of the tires on the same self-steer auxiliary lift axle suspension, as measured at spindle height.

Toe-in: When the front Toe distance is less than the rear Toe distance, the wheels are in a "Toe-in" condition also known as the positive condition.

Steer Ahead: the general steer angle orientation of the auxiliary lift axle wheels relative to the vehicle once the vehicle is driven in a straight line and the auxiliary lift axle is lifted. At that time, the axle tires should remain approximately parallel to the vehicle.

INSPECTION

The following field inspections and adjustments are necessary to ensure the proper performance of vehicles equipped with a Hendrickson self-steer auxiliary lift axle suspension.

NOTE IT IS IMPORTANT THAT THESE PROCEDURES ARE CONDUCTED ON FLAT AND LEVEL SURFACE/GROUND.

STEER AHEAD INSPECTION

⚠ WARNING

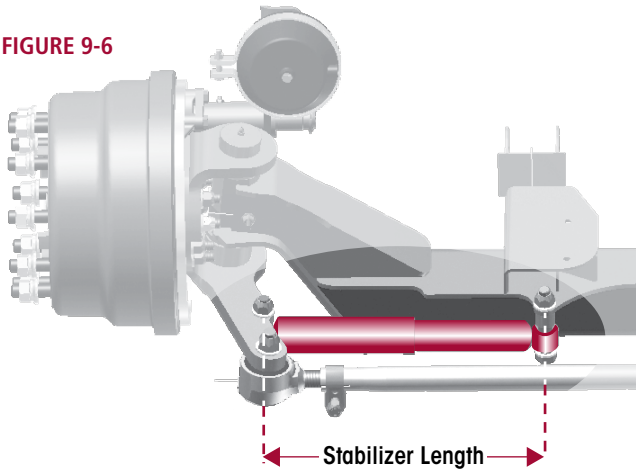
LOWER THE AUXILIARY LIFT AXLE ON A LEVEL FLOOR AND CHOCK THE WHEELS ON THE AXLES OTHER THAN THE AUXILIARY AXLE TO HELP PREVENT THE VEHICLE FROM MOVING. NEVER WORK UNDER A RAISED AXLE SUPPORTED BY ONLY A FLOOR JACK, WHICH CAN SLIP OR FALL OVER AND RESULT IN SERIOUS PERSONAL INJURY. ALWAYS SUPPORT A RAISED AUXILIARY AXLE WITH SAFETY STANDS.

19. On a level surface, lower the auxiliary axle onto the ground with the ride air springs set to the recommended operating pressure.

SERVICE HINT FOR RECOMMENDED RIDE AIR SPRING OPERATING PRESSURES AND RELATED INFORMATION, SEE THE AIR PRESSURE LOAD CHARTS INCLUDED IN (1) THE PRE-INSTALLATION LITERATURE PACKET PROVIDED BY HENDRICKSON AND/OR (2) HENDRICKSON'S OWNER'S MANUAL FOR STEERABLE AUXILIARY AXLE SYSTEMS, LITERATURE NO. OM-H754.

20. Drive the vehicle two (2) to five (5) feet straight ahead, ensuring the auxiliary axle is on a straight forward path.
21. Allow vehicle to roll to a stop (do not apply service brakes), set parking brakes.
22. Turn engine off and chock the wheels on the axles other than the auxiliary axle.
23. Raise the auxiliary axle.
24. On both the left and right hand side of the auxiliary axle, measure the distance from outboard bolt head of the stabilizer to inboard bolt head of the stabilizer, see Figure 9-6.
    a. If the two measurements are not within ½" of each other, it will be necessary to reset the Steer Ahead, see Steer Ahead Reset instructions in this publication.

FIGURE 9-6



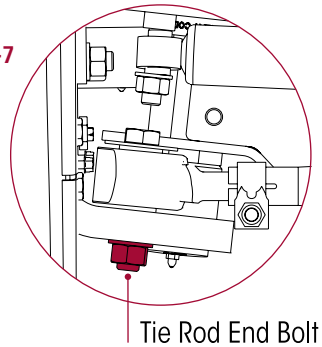
SERVICE HINT AN AXLE WITH THE STANDARD ROUND TUBE TAPERED TIE ROD REQUIRES THE COIL-OVER STABILIZERS TO BE REPLACED IF A STEER AHEAD RESET IS NECESSARY.

STEER AHEAD RESET

- Only applicable for the Compliant Tie Rods (CTR) and Heavy-duty Compliant Tie Rods (HD-CTR), not applicable for the Standard Round Tube Tie Rods.

1. On a level surface, raise the auxiliary axle.

FIGURE 9-7



2. Loosen, DO NOT remove, the tie rod end bolts on both ends of the tie rod until the bolts are free to rotate on the knuckles, see Figure 2.
3. Lower the auxiliary axle onto the ground with the ride air springs set to the recommended operating pressure.

SERVICE HINT

FOR RECOMMENDED RIDE AIR SPRING OPERATING PRESSURES AND RELATED INFORMATION, SEE THE AIR PRESSURE LOAD CHARTS INCLUDED IN (1) THE PRE-INSTALLATION LITERATURE PACKET PROVIDED BY HENDRICKSON AND / OR (2) HENDRICKSON'S OWNER'S MANUAL FOR STEERABLE AUXILIARY AXLE SYSTEMS (LITERATURE NO. OM-H754).

4. Drive the vehicle two (2) to five (5) feet straight ahead, ensuring the auxiliary axle is on a straight forward path.
5. Allow vehicle to roll to a stop (do not apply service brakes), set parking brakes.
6. Turn engine off and chock the wheels on the axles other than the auxiliary axle.
7. Tighten the CTR or HD-CTR tie rod end bolts to 350-450 foot pounds.
8. Raise the auxiliary axle.
9. On both the left and right hand side of the auxiliary axle, measure the distance from outboard bolt head of the stabilizer to inboard bolt head of the stabilizer, see Figure 1.
    a. If the two measurements are not within ½" of each other, it will be necessary to reset the Steer Ahead, see Steer Ahead Reset instructions in this publication.
10. It is required to proceed to Toe Inspection Procedure and, if necessary, Toe Setting Procedure.

TOE INSPECTION

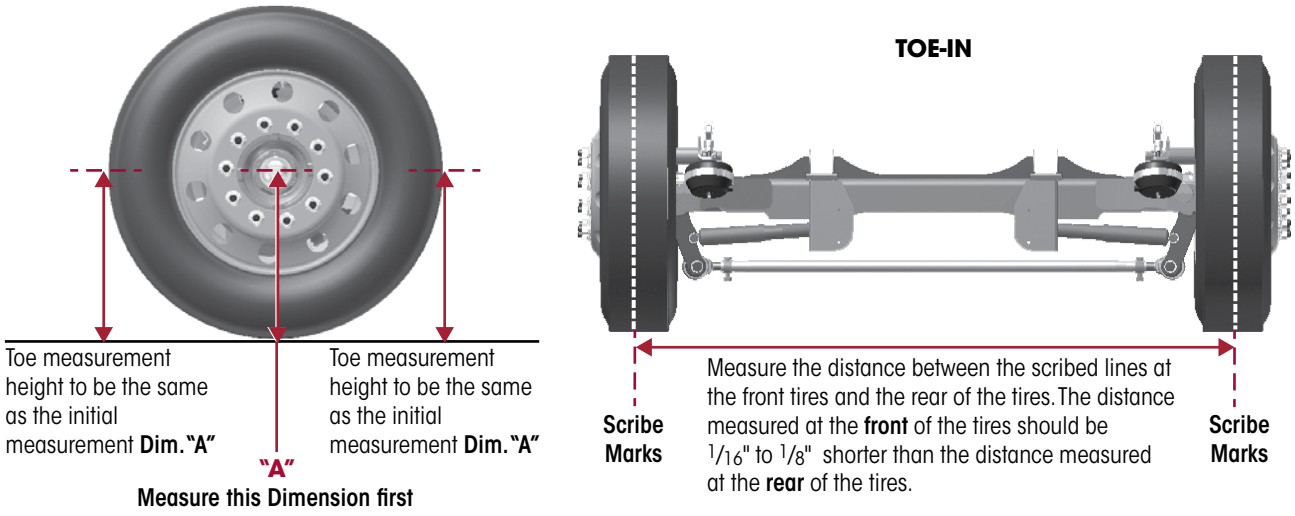
1. Ensure the vehicle is on flat level surface.
2. Lower the auxiliary axle onto the ground with the ride air springs set to the recommended operating pressure.

SERVICE HINT

FOR RECOMMENDED RIDE AIR SPRING OPERATING PRESSURES AND RELATED INFORMATION, SEE THE AIR PRESSURE LOAD CHARTS INCLUDED IN (1) THE PRE-INSTALLATION LITERATURE PACKET PROVIDED BY HENDRICKSON AND/OR (2) HENDRICKSON'S OWNER'S MANUAL FOR STEERABLE AUXILIARY AXLE SYSTEMS, LITERATURE NO. OM-H754.

3. Set wheels in straight ahead position by pulling vehicle straight ahead two (2) to five (5) feet.
4. Allow vehicle to roll to a stop (do not apply service brakes), set parking brakes.
5. Turn engine off and chock the wheels on the axles other than the auxiliary axle.
6. Raise the auxiliary axle.
7. Use paint and mark the center area of tread on both tires of the auxiliary axle around the complete outer diameter of the tires, see Figure 9-8.
8. Using a screwdriver and jack stands, scribe a line in the wet paint around the complete circumference of both tires. Spin the tires completely during both the painting and aligning process for a consistent reference during the toe setting procedure.
9. With the ride air springs set to the recommended operating pressure, lower the auxiliary axle onto the ground. Reference the load scale stickers provided in the literature packet from Hendrickson for the recommended operating pressure.
10. MEASURE TOE — use a tape measure or trammel bar to achieve 1/16" to 1/8" toe-in by measuring the distance from the center line of one scribed tire to the center line of opposing scribed tire at the rear of the auxiliary axle, see Figure 3. Repeat the measurement at the front of the auxiliary axle.
11. If the auxiliary axle does not meet Hendrickson's recommended 1/16" to 1/8" toe-in specification as shown in Figure 3, proceed to Toe Setting Procedure.

FIGURE 9-8 (Shown HD-CTR):

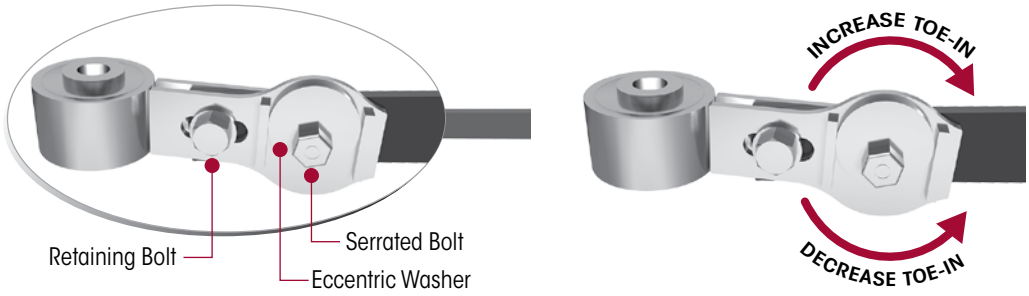


TOE SETTING

■ COMPLIANT TIE ROD (CTR)

1. After the inspection, if a toe adjustment is necessary, loosen the retaining and serrated bolts on both ends of the tie rod (see Figure 9-9).

FIGURE 9-9



2. Rotate the eccentric washer by rotating the bolt to achieve the recommended 1/16" to 1/8" toe-in specification.

NOTE AS THE SERRATED BOLT HEAD IS TURNED THE ECCENTRIC WASHER WITH INBOARD GROOVED RIDGES WILL ROTATE IN THE SAME DIRECTION OF THE SERRATED BOLT.

3. Rotate clock-wise to **INCREASE** toe-in and counter clock-wise to **DECREASE** toe-in, see Figure 5.
4. After the recommended toe specification is achieved, tighten the retaining and serrated bolts to 180-190 foot pounds. Verify with torque wrench.
5. Proceed to Final Inspection in this publication.

■ HEAVY–DUTY COMPLIANT TIE ROD (HD-CTR)

1. After the inspection, if a toe adjustment is necessary, loosen the tie rod clamp fasteners on both ends of the tie rod (see Figure 9-10).

FIGURE 9-10

2. Rotate the cross tube to achieve the recommended 1/16" to 1/8" toe-in specification.

SERVICE HINT

WHEN ROTATING THE CROSS TUBE THE BUSHINGS MAY WIND UP AND AFFECT MEASUREMENTS. TO UNWIND THE BUSHINGS, ROTATE THE CROSS TUBE FORWARD AND BACKWARD UNTIL THE WIND UP RELEASES.

3. After the recommended toe-in specification is achieved, tighten the tie rod clamp bolts to 40-60 foot pounds. Verify with torque wrench.
4. Proceed to Final Inspection in this publication.

■ STANDARD ROUND–TUBE TIE ROD

FIGURE 9-11

1. After the inspection, if a toe adjustment is necessary, loosen the tie rod clamp fasteners on both ends (see Figure 9-11 above).
2. Rotate the cross tube to achieve the recommended 1/16" to 1/8" toe-in specification.
3. After the recommended toe-in specification is achieved, tighten the tie rod clamp bolts to 40-60 foot pounds. Verify with torque wrench.
4. Proceed to Final Inspection in this publication.

FINAL INSPECTION

1. Ensure the vehicle is on flat level surface.
2. Lower the auxiliary axle onto the ground with the ride air springs set to the recommended operating pressure. Reference the load scale stickers provided in the literature packet from Hendrickson for the recommended operating pressure.
3. Set wheels in straight ahead position by pulling vehicle straight ahead two (2) to five (5) feet.
4. Allow vehicle to roll to a stop (do not apply service brakes), set parking brakes.
5. Turn engine off and chock the wheels on the axles other than the auxiliary axle.
6. Raise the auxiliary axle.
7. MEASURE TOE — use a tape measure or trammel bar to achieve 1/16" to 1/8" toe-in by measuring the distance from the center line of one scribed tire to the center line of opposing scribed tire at the rear of the axle. Repeat the measurement at the front of the axle.
   a. If the auxiliary axle does not meet the recommended 1/16" to 1/8" toe-in, the toe setting procedure must be repeated.

KINGPIN BUSHING INSPECTION

INSPECTION PROCEDURE

1. Chock the rear wheels to help prevent the vehicle from moving.
2. Set the parking brake.
3. Raise the lift axle and support with jack stands.
4. CHECKING THE UPPER KINGPIN BUSHING.
   a. Affix a magnetic base dial indicator on the axle and place the tip of the dial indicator on the inside of the upper kingpin connection as shown in Figure 9-12 below.
   b. Set the dial indicator to "0" zero.
   c. Move the top of the tire in and out by applying reasonable, constant pressure and then releasing.
   d. Check the reading on the dial indicator. If the dial indicator moves more than 0.025", the upper bushing is worn or damaged. Replace both bushings. Refer to the Kingpin Bushing Removal and Installation sections in this publication.
5. CHECKING THE LOWER KINGPIN BUSHING
   a. Install a dial indicator so that the base is on the axle and the indicator tip is against the inside of the bottom of the knuckle.
   b. Set the dial indicator to "0" zero.
   c. Move the top of the tire in and out by applying reasonable, constant pressure and then releasing.
   d. Check the reading on the dial indicator. If the dial indicator moves more than 0.025", the upper bushing is worn or damaged. Replace both bushings. Refer to the Kingpin Bushing Removal and Installation sections in this publication.

IMPORTANT: IF ONE BUSHING IS WORN OR DAMAGED, IT IS MANDATORY TO REPLACE BOTH THE TOP AND BOTTOM BUSHINGS ON THAT KNUCKLE ASSEMBLY.

FIGURE 9-12

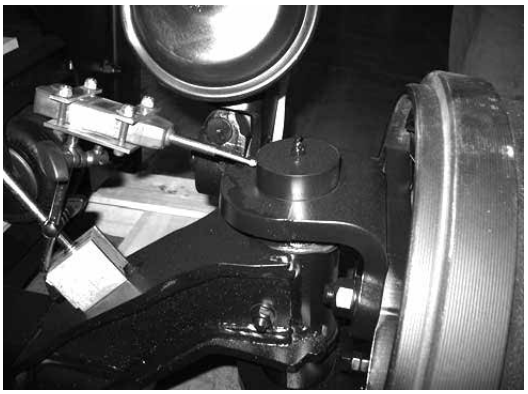
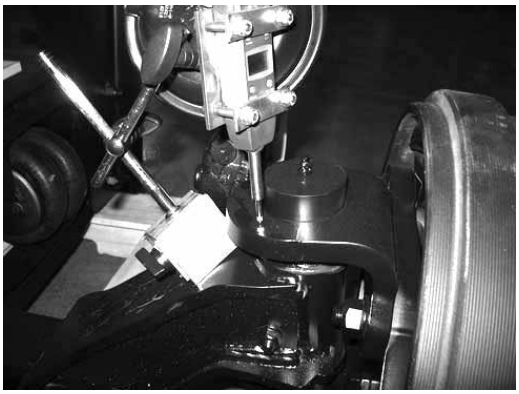


FIGURE 9-13



6. Remove jack stands and lower the lift axle.
7. Remove wheel chocks.

STEERING KNUCKLE INSPECTION AND ADJUSTMENT

CHECKING VERTICAL END PLAY (UP AND DOWN MOVEMENT)

1. Chock the rear wheels of the vehicle.
2. Set the parking brake.
3. Raise the lift axle and support with jack stands.
4. If necessary, remove the wheels, hubs and drums.
5. Place a dial indicator on each side of the axle as follows:
   a. Ensure wheels are positioned straight ahead.
   b. Place the magnetic dial indicator base on the axle.
   c. Place the tip of the dial indicator on top of the upper kingpin connection.
6. Place a jack and a wood block (with a hole that allows clearance for the lower kingpin grease fitting) under the lower kingpin grease cap area (see Figure 9-6).
7. Set the dial indicator to "0" zero.
8. Raise the jack until the dial indicator shows the end of vertical travel. Measure and record the dial indicator reading. Vertical (up and down) inspection clearance must be between 0.008" and 0.030".

ADJUSTING VERTICAL END PLAY

1. If vertical clearance is greater than 0.030", replace the thrust bearing.
2. After replacing the thrust bearing, if vertical clearance is greater than 0.018", install shims (Hendrickson Part No. R-001764-1Q12) between the top of the axle and the bottom of the upper kingpin connection to obtain the proper clearance specification. See the Steering Knuckle Disassembly section.
3. If vertical clearance is less than 0.008", remove the shims from between the top of the axle and the bottom of the upper kingpin connection to obtain the proper clearance specification.
4. Repeat Steps 2 or 3 until proper clearance is achieved.
5. Remove jack stands and lower the lift axle.
6. Remove wheel chocks.

STABILIZER

INSPECTION

Inspection of the stabilizer can be performed by conducting a visual inspection for leaking or damage.

1. Lower the axle to the ground
2. Chock the rear wheels to help prevent the vehicle from moving.
3. Set the parking brake.

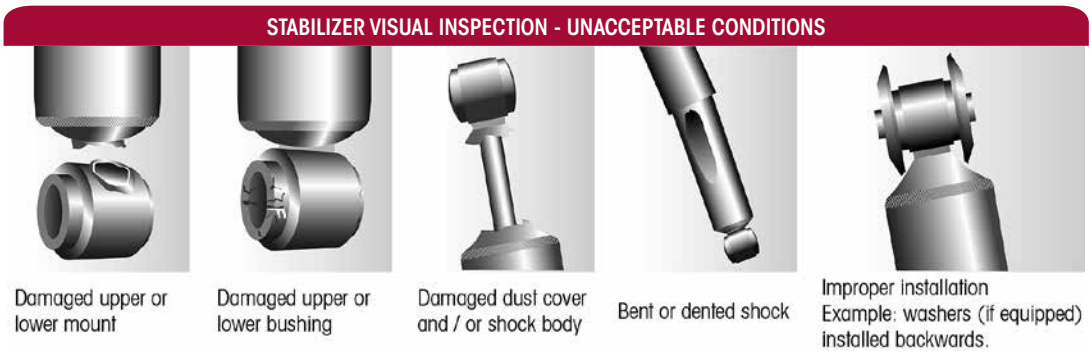
NOTE: IT IS IMPORTANT TO INSPECT THE STABILIZER FULLY EXTENDED.

4. Evidence of the following potential problems indicates replacement of your stabilizer is necessary:
   - Damaged inner or outer mounts
   - Damaged inner or outer bushings
   - Damaged dust cover
   - Bent or dented stabilizer
   - Evidence of improper installation. For instance, washers installed incorrectly.
   - Fluid leaking in streams from the upper seal
5. Remove wheel chocks.

ALTERNATE INSPECTION PROCEDURE

1. Remove the stabilizer.
2. Once removed, shake the suspected stabilizer and listen for the sound of metal parts rattling inside. Rattling of internal parts can indicate a failure.

FIGURE 9-14

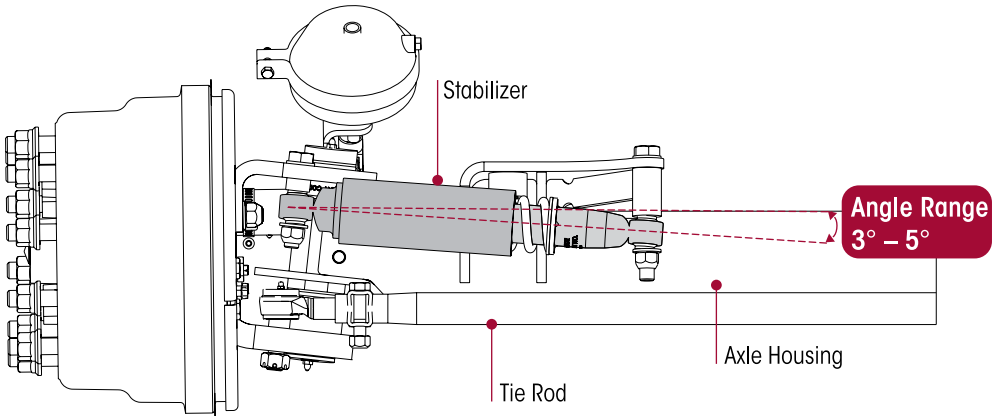


3. Replace as needed.
4. Remove jack stands and lower the lift axle.
5. Remove wheel chocks.

STABILIZER ANGLE INSPECTION

Hendrickson recommends verifying the stabilizer angle to ensure it is within the recommended 3 to 5 degree angle (See Figure 9-15 below). This can be done by use of a digital protractor or equivalent device. If the angle of your stabilizer does not meet the 3 to 5 degrees, contact Hendrickson Customer Service for the necessary spacers. After necessary spacers are added repeat procedure to verify angle is within specifications.

FIGURE 9-15



TIRE INSPECTION

The leading potential causes of tire wear on commercial vehicles according to TMC (The Technology & Maintenance Council) are the following in order of importance:

1. Tire Pressure
2. Toe Setting
3. Thrust Angle
4. Camber

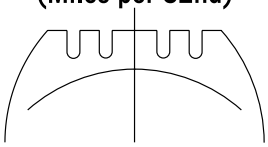
The following tire Inspection guidelines are based upon TMC recommended practices. Any issues regarding irregular tire wear where Hendrickson is asked for assistance, will require tire and alignment maintenance records as described in the TMC Literature Number RP 642 (Guidelines for Total Vehicle Alignment).

Tire wear is normally the best indicator of vehicle alignment condition. If tires are wearing too rapidly or irregularly, alignment corrections may be needed. The tire wear patterns described below can help isolate specific alignment problems.

The most common conditions of concern are:

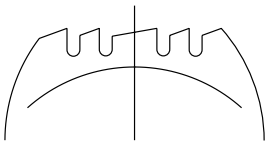
- Overall Fast Wear (miles per 32nd)
- Feather Wear
- Cupping
- Diagonal Wear
- Rapid Shoulder Wear (one shoulder only)
- One-Sided Wear

OVERALL FAST WEAR (Miles per 32nd)



Overall Fast Wear is fast wear can be described as exhibiting a good, but accelerated wear pattern. It is typically caused by operating conditions, such as mountainous terrain, frequency and severity of turning, abrasive road surfaces in combination with vehicle configurations and their attributes-such as power steering, heavy axle loads, high wheel cuts, setback axles, short wheel base tractors, long wheel base straight trucks. To correct this problem, consult with vehicle and tire manufacturers when specifying equipment or replacing tires. For more information, see TMC Literature Number RP 219 "Radial Tire Wear Conditions and Causes". For information on how to accurately measure and record tire rates, see TMC Literature Number RP 230 "Tire Test Procedures for Tread Wear, Serviceability, and Fuel Economy".

FEATHER WEAR



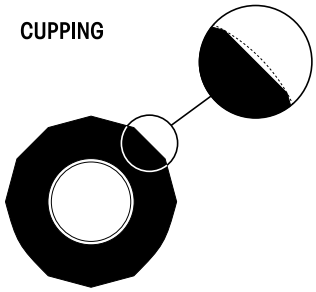
Feather Wear is when tread ribs or blocks are worn so that one side is higher than the other resulting in step-offs across the tread face. Generally, ribs or blocks exhibit this wear. To spot this problem, do the following:

With one hand flat on the tread of the tire and a firm down pressure, slide your hand across the tread of the tire. In one direction, the tire will feel smooth and in the opposite direction there will be a sharp edge to the tread. Typical causes of feather wear include: excessive side force scrubbing, resulting from conditions of misalignment such as excessive toe, drive axle misalignment, worn, missing or damaged suspension components, bent tie rods or other chassis misalignment.

To correct this problem, tires can be rotated to another axle for maximum utilization of remaining tread. Additionally, diagnose the vehicle itself and correct misalignment condition as required. If steer tire feathers are in opposite directions, an improper toe condition is most likely the cause. For more information, see TMC Literature No. RP 219 "Radial Tire Wear Conditions and Causes" (page 5).

If feather wear on both steer tires is in the same direction, drive axle or other chassis misalignment is indicated. If one steer tire shows feather wear and the other steer tire has normal wear, a combination of toe and drive axle or chassis misalignment is indicated.

CUPPING



Cupping is localized, dished out areas of fast wear creating a scalloped appearance around the tire. Cupping, which appears around the tire on the shoulder ribs, may also progress to adjoining ribs. See TMC Literature No. RP 219 "Radial Tire Wear Conditions and Causes" (page 7). Cupping is usually a result of moderate-to-severe imbalance, improper rim/wheel mounting, excessive wheel-end play or other assembly non-uniformity. It can also be due to lack of stabilizer control on some suspension types.
To solve cupping problems:

- Tires: correct mis-mount or balance problem. If ride complaints arise, steer tires may be rotated to drive or trailer axle
- Vehicle: diagnose component imbalance condition, i.e., wheel, rim, hub, brake, drum. Correct as necessary

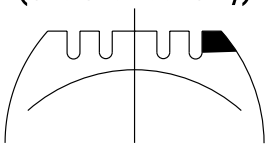
DIAGONAL WEAR

Diagonal Wear can be described as localized flat spots worn diagonally across the tread at approximately 25-35° angles, often repeating around the tread circumference. For more information, see TMC Literature Number RP 219 "Radial Tire Wear Conditions and Causes" (page 20).

Diagonal wear is usually caused by bad wheel bearings, toe-out, mi-mounting of tire and wheel assembly to axle, and mismatched duals for size and/or inflation pressures. It may start as brake skid. Diagonal wear is aggravated by high speed empty or light load hauls.

To correct diagonal wear, reverse direction of rotation of the tire. If wear is excessive, true or retread. If the source of trouble is the vehicle, diagnose cause and correct as needed.

RAPID SHOULDER WEAR (One Shoulder Only)



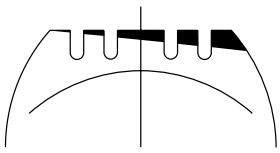
Rapid Shoulder Wear (One Shoulder Only) is defined as a tire worn on the edge of one shoulder, sometimes extending to inner ribs. It can progress to diagonal wipeout. For more information, see TMC Literature No. RP 219 "Radial Tire Wear Conditions and Causes" (page 22).

This wear condition is usually caused by excessive toe or excessive camber. These conditions can be created by a misaligned or bent axle and can also be caused by loose or worn wheel bearings.

To correct this type of rapid shoulder wear:

- Tires: change direction of rotation of tire. If shoulder wear is severe, remove and retread
- Vehicle: diagnose misalignment and/or mechanical condition and correct

ONE-SIDED WEAR



One-sided wear is excessive wear on one side of tire extending from the shoulder towards the center of the tread. For more information, see TMC Literature No. RP 219 "Radial Tire Wear Conditions and Causes" (page 26).

One-sided wear is usually caused by improper alignment, worn kingpins, loose wheel bearings, excessive camber, excessive axle loads, non-parallel axles, or non-uniform tire and wheel assembly caused by improper bead seating or bent wheel.

To correct one-sided wear:

- Tires: depending on severity, rotate tires to another axle position or, if worn to minimum tread depths, submit for possible retreading
- Vehicle: diagnose mechanical problem and correct

SECTION 10
COMPONENT REPLACEMENT

STEERING KNUCKLE DISASSEMBLY

1. Chock the rear wheels of the vehicle.
2. Set the parking brake.
3. Raise the lift axle and support with jack stands.
4. Remove the wheel and hub assembly.
5. Remove the brake components from the steering knuckle.
6. Remove the tie rod assembly (See Figure 10–1 below):

FIGURE 10-1

7. Remove the bolts that connect upper kingpin assembly to the steering knuckle.

⚠ WARNING

REMOVAL OF THE BOLTS WILL ALLOW THE STEERING KNUCKLE TO SEPARATE FROM THE AXLE WHICH CAN RESULT IN COMPONENT DAMAGE AND/OR PERSONAL INJURY. STEERING KNUCKLE MUST BE SUPPORTED BEFORE REMOVAL OF THE TWO BOLTS.

REMOVE THE GREASE ZERKS FROM THE KNUCKLE ASSEMBLIES. THIS WILL ALLOW THE KNUCKLE ASSEMBLIES TO FREELY SLIDE UP AND DOWN THE KINGPINS WITHOUT CREATING BACK PRESSURE.

8. Remove the steering knuckle from the kingpin by sliding it down the kingpin.
9. Remove the upper kingpin assembly from the axle by sliding it up and off the kingpin.

KINGPIN PREPARATION AND MEASUREMENT

CLEANING THE GROUND OR POLISHED PARTS

- Use a cleaning solvent to clean ground or polished parts and surfaces. DO NOT USE GASOLINE

⚠ CAUTION

DO NOT USE HOT SOLUTION TANKS OR WATER AND ALKALINE SOLUTIONS TO CLEAN GROUND OR POLISHED PARTS. DAMAGE TO THE PARTS WILL RESULT.

CLEANING THE ROUGH PARTS

- Rough parts can be cleaned with the ground or polished parts. Rough parts can also be cleaned in hot solution tanks with a weak alkaline solution. The parts must remain in the hot solution tanks until they are completely cleaned and heated.

DRYING THE CLEANED PARTS

- Parts must be dried immediately after cleaning. Dry the parts with clean paper towels, clean rags or compressed air. DO NOT dry bearings by spinning with compressed air. Damage to the bearings will result.

PREVENTING CORROSION ON CLEANED PARTS

- Apply a light coating of oil to all cleaned and dried parts that are going to be reused. DO NOT apply oil to the brake lining or the brake drums. If parts are to be stored, apply an effective rust inhibitor to all surfaces.

⚠ WARNING

TO HELP PREVENT SERIOUS EYE INJURY, ALWAYS WEAR PROPER EYE PROTECTION WHEN YOU PERFORM VEHICLE MAINTENANCE OR SERVICE.

⚠ WARNING

SOLVENT CLEANERS CAN BE FLAMMABLE, POISONOUS AND CAUSE BURNS. TO HELP AVOID SERIOUS PERSONAL INJURY, CAREFULLY FOLLOW THE MANUFACTURER'S PRODUCT INSTRUCTIONS / GUIDELINES AND THE FOLLOWING PROCEDURES:

1. WEAR PROPER EYE PROTECTION.
2. WEAR PROTECTIVE CLOTHING.
3. WORK IN A WELL VENTILATED AREA.
4. DO NOT USE GASOLINE, SOLVENTS OR OTHER MATERIALS THAT CONTAIN GASOLINE THAT CAN EXPLODE.

⚠ WARNING

HOT SOLUTION TANKS OR ALKALINE SOLUTIONS MUST BE USED CORRECTLY. FOLLOW THE MANUFACTURER'S RECOMMENDED INSTRUCTIONS AND GUIDELINES CAREFULLY TO HELP PREVENT PERSONAL ACCIDENT OR INJURY.

1. Prepare and polish the kingpin by removing all grease and excess debris using a fine grit (220 grit or higher) emery cloth and parts solvent (see Figures 10-2 through 10-5).

FIGURE 10-2

FIGURE 10-3

FIGURE 10-4

FIGURE 10-5

2. Inspect the kingpin for wear or damage. Use a micrometer, measure the upper and lower kingpin in two locations. Positions must be 90 degrees (perpendicular) from each other (See Figures 10-6 through 10-9).
3. If the kingpin diameter is less than 1.802", kingpin replacement may be necessary.

FIGURE 10-6

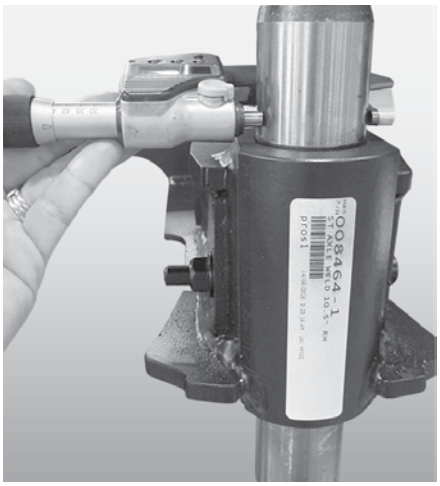


FIGURE 10-7

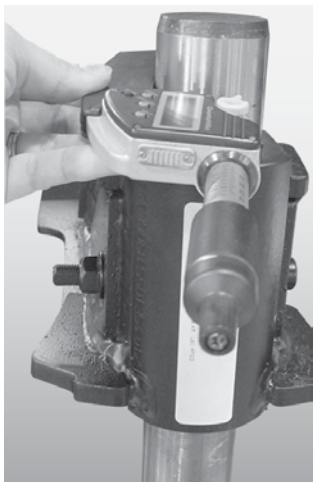


FIGURE 10-8

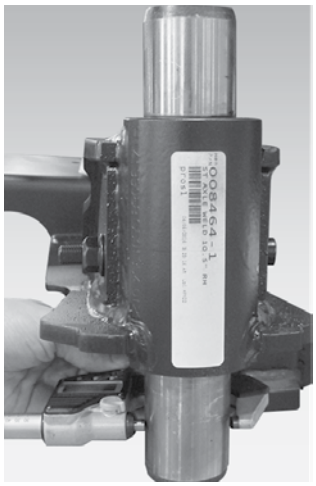
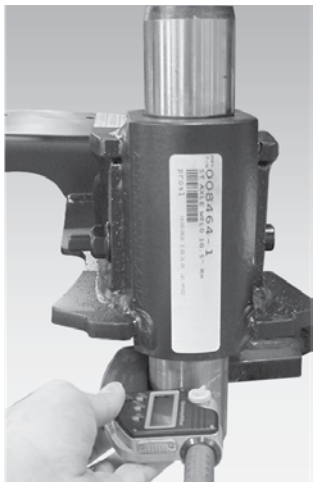


FIGURE 10-9



FABRICATED KNUCKLE KINGPIN BUSHING

YOU WILL NEED:

- A hydraulic shop press with a minimum forcing capacity of 5 tons

⚠ WARNING

BEFORE APPLYING HYDRAULIC PRESSURE TO ANY TOOLING SET-UP, ALWAYS CHECK TO ENSURE THE PRESS PLATE, ADAPTERS AND COMPONENTS BEING WORKED ON ARE POSITIONED PROPERLY, I.E. "IN LINE" WITH THE RAM OF THE PRESS. IMPROPER POSITIONING CAN CAUSE PERSONAL INJURY AND / OR COMPONENT DAMAGE.

FIGURE 10-10

The kingpin bushing housing on a fabricated knuckle includes pre-reamed bushings and seals.

KINGPIN BUSHING REMOVAL

1. Install the steering knuckle assembly or upper kingpin connection in the press. Ensure is securely supported on the prior to applying hydraulic pressure to press out the bushing.
2. Remove worn kingpin bushing housing.
3. Install the new kingpin bushing housing (refer to Figure 10-10) from the machined side (axle side) of the steering knuckle and upper kingpin connection. Ensure that the kingpin bushing housing is tight against the machined surface (see Figures 10-11 through 10-13):

FIGURE 10-11

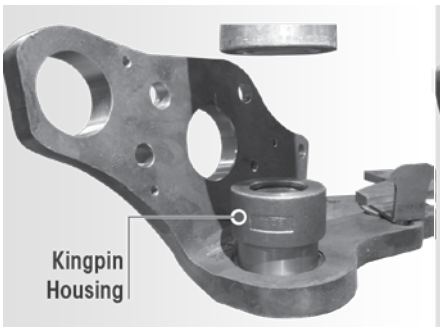


FIGURE 10-12

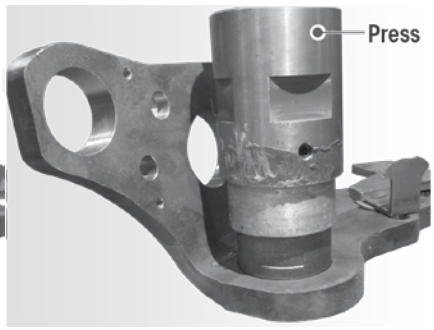
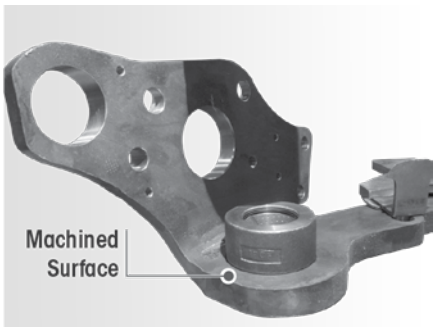


FIGURE 10-13



CAST KNUCKLE KINGPIN BUSHING REMOVAL

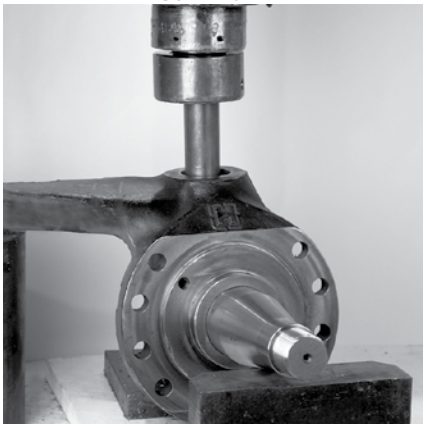
YOU WILL NEED:

- A hydraulic shop press with a minimum forcing capacity of 2.5 tons (minimum press capacity of 5,000 psi or use an arbor press)

⚠ WARNING

BEFORE APPLYING HYDRAULIC PRESSURE TO ANY TOOLING SET-UP, ALWAYS CHECK TO BE SURE THE PRESS PLATE, ADAPTERS AND COMPONENTS BEING WORKED ON ARE POSITIONED PROPERLY, I.E. "IN LINE" WITH THE RAM. IMPROPER POSITIONING CAN CAUSE PERSONAL INJURY AND/OR COMPONENT DAMAGE.

FIGURE 10-14



1. Remove the grease cap retaining ring.
2. Install the steering knuckle upside down in press. Be sure to support the steering knuckle assembly so that it sits in-line with the press (see Figure 10-14).
3. Use the grease cap to press out the kingpin bushing and seal. Remove the grease zerk in the grease cap or use a hollow driver, to press out the kingpin bushing.
4. Use the same procedure to remove the kingpin bushing in the upper kingpin connection.
5. Clean the parts and then inspect before reassembling.

CAST KNUCKLE BORE MEASUREMENT

Complete the following steering knuckle bore inspection and the measurement instructions prior to installing the kingpin bushing.

1. Measure the upper knuckle bore inside diameter at two locations. Always use an inside micrometer or a telescoping gauge when taking a knuckle bore measurement. Some out-of- roundness at the top and bottom of the bore edges is acceptable. The steering knuckle bore diameter is 1.938" ± 0.003".
2. Measure the upper and lower bore in two positions and at two locations. The two positions must be 90 degrees opposed from each other (See Figures 10-15 through 10-17). If the average measurement is more than the knuckle bore maximum diameter specification, replace the knuckle.

FIGURE 10-15

FIGURE 10-16

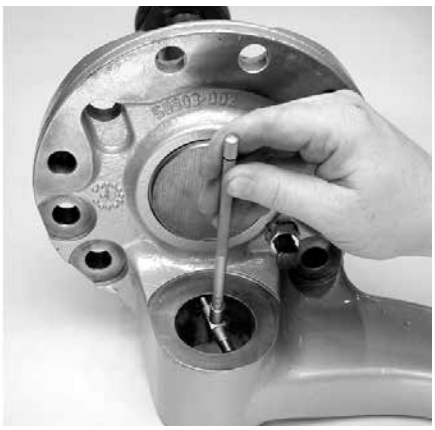
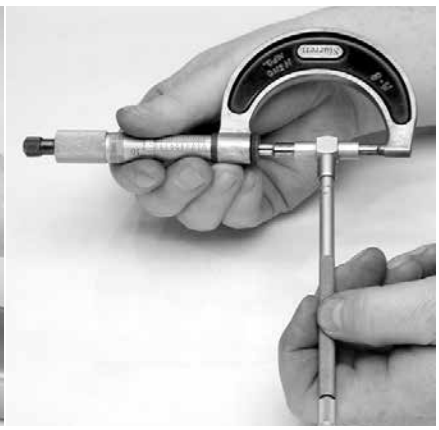


FIGURE 10-17



CAST KNUCKLE KINGPIN BUSHING REAMING

YOU WILL NEED:

- A hydraulic shop press with a minimum forcing capacity of 5 tons

⚠ WARNING

BEFORE APPLYING HYDRAULIC PRESSURE TO ANY TOOLING SET-UP, ALWAYS CHECK TO BE SURE THE PRESS PLATE, ADAPTERS AND COMPONENTS BEING WORKED ON ARE POSITIONED PROPERLY, I.E. "IN LINE" WITH THE RAM. IMPROPER POSITIONING CAN CAUSE PERSONAL INJURY AND/OR COMPONENT DAMAGE.

1. Install the steering knuckle assembly, steering arm or upper kingpin connection in the press.
2. Always install the kingpin bushing from the machined side (axle side) of the steering knuckle using a bushing driver. Press in bushing to a depth of no less than 15⁄64" (0.236") or 6 millimeters and no more than 5⁄16" (0.32") or 8 millimeters. See Figures 10-19 and 10-20.
3. Following this procedure it is necessary to ream the kingpin bushings to fit the kingpins, see Kingpin Bushing Reaming Instructions in this section.

FIGURE 10-18

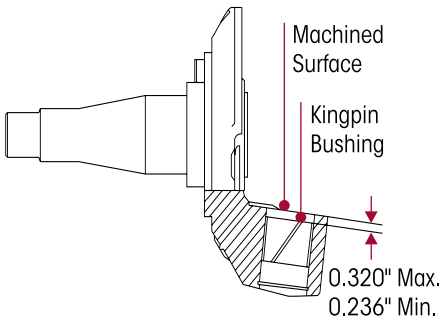
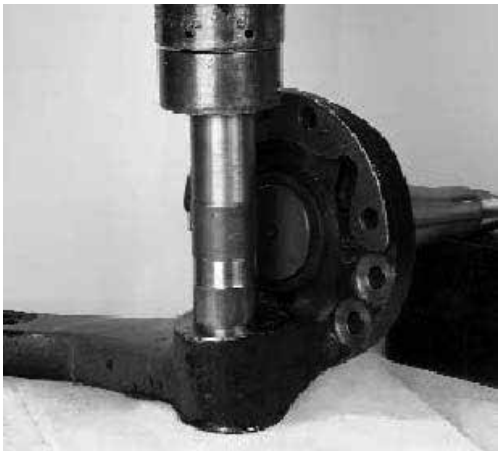


FIGURE 10-19



KINGPIN BUSHING REAMING

CAUTION

REAM THE KINGPIN BUSHINGS WITH AN ADJUSTABLE STRAIGHT FLUTE REAMER. DO NOT HONE OR BURNISH THE KINGPIN BUSHINGS. HONING OR BURNISHING WILL DAMAGE THE BUSHINGS AND WILL VOID APPLICABLE WARRANTIES.

WARNING

WHEN INSTALLING STEERING KNUCKLE COMPONENTS IN A VICE, IT IS NECESSARY TO PROTECT THE MACHINED SURFACES FROM GOUGES AND / OR MARRING BY USING BRASS JAWS. FAILURE TO DO SO CAN CAUSE PREMATURE PART DAMAGE, DAMAGE TO THE STEERING KNUCKLE COMPONENTS, ADVERSE VEHICLE HANDLING, PERSONAL INJURY OR PROPERTY DAMAGE AND WILL VOID APPLICABLE WARRANTIES.

1. Install the steering knuckle assembly in a vise with brass jaws.

SERVICE HINT: IT IS ACCEPTABLE TO MOUNT THE KNUCKLE COMPONENTS IN A VISE EITHER VERTICALLY OR HORIZONTALLY WHEN PERFORMING THE REAMING PROCEDURE.

2. Install the reamer into the steering knuckle until the blades touch the kingpin bushing.
3. Rotate the reamer smoothly with light downward pressure. DO NOT apply too much pressure. See Figures 10-20 and 10-21.

FIGURE 10-20

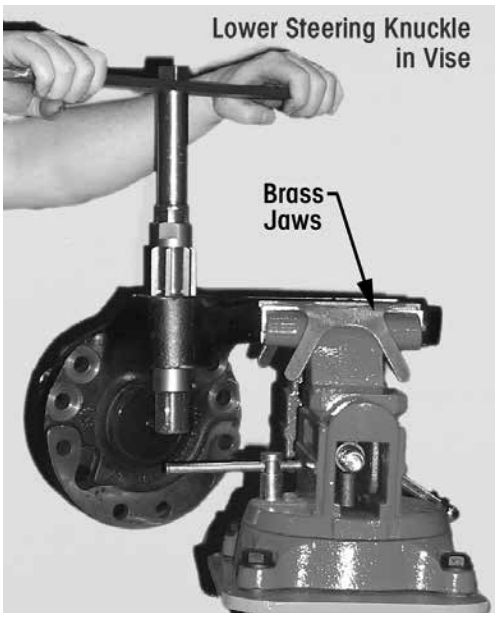
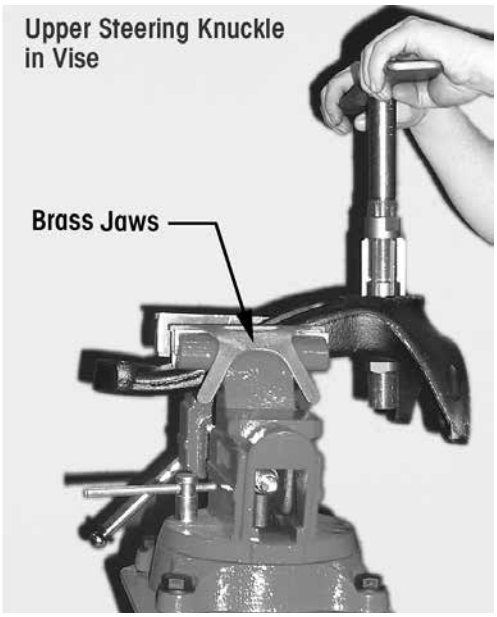


FIGURE 10-21



4. Slide the reamer out of the bottom of the steering knuckle assembly. If it is necessary to remove the reamer from the top, rotate the reamer opposite of the cutting rotation.
5. Clean and remove all bearing material from the knuckle assembly. Be sure to remove material from the grease channels and dimples.
6. Clean the 5/8" brake backing plate bolts with a wire wheel and run a tap through the threads of the steering knuckle / upper kingpin connection. Flush out with brake cleaner and dry with compressed air.
7. Repeat Steps 1 through 6 to the upper kingpin connection.

WARNING

PRIOR TO INSTALLATION ENSURE THAT ALL RESIDUAL LOCTITE MATERIAL IS REMOVED FROM THE MOUNTING BOLTS AND THE THREADED HOLES IN THE UPPER KINGPIN CONNECTION, AND NEW LOCTITE 277 OR EQUIVALENT IS APPLIED TO HELP ENSURE THAT THE BOLTS SUSTAIN THE PROPER TORQUE REQUIREMENT. FAILURE TO DO SO CAN CAUSE ADVERSE VEHICLE HANDLING RESULTING IN PERSONAL INJURY OR PROPERTY DAMAGE.

FIGURE 10-22

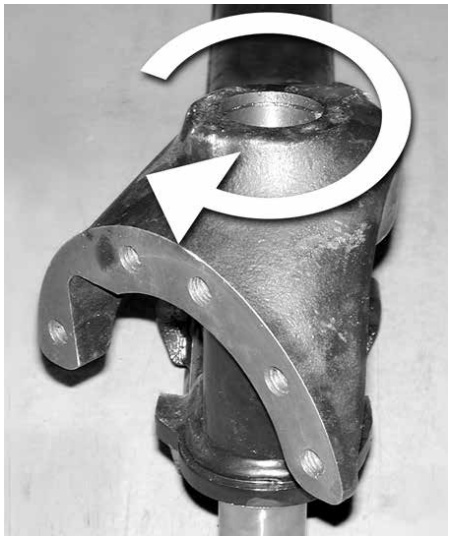


FIGURE 10-23

NOTE: THE HENDRICKSON GENUINE PART SOCKET HEAD CAP SCREW (PART NUMBER: 6110C125H4A8) COMES WITH A PRE-APPLIED LOCTITE COMPOUND.

8. Install the steering knuckle and upper kingpin connection on the kingpin.
9. Check for the proper fit by rotating the knuckle assembly back and forth to verify there is no binding on the kingpin.
10. If the bushing is too tight, repeat Steps 1 though 9 until the proper clearance is achieved.

KINGPIN SEAL INSTALLATION

1. Place the steering knuckle in a vise with brass jaws or place on a suitable workbench. The steering knuckle will have the machined surface facing up (axle side up), see Figure 10-25.
2. Lay the kingpin seal into the bore of the steering knuckle. The seal lip should face outward toward the axle.
3. Use a bushing driver tool to press the seal firmly into the steering knuckle.
4. Install the kingpin seal until it makes contact with the kingpin bushing.
5. Repeat Steps 1 through 4 on the upper kingpin connection.

FIGURE 10-24

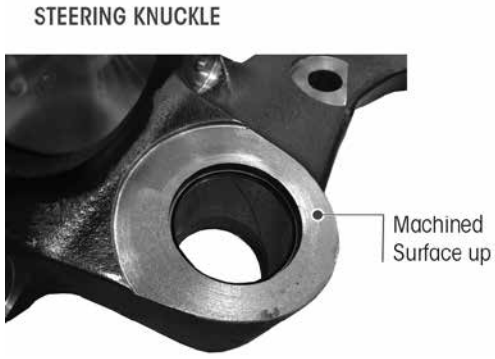
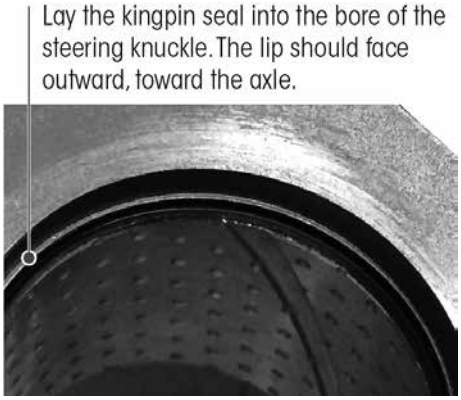


FIGURE 10-25



STEERING KNUCKLE ASSEMBLY

After replacing the kingpin bushings, it is necessary to reassemble the steering knuckle assemblies.

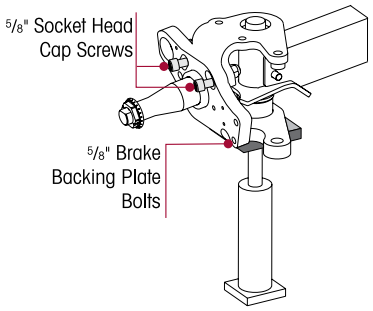
1. Install the thrust bearing on the lower kingpin, so the top side is up (the thrust bearing may be stamped TOP or the black seal will designate the top side), when the axle is in the operating position.
2. Pack the bearing dimples with multipurpose grease (NLGI Grade 2).
3. Install the steering knuckle assembly on the kingpin. It will be necessary to support the steering knuckle assembly with a bottle jack and a block of wood under the steering knuckle assembly.

THE EASIEST WAY TO INSTALL THE KNUCKLE IS WITH THE GREASE CAP NOT INSTALLED IN THE STEERING KNUCKLE ASSEMBLIES. IN THIS MANNER, IT DOES NOT CREATE BACK PRESSURE. THE ASSEMBLY CAN THEN FREELY SLIDE UP AND DOWN ON THE KINGPIN.

Raise the bottle jack so that there is no free play between the steering knuckle, thrust bearing and the bottom of the axle.

4. Install the upper kingpin connection on the upper kingpin.
5. Install the left and right brake backing plate bolts finger tight. These are for guide purposes only.

FIGURE 10-26



NOTE: TWO GUIDE STUDS MAY BE SUBSTITUTED IN PLACE OF THE BRAKE BACKING PLATE BOLTS.

6. Install the two new socket head cap screws until they are finger tight.
7. Apply slight upward pressure on the upper kingpin connection.
8. Insert feeler gauges between the upper kingpin connection and the top of the axle. Check the clearance between the upper kingpin connection and the top of the axle.
9. Remove the brake backing plate bolts and socket head cap screws.
10. Remove the upper kingpin connection.
11. Install the appropriate number of shims to achieve 0.008" to 0.011" clearance between the upper kingpin connection and the top of the axle.

FIGURE 10-27

EXAMPLE: IF 0.050" CLEARANCE WERE MEASURED, 0.040" SHIMS WOULD BE REQUIRED TO OBTAIN THE REQUIRED 0.008" TO 0.011" CLEARANCE.

12. Install the upper kingpin connection onto the kingpin.
13. Slide two 0.010" feeler gauges on each side of the kingpin between the axle and the upper kingpin connection.

⚠ WARNING

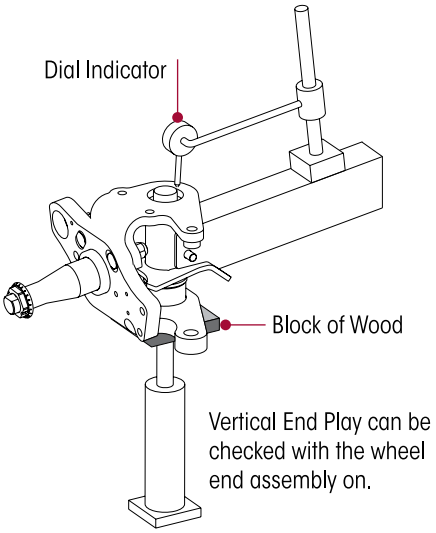
PRIOR TO INSTALLATION ENSURE THAT ALL RESIDUAL LOCTITE MATERIAL IS REMOVED FROM THE MOUNTING BOLTS AND THE THREADED HOLES IN THE UPPER KINGPIN CONNECTION, AND NEW LOCTITE 277 OR EQUIVALENT IS APPLIED TO HELP ENSURE THAT THE BOLTS SUSTAIN THE PROPER TORQUE REQUIREMENT. FAILURE TO DO SO CAN CAUSE ADVERSE VEHICLE HANDLING RESULTING IN PERSONAL INJURY OR PROPERTY DAMAGE.

14. Install the socket head cap screws and tighten. Refer to torque specifications section in this publication.

NOTE: THE HENDRICKSON GENUINE PART SOCKET HEAD CAP SCREWS (PART NUMBER: R-6110C125H4H8). APPLY LOCTITE.

15. Once the final torque of the socket cap screws has been obtained, remove the two 0.010" feeler gauges and lower the bottle jack. Check the remaining bolt holes to ensure that the bolts will thread in.

FIGURE 10-28



16. Affix a magnetic base dial indicator on the axle and place the tip of the dial indicator on top of the upper kingpin connection, see Figure 11-28.
17. Zero the dial indicator.
18. Raise the bottle jack until there is no clearance between the steering knuckle and the bottom of the axle.
19. Check the reading on the dial indicator. The specification for vertical travel on the steering knuckle assemblies is 0.008" to 0.011".
20. If the clearance is not within the required specification, repeat Steps 3 through 9 until the proper clearance is obtained by adding or removing shims.
21. If the vertical travel is not within the specification, repeat Steps 3 through 16 until the proper vertical travel is obtained.
22. Remove the bottle jack to remove the load off the knuckle assembly and continue assembling the wheel-ends.
23. Install the tie rod cross tube into the tie rod arm.
25. **Compliant Tie Rod:** Tighten the mounting bolts. Refer to torque specifications section in this publication.

    Rigid Tie Rod: Tighten the castle nuts to 185 foot pounds torque, then rotate the castle nut to the next castle slot and install the cotter pin. Tighten bolts. Refer to torque specifications section in this publication.

LOCTITE APPLIED TO KNUCKLE ASSEMBLY BOLTS IS A CRITICAL PROCEDURE TO ENSURE THAT THESE BOLTS SUSTAIN THE TORQUE REQUIREMENT OF THE KINGPIN CONNECTION.

26. Install new O-rings on the grease caps and lubricate the O-rings with grease.
27. Install grease caps and new retaining rings.

AUXILIARY AXLE BRAKE REPLACEMENT

SUPPORT THE LIFT AXLE PRIOR TO SERVICING

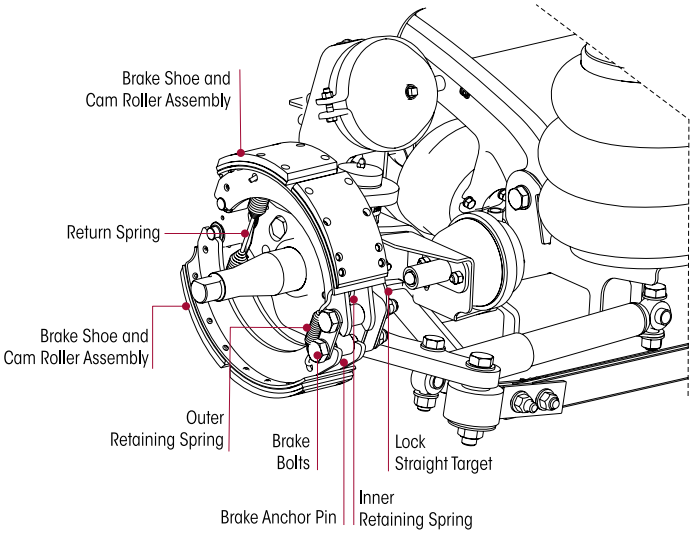
WARNING

PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO HELP PREVENT THE VEHICLE FROM MOVING. PRIOR TO SERVICING A LIFT AXLE IN THE RAISED POSITION, (1) PROPERLY SUPPORT THE LIFT AXLE WITH SAFETY STANDS, AND (2) RELEASE ALL AIR PRESSURE IN THE LIFT AXLE AIR SPRINGS AND RIDE SPRINGS. DO NOT WORK AROUND OR UNDER A RAISED LIFT AXLE SUPPORTED ONLY WITH FLOOR JACKS OR OTHER LIFTING DEVICES, FAILURE TO DO SO CAN CAUSE DEATH, PERSONAL INJURY OR DAMAGE TO COMPONENTS.

For replacement brake service kits or If a part is not included in the brake service kit, contact Hendrickson Customer Service Department at (800) 660-2843.

1. Chock the rear wheels of the vehicle.
2. Set the parking brake.
3. Raise the lift axle and support with jack stands.
4. Remove wheel, brake drum and axle end components to expose the brake shoes.

FIGURE 10-29



5. Remove the outer retaining spring and inner retaining spring.
6. Support the lower brake shoe assembly and remove the return spring. Set parts aside and remove the upper brake shoe.
7. Remove the brake bolts and brake anchor pin. If lock straight target is present, note the position for proper reassembly location.
8. Hendrickson replacement brake kits for each specific axle will have the necessary parts to be replaced. Discard worn or damaged parts.
9. Install brake bolts through the anchor pin. Tightened to 160 foot pounds torque.
10. Install new parts in reverse order from Step 5.

NOTE: WHEN REINSTALLING THE RETAINING SPRING, ENSURE THE RETURN SPRING IS COMPLETELY CLIPPED INTO THE MOUNTING HOLE.

⚠ WARNING ENSURE THE RETURN SPRING IS COMPLETELY CLIPPED INTO THE MOUNTING HOLE. FAILURE TO DO SO COULD RESULT IN BRAKE FAILURE.

FIGURE 10-30

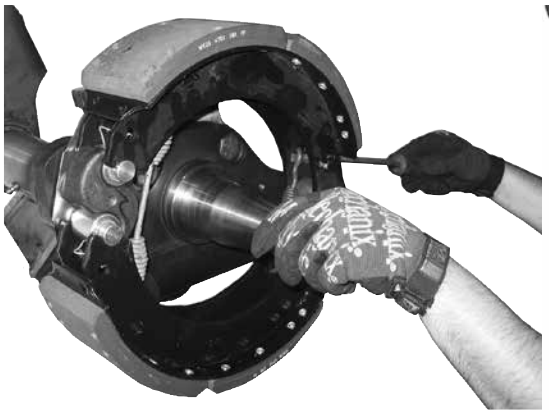


FIGURE 10-31

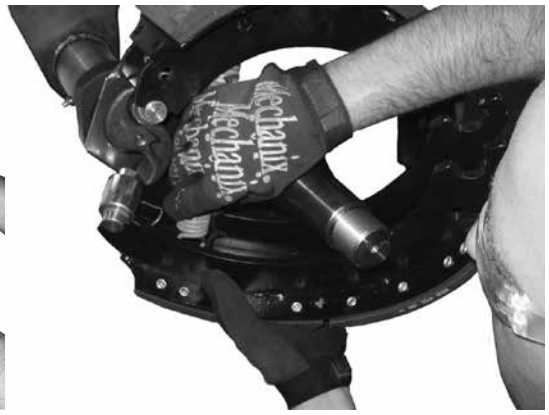


FIGURE 10-32

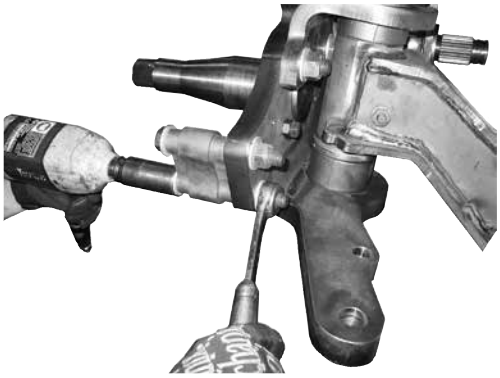
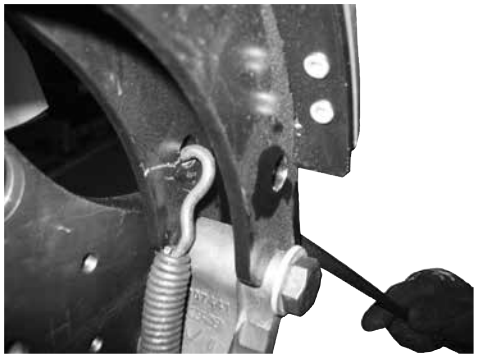


FIGURE 10-33



11. Install the wheel, brake drum and axle end components.
12. Remove jack stands and lower the lift axle.
13. Remove wheel chocks.

AIR CONTROL SYSTEMS

For the latest information about Hendrickson's air control systems, please refer to Technical Publication H817 LC Auxiliary Lift Axle Control Kits, which is available online at https://www.hendrickson-intl.com/Auxiliary

SECTION 11
TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	CORRECTION
Not getting the desired load on the axle	Not having proper air pressure to the ride air springs	a. Adjust the air pressure at regulator valve b. Verify sufficient pressure to the air control system
	Air control system not properly installed	Check plumbing of air system, refer to Hendrickson Publication Number H817
	Mounted too high Incorrect ride height specification	a. Larger tire b. Change axle seat height
Unit not getting the correct lift	Lift air springs not getting proper air pressure	a. Check system pressure b. Check air system plumbing, refer to Hendrickson Publication Number H817 c. Check air spring pressure
	Interference with chassis, drive line or other components	Inspect for interference
	Unit not installed properly	Check installation with factory installation drawing
Unit has vertical hop	Not running sufficient load	Increase air pressure
	Unbalanced tires	Balance tires
Axle Shimmy	Improper caster setting	Readjust caster if possible
	Toe setting is incorrect	Readjust toe setting, refer to Hendrickson Publication Number H785
	Axle bolt connection loose	Re-torque to factory torque values, see Torque Specification Section in this publication
	Pivot bolt connection loose	Re-torque to factory torque values, see Torque Specification Section in this publication
	Axle out of alignment	Re-align axle
	Tires different size on each side	Use same size tires
	Tires unbalanced	Balance tires
	Air pressure in tires different from side to side	Equalize air pressure
	Stabilizers worn	Verify stabilizer resistance and replace as necessary
Axle does not track forward	Toe setting	Set toe, refer to Hendrickson Publication Number H785
Axle does not track in reverse (Reverse Caster Only)	Inadequate air pressure to forward caster shift chambers	Increase psi minimum (100 psi)
	One or both forward caster shift chambers is damaged	Replace chamber(s)
	Hanger bracket mounted incorrectly on the frame rail	Remount frame rail bracket
	Installed unit is not designed to accommodate the reverse castor option	a. Contact Hendrickson Customer Service to spec out a unit with reverse caster if required or b. Lift axle is in reverse, if reverse caster is not necessary
Axle in reverse caster when lifted	Incorrect air line plumbing	Correct air plumbing, refer to Hendrickson Publication Number H817

SECTION 12
APPROVED WHEEL-END CONFIGURATIONS

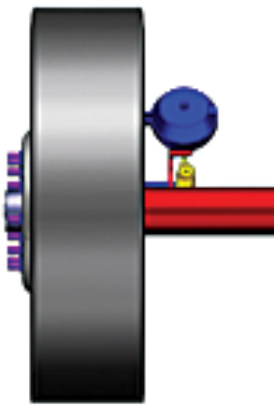
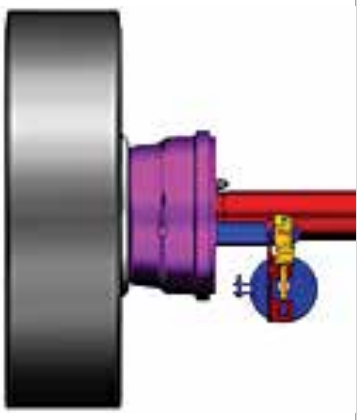
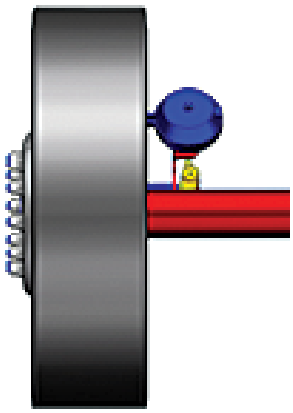
For more detailed information about approved wheel-end configurations, we recommend that you contact Hendrickson Customer Service: liftaxle@hendrickson-intl.com.

WHEEL-END LITERATURE

The following literature pertains to wheel-end options available on Hendrickson Auxiliary Lift Axle Suspension Systems. The latest revisions of these documents can be found online: https://www.hendrickson-intl.com.

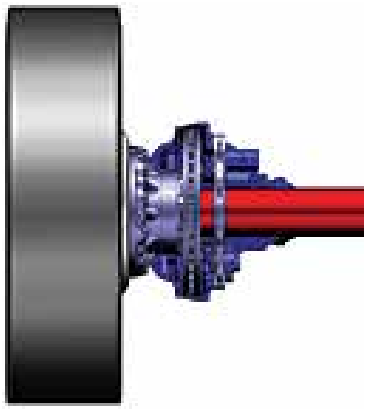
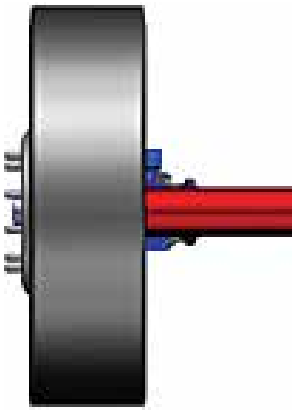
Product	Title/Description	Lit. #
HXL3®	Trailer Suspension Systems: Wheel-End System, Hub Maintenance Procedures	T72006
HXL5®	Trailer Suspension Systems: Wheel-End System, Hub Maintenance Procedures	T72007
TIREMAAX®	TIREMAAX® Pro and CP Tire Inflation Systems: Installation, Service & Trouble-Shooting Procedures	T51002

Approved Wheel-End Configurations: Drum Brakes			
Spindles & Wheels	15x4		
	TIREMAAX*	HXL 3/5	H-STANDARD
N-Spindle with Single wheels dished OUT	YES at13,500 LBS. AXLE RATING	YES at13,500 LBS. AXLE RATING	YES at13,500 LBS. AXLE RATING
P-Spindle with Single wheels dished OUT 16.5" or higher RH only	YES at13,500 LBS. AXLE RATING	YES at13,500 LBS. AXLE RATING	YES at13,500 LBS. AXLE RATING
FF (Truck Spindle) with Single wheels dished IN	NO	NO	YES at13,500 LBS. AXLE RATING
*Tire Pressure Control System			

Drum Brake Options		
N-Spindle 15x4 Drum Brakes Dished-In Wheels	P-Spindle 15x4 Drum Brakes Dished-Out Wheels	FF-Spindle 15x4 Drum Brakes Dished-In Wheels
		

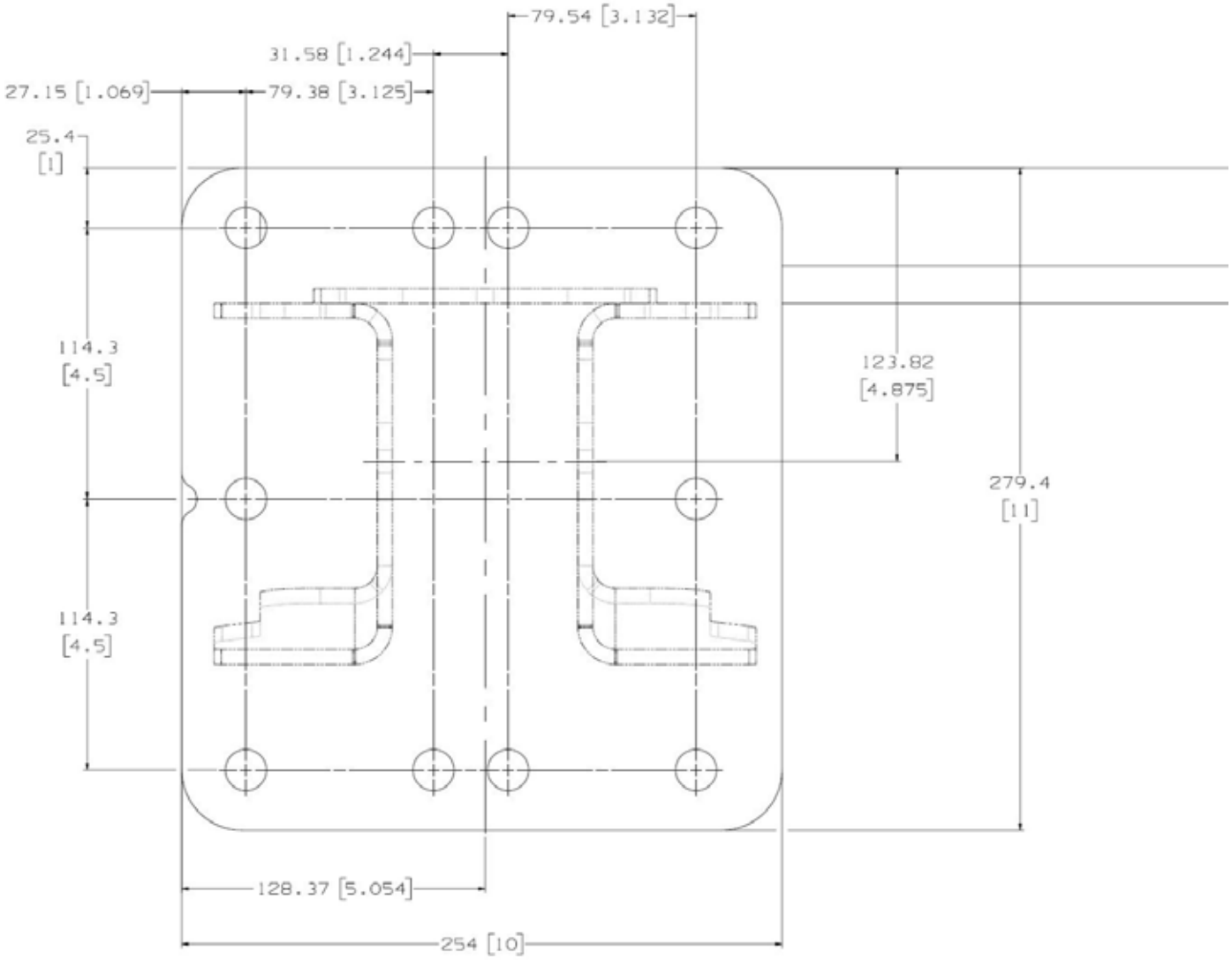
Approved Wheel-End Configurations: Disc Brakes			
Spindles & Wheels	MAAX22T		
	HXL 3/5	HXL 3/5& TIREMAAX*	H–STANDARD
P-Spindle Single wheels dished OUT 16.5" or higher RH only	YES at12,200 LBS. AXLE RATING	YES at12,200 LBS. AXLE RATING	YES at12,200 LBS. AXLE RATING
FF-Spindle (Truck) Single wheels dished IN	NO	NO	TBD

Spindles & Wheels	Bendix ADB22X		
	HXL 3/5	HXL 3/5 & TIREMAAX*	H–STANDARD
P-Spindle Single wheels dished OUT 16.5" or higher RH only	YES at11,000 LBS. AXLE RATING	YES at11,000 LBS. AXLE RATING	YES at11,000 LBS. AXLE RATING
FF-Spindle (Truck) Single wheels dished IN	NO	NO	YES at13,500 LBS. AXLE RATING
*Tire Pressure Control System			

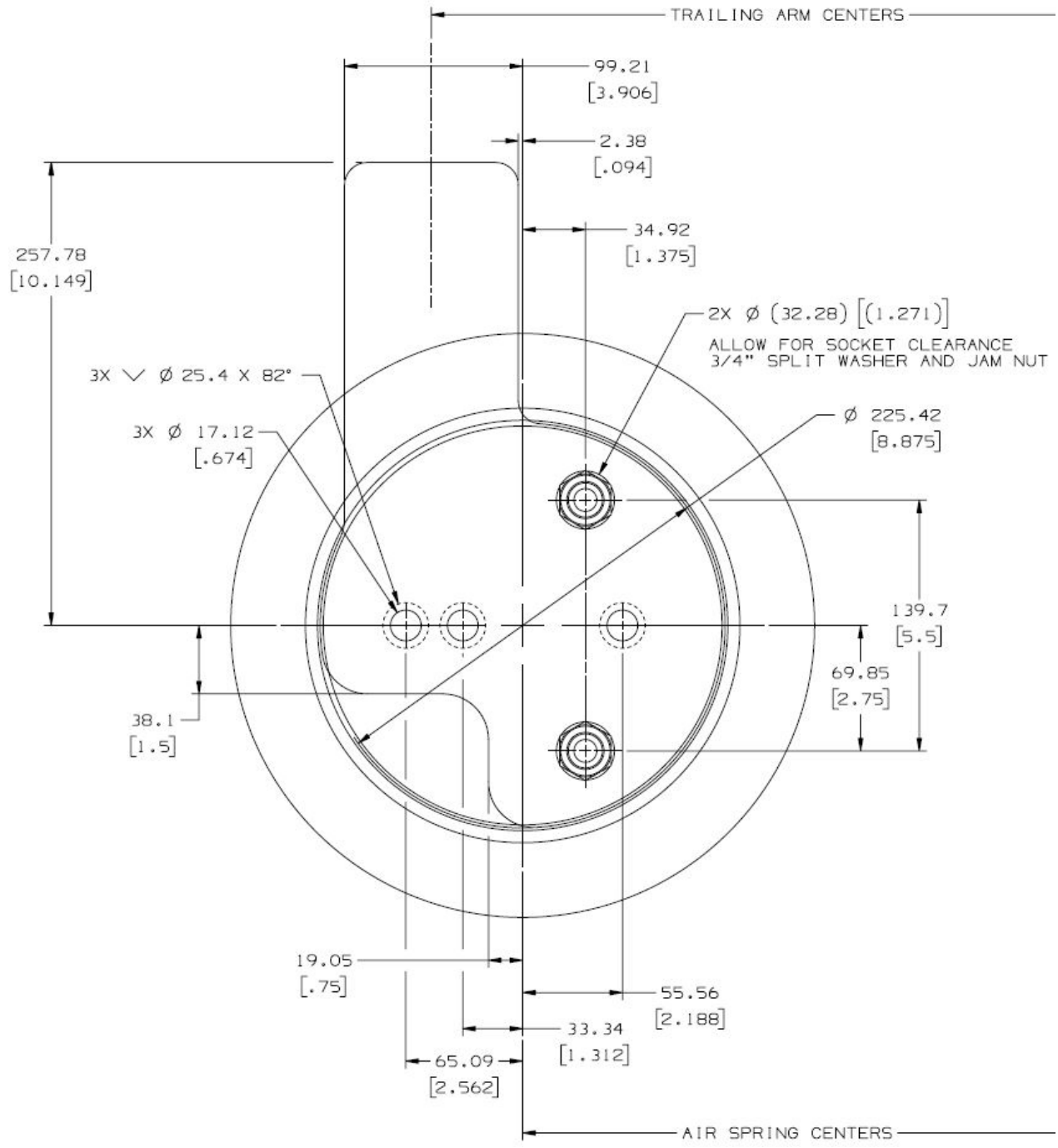
Disc Brake Options	
P-Spindle, Disc, Dished Out Wheels	FF-Spindle, Disc, Dished In Wheels
	

SECTION 13
TRAILER MOUNT DRAWINGS

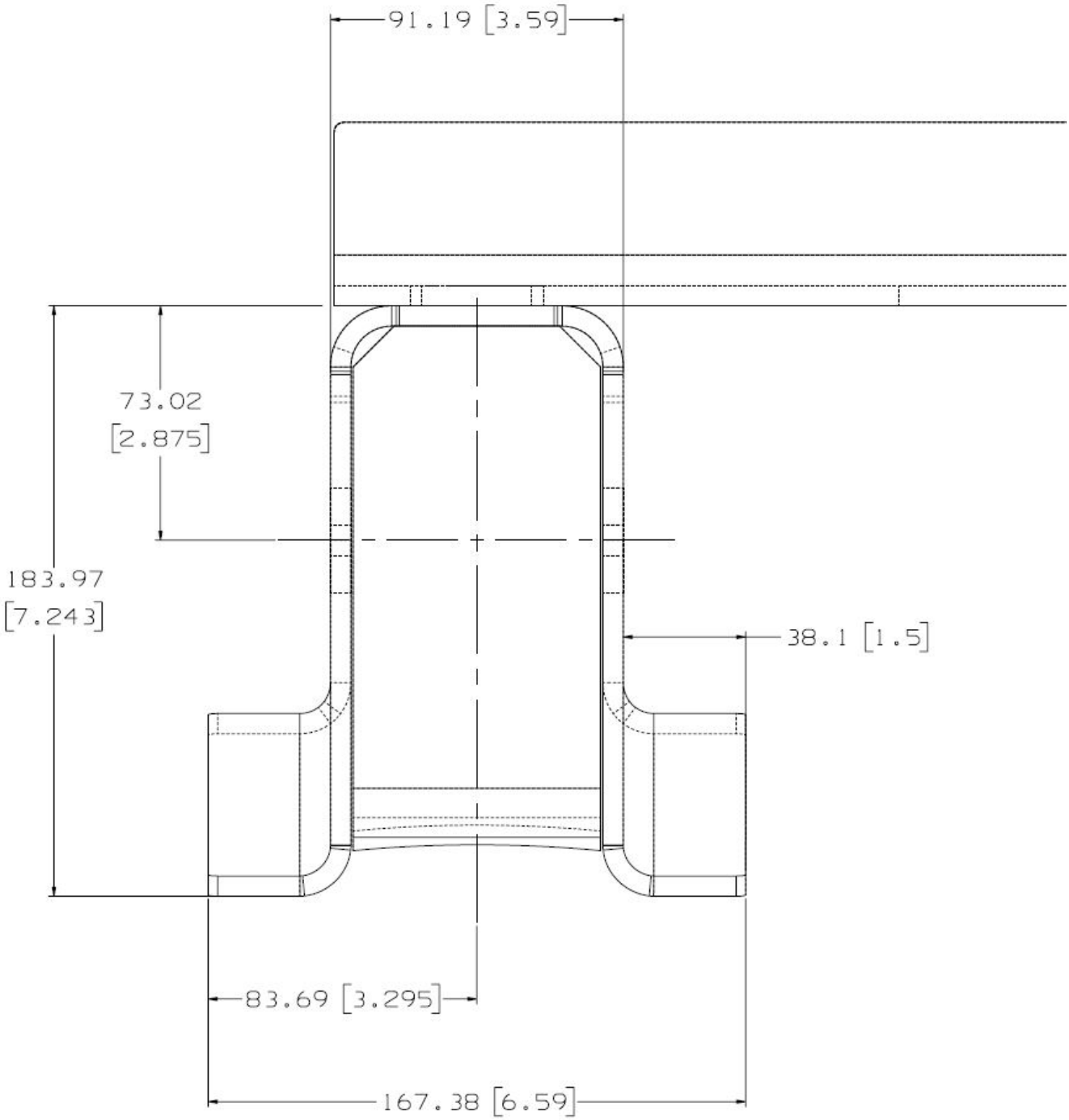
HANGER MOUNT: BOLT-ON



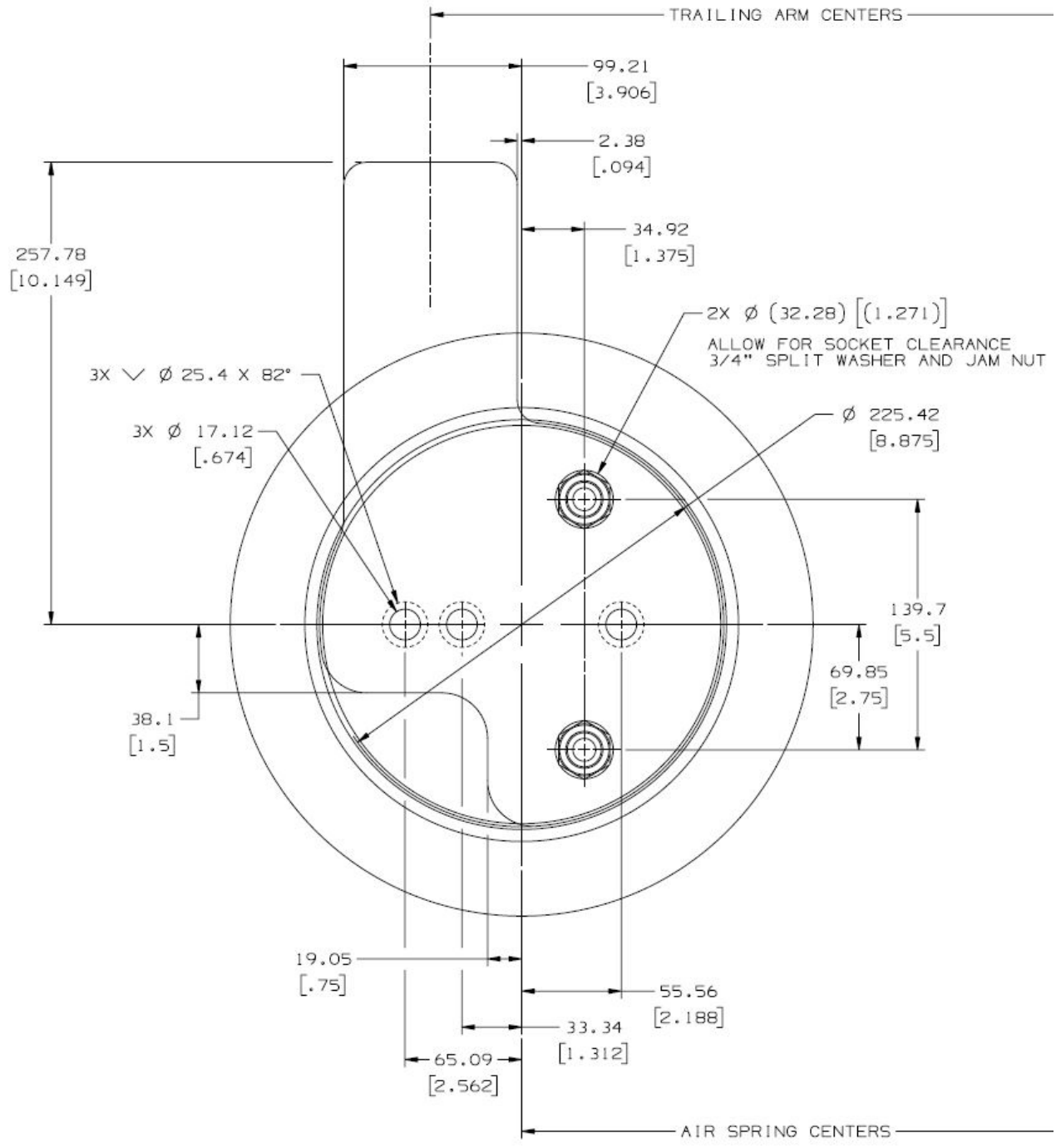
AIR SPRING MOUNT: BOLT-ON

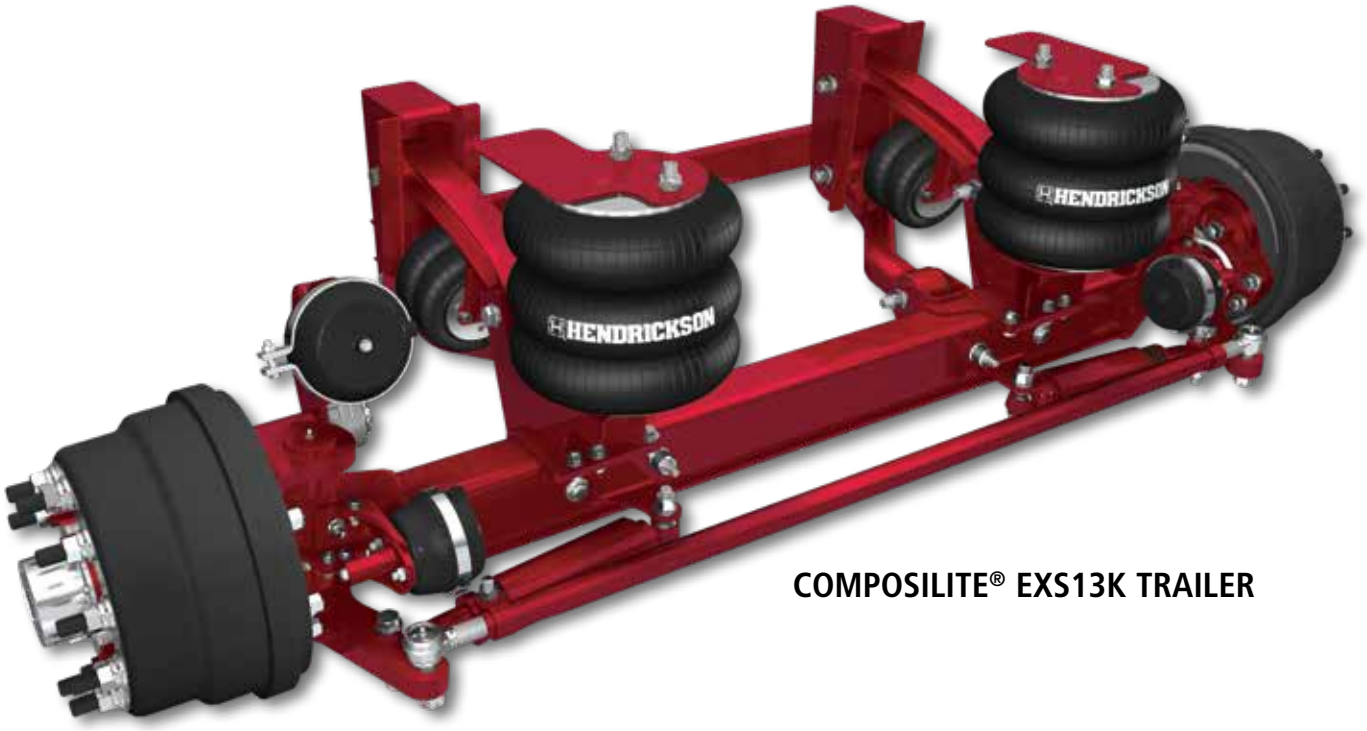


HANGER MOUNT: WELD-ON



AIR SPRING MOUNT: WELD-ON





COMPOSILITE® EXS13K TRAILER

Actual product performance may vary depending upon vehicle configuration, operation, service and other factors.
All applications must comply with applicable Hendrickson specifications and must be approved by the respective vehicle manufacturer with the vehicle in its original, as-built configuration.
Contact Hendrickson for additional details regarding specifications, applications, capacities, and operation, service and maintenance instructions.

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