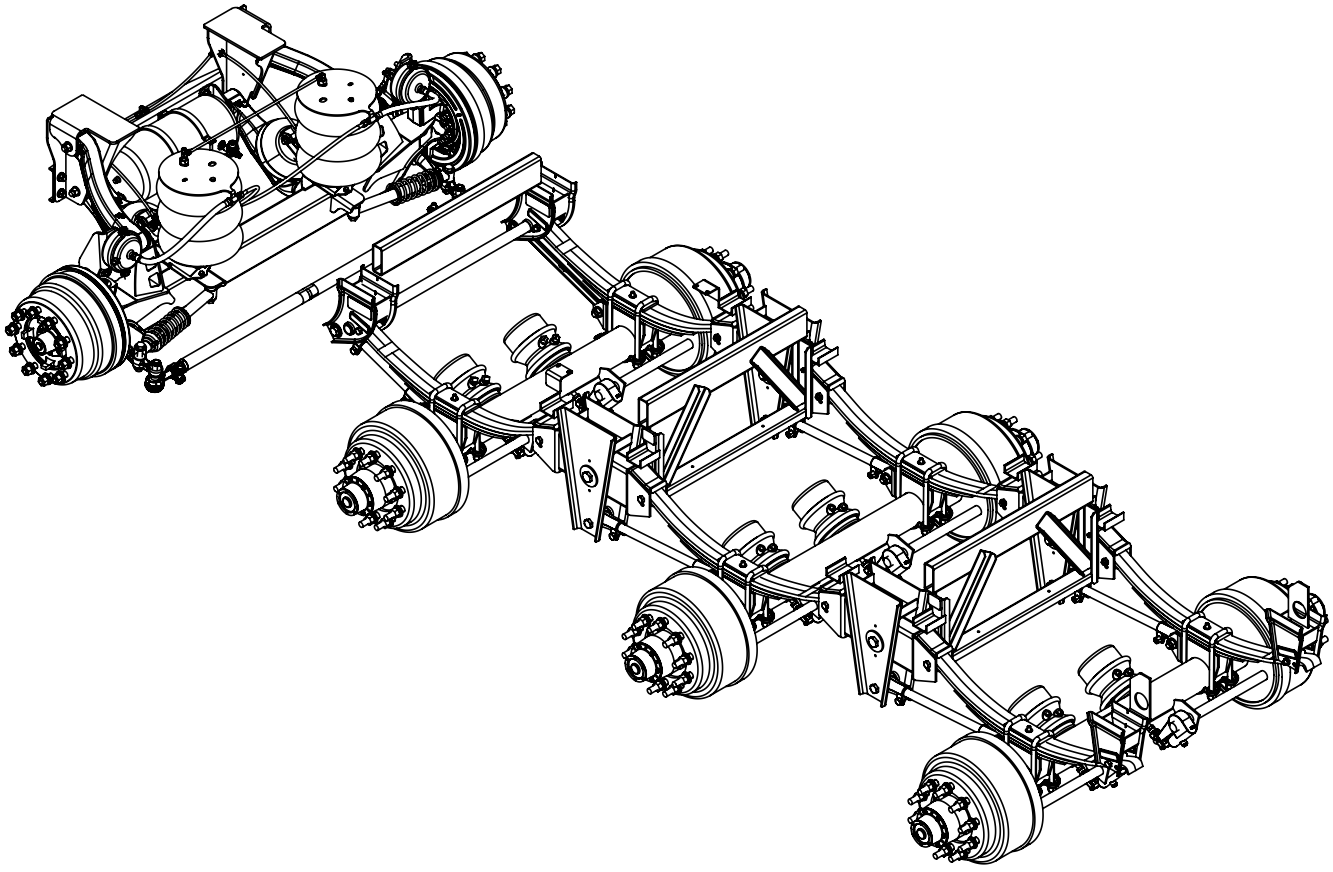
DEMCO

Doing Our Best to Provide You the Best

8SB00002, Rev AB
05/24

GONDOLA TRAILER AXLE GUIDE

5SB00413 **QUAD AXLE, TRI-AXLE SPRING W/FRONT AIR RIDE LIFT-STEER**



OPERATOR MANUAL

TABLE OF CONTENTS

In this document you will find information based on available knowledge at the time of its publication. To be accurate with the information, every effort was made but may not cover all details or variations of a trailer or provide every possibility in connection with its production, operation and maintenance. A Feature and Option may be presented in the manual that is not relevant to this trailer. Demco assumes no obligation of notice, to holders of this document, with changes made to a product.

SPECIFICATIONS AND DESIGN ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Demco is often making improvements and developing new designs. In doing so, we reserve the right to make changes and/or improvements without obligation for equipment sold beforehand. Self-modification to our trailers may affect the operation, function, and safety, so this is not advised. If a replacement part is necessary, Demco should supply it, please contact your nearest dealer or Demco.

DEMCO STATEMENT OF PRODUCT SAFETY

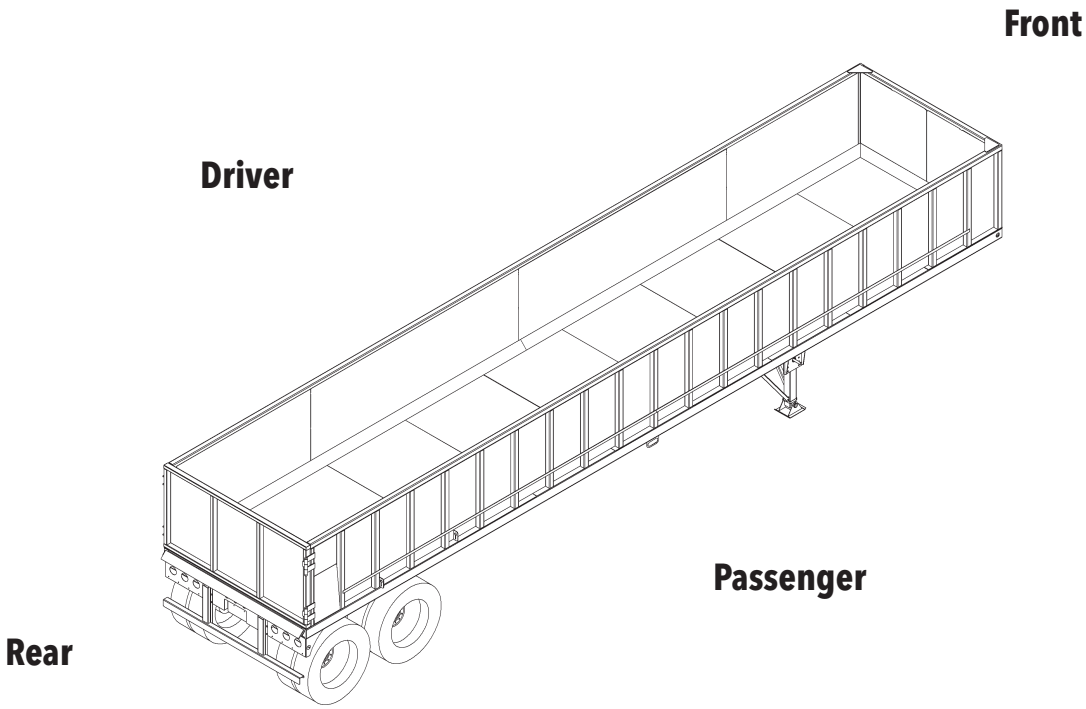
As a producer of agricultural and transportation equipment, Demco is fully aware of its responsibility of providing its customers products that perform their expected use, in a truly safe manner. Safety considerations shall be a fundamental and high precedence part of all engineering/design analysis and judgments involving Demco products. It is our stated policy that our products will be manufactured to coincide with the safety standards specified by the National Association of Trailer Manufacturers and/or any other officially recognized standards at the time manufactured. However, this statement should not be translated to mean that our product will uphold against a customer's own carelessness or disregard for common safety practices specified in each product's manual, nor will we be accountable for any such occurrence.

GENERAL INFORMATION

Demco requires that you and anyone else who will be operating and maintaining the trailer read and understand the guidelines in the manual for safe, efficient, and trouble free operations. Proper maintenance, adjustments and use will result in many years of service. Keep this manual handy for frequent reference and to pass on to new operators or owners. If assistance, information, or additional copies of the manual are needed, contact the nearest dealer, a distributor, or Demco.

PLEASE NOTE

- All documents within the manual referring to products not manufactured by Demco have been printed with the permission of the respective manufacturer.
- All references to driver, passenger, front and rear of the trailer are determined from a position behind the trailer and facing forward.



Tighten all bolts to torques specified in chart unless otherwise noted. Check tightness of bolts periodically, using bolt chart as guide. Replace hardware with same grade bolt.

NOTE: Unless otherwise specified, high-strength Grade 5 hex bolts are used throughout assembly of equipment.

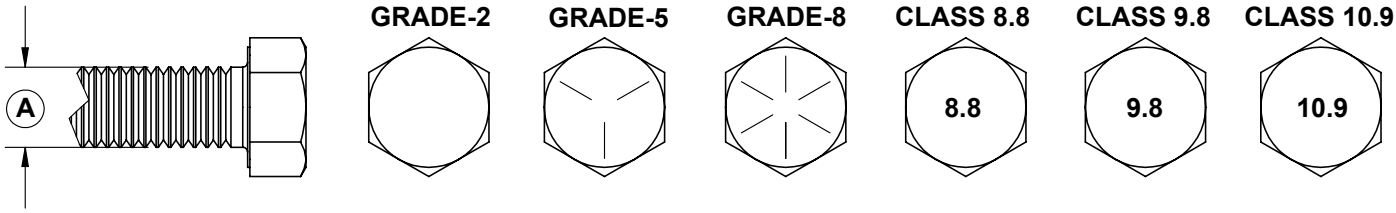
TORQUE SPECIFICATIONS

Bolt Torque for Standard Bolts *						
"A"	GRADE 2		GRADE 5		GRADE 8	
	lb-ft	(N.m)	lb-ft	(N.m)	lb-ft	(N.m)
1/4"	6	(8)	9	(12)	12	(16)
5/16"	10	(13)	18	(25)	25	(35)
3/8"	20	(27)	30	(40)	45	(60)
7/16"	30	(40)	50	(70)	80	(110)
1/2"	45	(60)	75	(100)	115	(155)
9/16"	70	(95)	115	(155)	165	(220)
5/8"	95	(130)	150	(200)	225	(300)
3/4"	165	(225)	290	(390)	400	(540)
7/8"	170	(230)	420	(570)	650	(880)
1"	225	(300)	630	(850)	970	(1310)

Bolt Torque for Metric Bolts *						
"A"	CLASS 8.8		CLASS 9.8		CLASS 10.9	
	lb-ft	(N.m)	lb-ft	(N.m)	lb-ft	(N.m)
6	9	(13)	10	(14)	13	(17)
7	15	(21)	18	(24)	21	(29)
8	23	(31)	25	(34)	31	(42)
10	45	(61)	50	(68)	61	(83)
12	78	(106)	88	(118)	106	(144)
14	125	(169)	140	(189)	170	(230)
16	194	(263)	216	(293)	263	(357)
18	268	(363)	--	--	364	(493)
20	378	(513)	--	--	515	(689)
22	516	(699)	--	--	702	(952)
24	654	(886)	--	--	890	(1206)

Torque figures indicated are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or cap screws unless otherwise specified in this manual. When using locking elements, increase torque values by 5%.

* GRADE or CLASS value for bolts and cap screws are identified by their head markings.



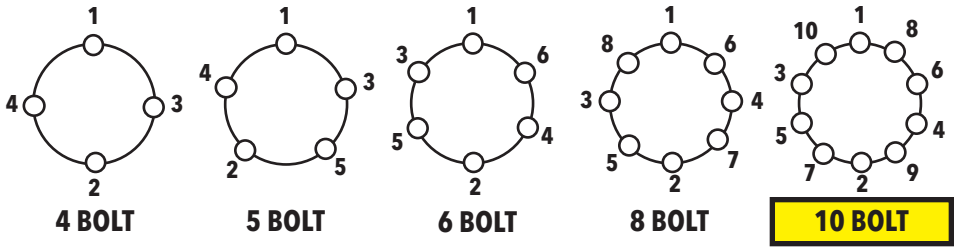
BOLT TORQUE REQUIREMENTS

It is extremely important to apply and maintain proper wheel mounting torque on your trailer axle. Torque is a measure of the amount of tightening applied to a fastener (nut or bolt) and is expressed as length times force. For example, a force of 90 pounds applied at the end of a wrench one foot long will yield 90 lbs-ft of torque. Torque wrenches are the best method to assure the proper amount of torque is being applied to a fastener.

> **NOTE:** Wheel nuts or bolts must be applied and maintained at the proper torque levels to prevent loose wheels, broken studs, and possible dangerous separation of wheel from your axle.

Be sure to use only the fasteners matched to the cone angle of your wheel (usually 60 degrees or 90 degrees). The proper procedure for attaching your wheels is as follows:

1. Start all bolts or nuts by hand to prevent cross threading.
2. Tighten bolts or nuts in the following sequence.
3. The tightening of the fasteners should be done in stages. Following the recommended sequence, tighten fasteners per wheel torque requirements diagram:

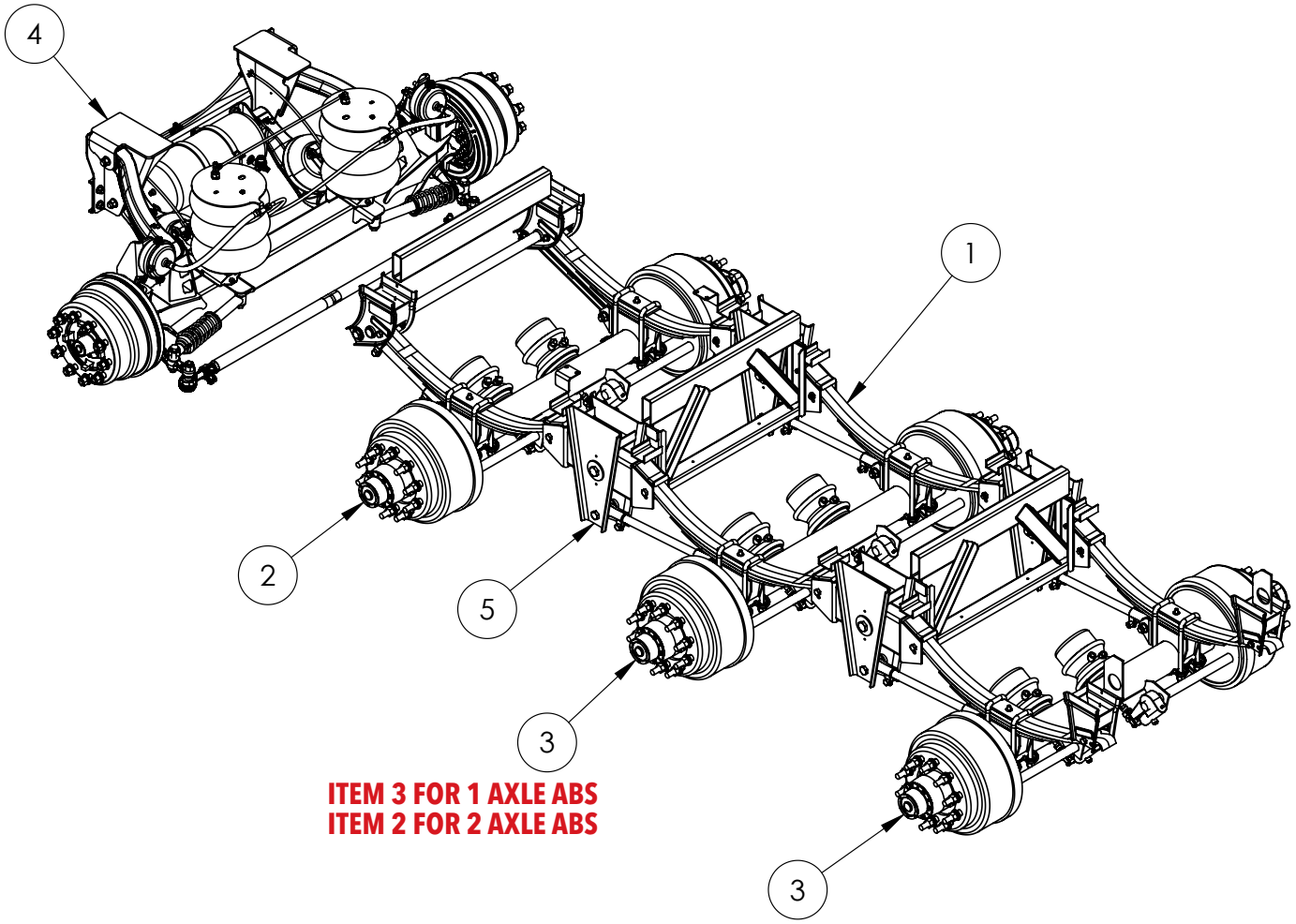


4. Wheel nuts or bolts should be torqued before first road use and after each wheel removal. Check and re-torque after the first 50 miles and again at 100 miles. Check periodically thereafter.

WHEEL AND RIM TORQUE REQUIREMENTS

Description	Application	Minimum Torque (lbs-ft)	Maximum Torque (lbs-ft)
1/2" Cone Nut	12" – 13" Wheel	50	65
	14" – 15" Wheel	90	120
5/8" Cone Nut	Flat Disc Wheel	175	225
3/4" Hex Nut	Demountable Ring Clamp	210	260
3/4" Spherical Nut	Single Wheel	450	500
	Inner Dual	450	500
1-1/2" Spherical Nut	Outer Dual	450	500
5/8" Flange Nut	Wheels	275	325

Ref No.	Part Number	Qty	Description
1	1AS0SN32250	6	3 LEAF HIGH ARCH SPRING
2	1AAA225SAHS	1	22.5K AXLE W/ ABS, HUB PLT, LONG STUD
3	1AAB225SAHS	2	22.5K AXLE W/O ABS, DRESSED, LONG STUD
4	1ASAP4322	1	SUSPENSION KIT, WATSON & CHALIN STL1191
5	1ASV0D3225G	4	TRI-AXLE SUSP 61" W/S 2.75 SEAT STRADDLE MOUNT



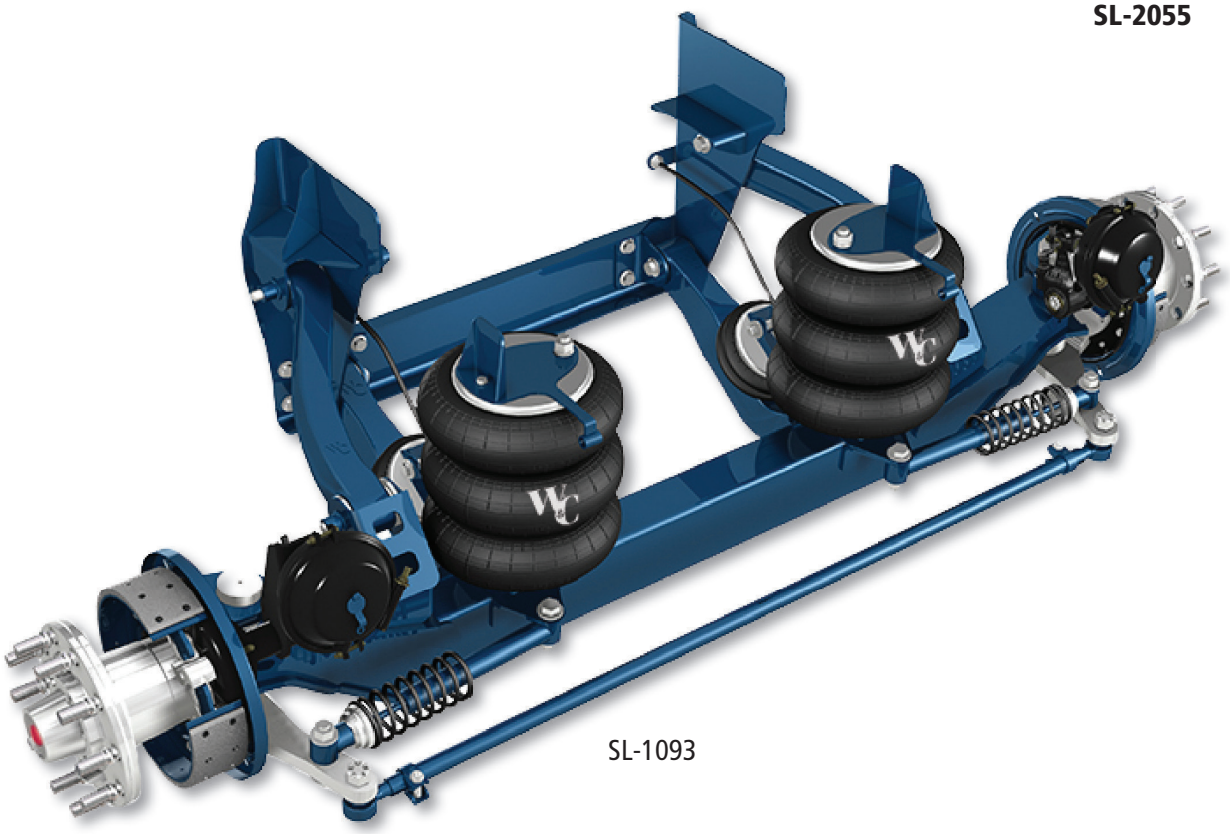
ITEM 3 FOR 1 AXLE ABS
ITEM 2 FOR 2 AXLE ABS

INSTALLATION AND OPERATION MANUAL

STEERABLE LIFT AXLE SYSTEMS

SL SERIES

SL-089X
SL-1093
SL-1190
SL-2055



SL-1093

Delivering Suspension Solutions

For more information, call 800.445.0736

1. Introduction

This publication is to acquaint and assist you in installing and operating the Watson & Chalin Auxiliary Steerable Liftable Air Ride Suspension Product Line and is intended for use only with this Product Line.

This manual includes installation and operating information on Watson & Chalin model numbers:

SL-089X
SL-1093
SL-1190
SL-2055

Watson & Chalin reserves the right to change its products or manuals at any time. Contact Watson & Chalin at 1.800.445.0736 for information on recent changes to products.

Defective components should be returned to Watson & Chalin with a pre-arranged Returned Goods Authorization (RGA) number through the warranty department. If the defect is in compliance with warranty conditions, the defective component may then be replaced.

If the part is damaged in shipment, please contact the freight company to file a claim. The freight company is responsible for any damage to components during shipment.

IMPORTANT

The entire manual must be read and understood before proceeding with installation or service of any components.

This manual should be used in conjunction with corresponding drawings that come with Watson & Chalin suspensions upon delivery.

The vehicle manufacturer must approve any changes to the vehicle frame before the changes are done. Cutting or altering the vehicle's frame is normally not permitted by the manufacturer and affects the manufacturer's warranty coverage.

1.1 Installer Responsibility

The installer of the suspension system must:

- Ensure that the vehicle functions properly with the increased weight of an additional axle.
- Determine the correct location of the suspension to provide the proper vehicle load distribution as to not exceed the rated capacity of the components involved.
- Ensure the installation of the correct brake system components to guarantee proper braking performance. Brake installation must comply with FMVSS121 specifications.
- Ensure that proper clearance exists between the drive shaft and the auxiliary axle.
- Ensure suspension operates within run range.

2. Before You Begin

Before you begin to install the Watson & Chalin suspension system, you must:

- Check specifications on suspension systems to be sure that the correct suspension system was chosen for the vehicle.
- Verify the vehicle frame width is within the allowable mounting range of the suspension and that the vehicle crossmembers are correctly positioned.
- Mark the location of the suspension side rails and check for interferences with existing bracketry and components.
- Check for interference between the axle and drive shaft.
- Ensure suspension operates within the run range.

2.1 Safety Explanations

Watson & Chalin uses the following types of notes to warn against possible safety problems and to give information that helps to prevent damage to equipment.

IMPORTANT

An important message indicates a procedure that should be followed exactly.

WARNING

A warning indicates hazards or unsafe practices that could result in severe personal injury or death, if the procedure is not followed exactly.

WARNING

All safety statements should be read carefully to prevent bodily injury, to assure that parts are assembled properly and to retain the manufacturer's warranty.

2.2 Warning

WARNING

Proper axle attachment required for safe operation of the vehicle.

WARNING

No alteration of any Watson & Chalin suspension components is permitted without proper authorization from qualified Watson & Chalin personnel.

WARNING

No welding of any suspension components is permitted except when specified by Watson & Chalin.

2.3 Identifying Your Model

IMPORTANT

It is important that you know what model number has been assigned to your assembly in case you ever need to contact Watson & Chalin.

Identification Plate

Each suspension assembly has an identification plate located on the left side rail assembly. This is on the driver's side of the vehicle. The plate includes the model number, serial number and capacity in pounds for the assembly. It is important to record the model and serial number for future reference.

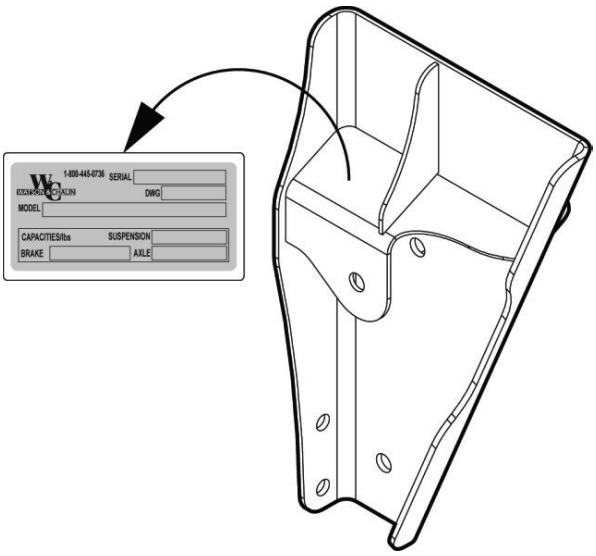


FIG – 1 Identification Plate

3. Ride Height

Ride Height, also referred to as Run Height, is the distance between the suspension mounting surface, or the bottom of the vehicle frame and the spindle center of the auxiliary lift able axle in the lowered run position. It is one of the most important dimensions to obtain and when set properly, allows for the optimum amount of lift that the axle can achieve.

IMPORTANT

A correct installation requires that the suspension ride height be within the range specified on the corresponding drawing when the vehicle is in its loaded condition.

Watson & Chalin provides numerous different SL series suspension systems to accommodate different vehicle ride heights and capacities.

3.1 Calculating Ride Height

Proper Ride Height is calculated with the following equation:

Ground to Bottom of Vehicle Frame (loaded) _____

Static Loaded Tire Radius –_____

Ride Height = _____

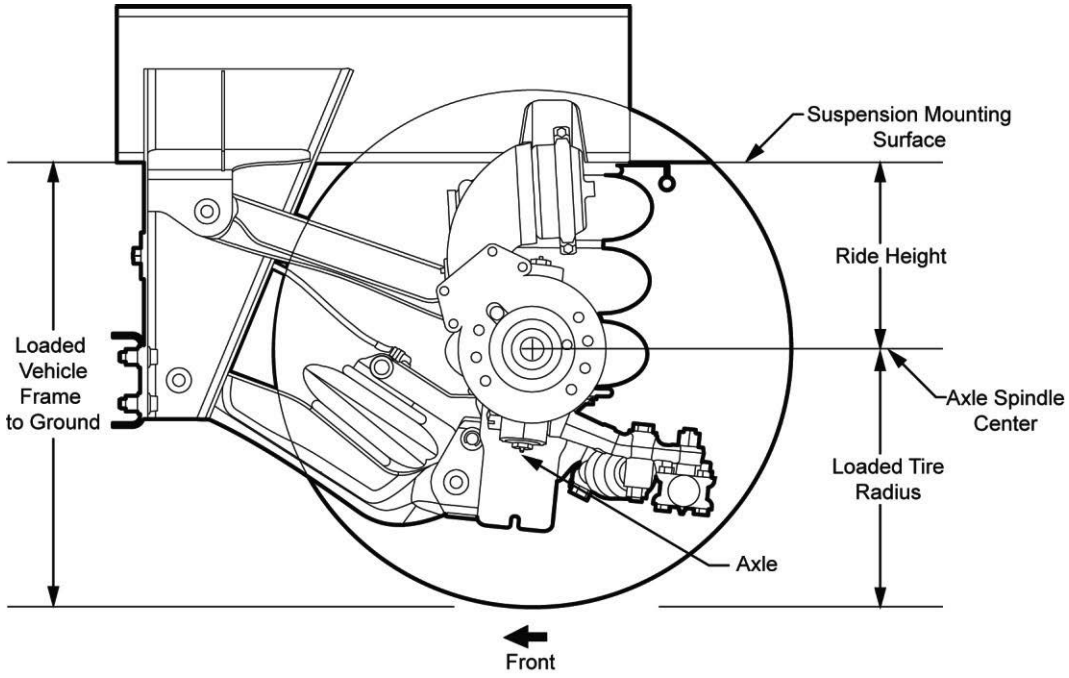


FIG – 2 Ride Height

4. Installation

The following instructions are for installing the components of the Watson & Chalin SL Series Suspension systems. All model numbers in the series are installed using the same set of instructions. Watson & Chalin assumes that the correct auxiliary suspension and axle were chosen based on the individual design criteria.

The suspension systems must be installed with the proper amount of tire-to-ground clearance to ensure trouble free operation of the vehicle. If there is too much ground clearance, the suspension will not carry its share of the load, straining the other suspension components. When there is too little ground clearance or if the suspension is overloaded, the vehicle will bottom out while going over bumps and damage can be done to the suspension components or other components on the vehicle.

4.1 Mounting the Suspension

Before mounting the suspension, you must:

- Confirm that the proper suspension and axle was chosen based on your company's specifications.
- Ensure the chassis frame has the proper crossmember reinforcement in the area where the auxiliary axle hanger/rail is located.
- If you had the vehicle frame predrilled for mounting the SL series axle prior to purchase, make sure to align to these bolt positions.
- Also remember to remove the associated bolts from the frame prior to axle alignment and installation.

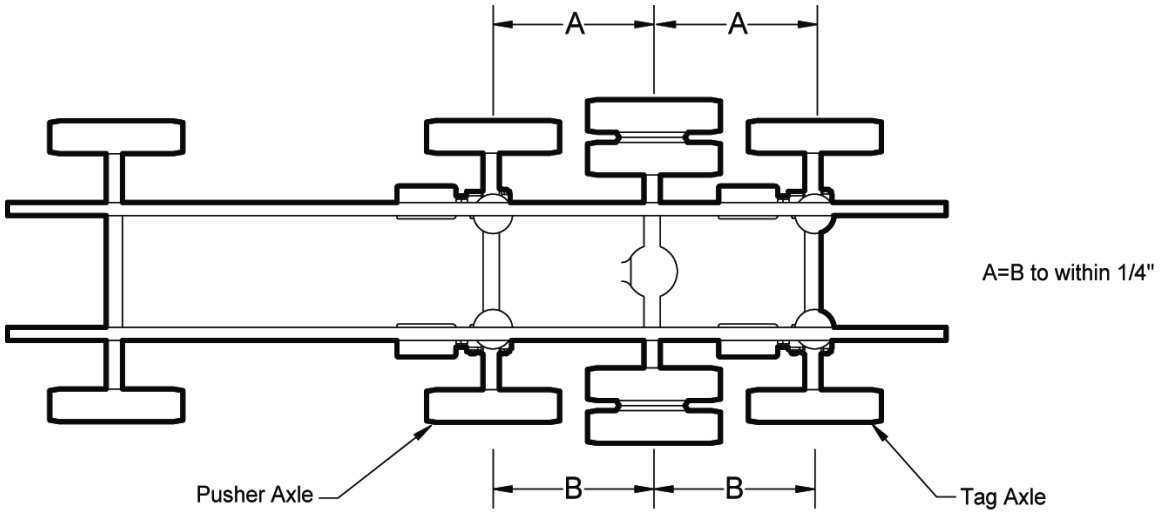


FIG – 3 Pusher and Tag Axle Alignment

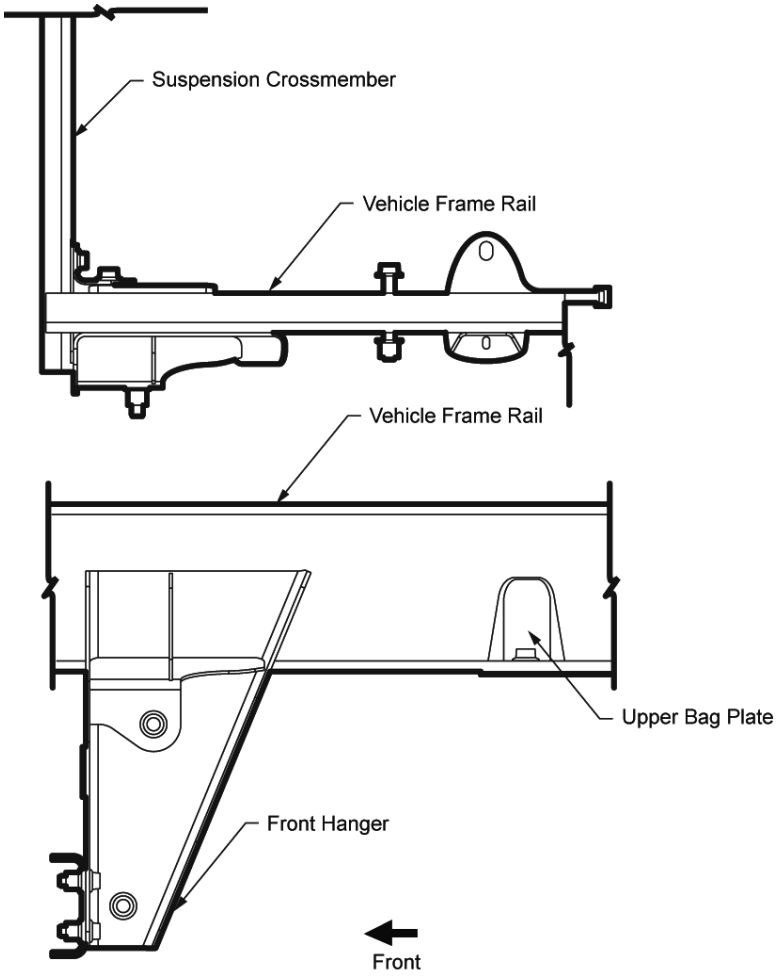
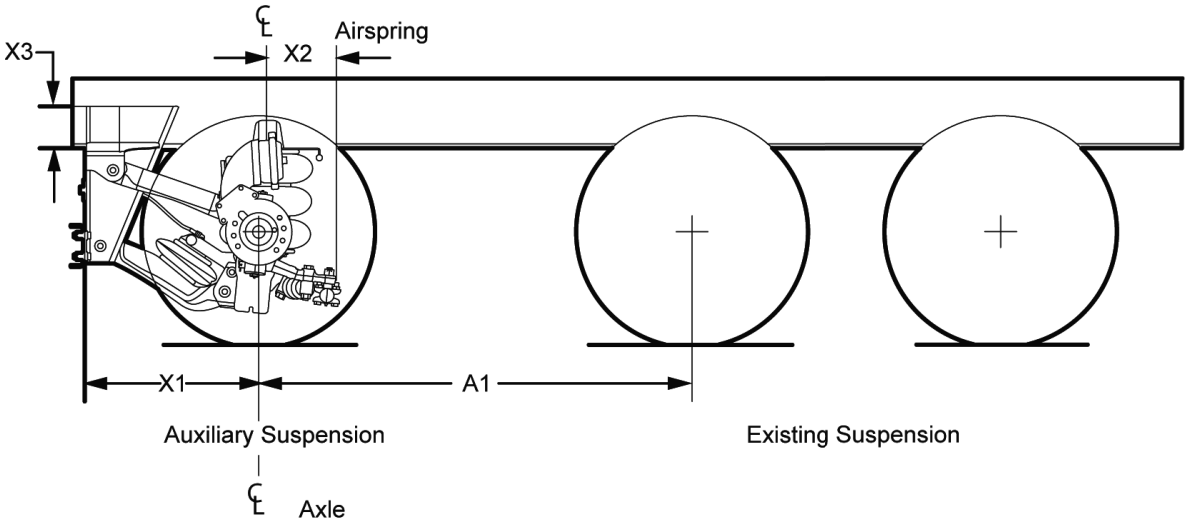


FIG – 4 Chassis Crossmember Reinforcement

NOTE

Throughout the installation process you must check frequently for suspension clearance problems while mounting the suspension.

To mount the suspension to the vehicle:



A_1 = Dimension of axle location (customer supplied).

X_1 = Axle center line to suspension front dimension (located on suspension assembly drawing).

X_2 = Axle center line to rear of stabilizer shock dimension.

X_3 = Bottom of chassis frame to top of side rail.

Front

FIG – 5 Suspension Mounting

1. Place the vehicle on a level surface.
2. Mark the approximate location of the suspension side rail assemblies on the vehicle frame rails.
3. Check for interference with any existing brackets or mounting bolts.
4. Locate the auxiliary axle mounting position.
5. From the centerline of the axle at the wheel center, mark the location of this axle measurement on the outside of the vehicle frame rail.
6. Raise the back end of the frame using either a lift, jack or driving the rear axles and tires onto a lift.
7. Raise the suspension into position using the marked axle, front hanger rail and upper bag plate center line as locators.

NOTE

If, while raising the SL series suspension into place, the hangers get stuck on the frame because they are too narrow. Loosen the bolts on one side of the crossmember. This will allow the hangers to separate enough to move into position. If you have a welded crossmember you will not be able to loosen in this way.

8. Using clamps, clamp the suspension rail to the vehicle frame rail.

IMPORTANT

Both the side and bottom mounting surfaces must sit flush with the side and bottom of the vehicle frame rails or spacers, or the suspension warranty is invalid. See figure 6.

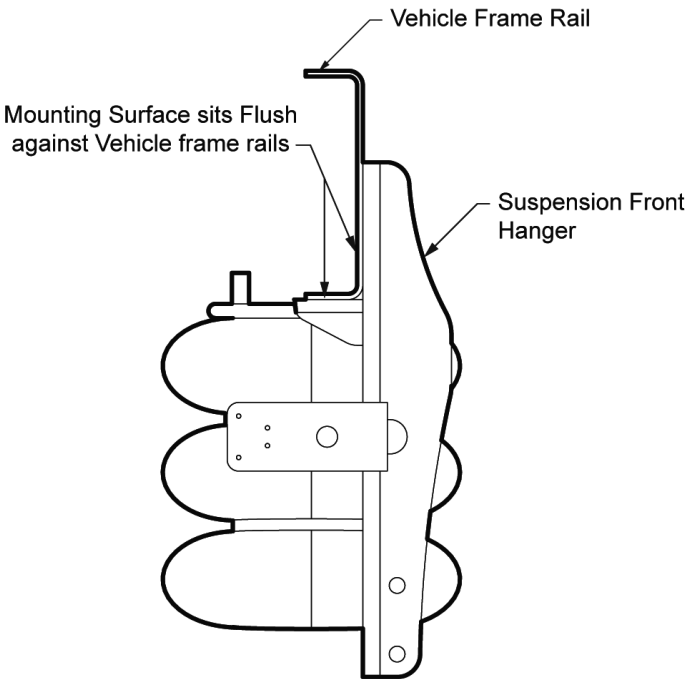


FIG – 6 Frame Alignment

9. Mark the location of the mounting holes on the outside of both suspension frame rails.

10. Inspect vehicle frame rails for any items that may cause drilling obstructions.

WARNING

Welding, drilling or bolting through the bottom flange of the suspension frame or vehicle rails voids the manufacturer's warranty.

NOTE

5/8" SAE Grade 8 UNF fasteners for the SL089X and SL1093, and 3/4" SAE Grade 8 UNF fasteners for the SL1190 and SL2055 suspensions.

11. Drill two holes (21/32" diameter for 5/8" fastener, 13/16" diameter for 3/4" fastener) through each suspension rail and vehicle frame rail.

12. Fasten each suspension side rail to the vehicle frame using the appropriate size/grade fastener specified above, flat washer and lock nut. Use at least 2 bolts per side.

13. Drill remaining mounting holes per side rail. See furnished suspension drawing for recommended fastener quantities and locations.

14. Install the remaining bolts, washers and lock nuts and tighten cap screws to proper torque. See "Torque Requirements" on page 13 for details.

15. Drill a minimum of one 21/32" diameter holes through the upper air spring mounting brackets and chassis frame.

16. Fasten each bag plate assembly with 5/8" SAE grade 8 UNF fine thread cap screws, flat washers and lock nuts as seen in figure 7.

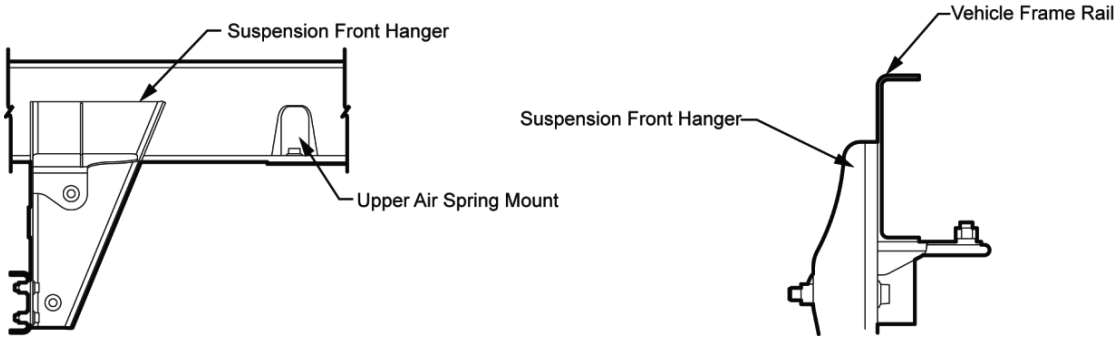


FIG – 7 Recommended Fastening Method

17. Check the front hanger for proper arm centers.

18. Align the crossmember with side rail.

NOTE

Hangers must be parallel to one another to ensure proper operation.

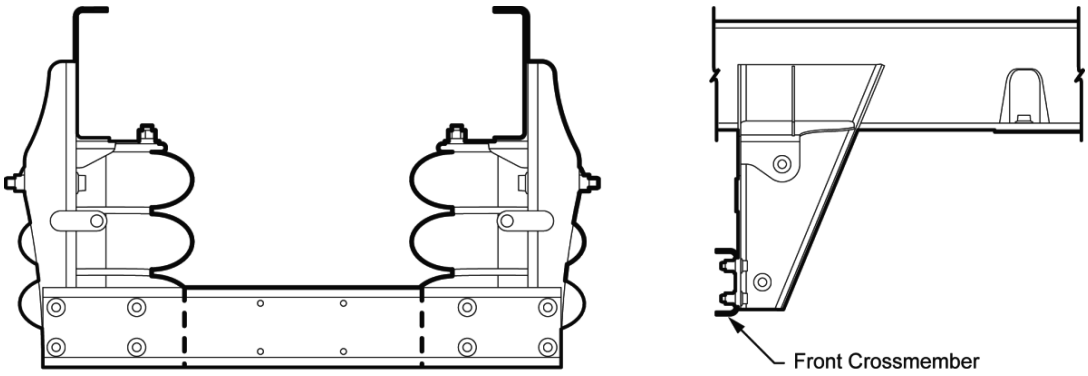


FIG – 8 Front Lower Crossmember

19. Attach crossmember to the suspension front hangers with supplied fasteners and tighten to specified torque values.

20. Remove the clamp from the vehicle frame rails.

4.2 Adjusting Maximum Turn Angle

This section is used to check and adjust, if necessary, the maximum turn angle of SL Series suspension systems in order to obtain proper clearance.

NOTE

SL 089X, SL 1093, SL 1190 Suspensions have permanent Non-Adjustable Stops.

To adjust the maximum Turn Angle:

1. Measure the current Turn Angle.

2. The maximum turn angle for SL Series models is normally set at the maximum 25º. Some suspensions may require less turn angle.

3. If the maximum turn angle needs to be adjusted, adjust the stop bolt until the correct maximum angle is obtained on both sides.

4. To obtain the maximum Turn Angle:

   a. Loosen the stop bolt jam nut as seen in figure 9.

   b. Adjust the turn angle by adjusting the stop bolt in or out.

   c. Tighten the jam nut to 65-85 lbs. /ft.

WARNING

Do not turn the stop bolt so much that the bolt end protrudes past the brake spider as this can cause damage to other components.

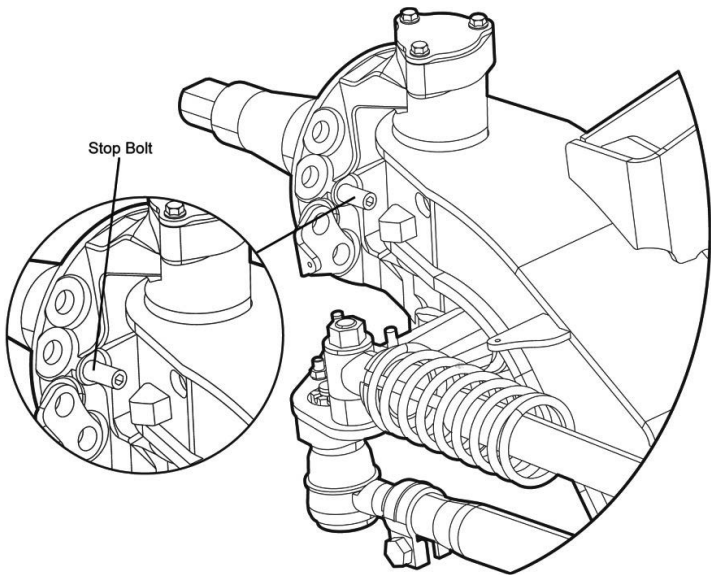


FIG – 9 Stop Bolt Location

4.3 Adjusting Wheel Toe-in

Toe-in is the relationship of the distance between the front and rear of the tires or the amount at which the front wheels point inward. Toe-out is the amount at which the tires point outward. When the front distance is less than the rear distance, the wheels are in a “toe-in” condition. Most tire wear is caused by incorrect toe settings.

To adjust wheel Toe-in:

1. Place the vehicle on a level surface.
2. Lift the axle until tires are free to spin.
3. Use paint or chalk to mark the horizontal center of tires around the complete outer surface of the tire.
4. Place the pointers of a trammel bar on the marks of each tire and rotate the tires making sure a straight line has been marked.
5. Measure and record the distance at the back of the tires.
6. Measure and record the distance at the front of the tires.
7. Use the following calculation to determine the Toe-in measurement.

Distance between back tires (R) _____

Distance between front tires (F) –_____

Toe-in must be “0.09” + or – “0.03”. = _____

NOTE

A positive result is considered Toe-in and a negative result is considered Toe-out.

8. If the Toe-in measurement is not at the specified distance:

- Loosen clamp bolts and nuts at each end of the tie rod.
- Turn tie rod tube with a pipe wrench to adjust wheel Toe-in.
- Tighten clamp bolts to the proper torque.

9. Repeat step 1 through step 8 until correct Toe-in is obtained.

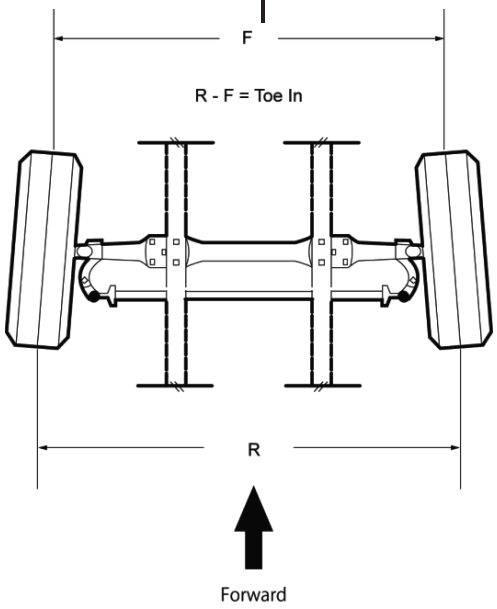


FIG – 10 Toe-in

5. Torque Requirements

Torque specifications listed in the following tables are applied to nuts, but not bolts. All torque requirements are for lubricated threads only. A lubricated thread is defined as a bolted connection that has some form of friction modifier or lubricant applied to the thread surfaces, which provides a lower torque requirement.

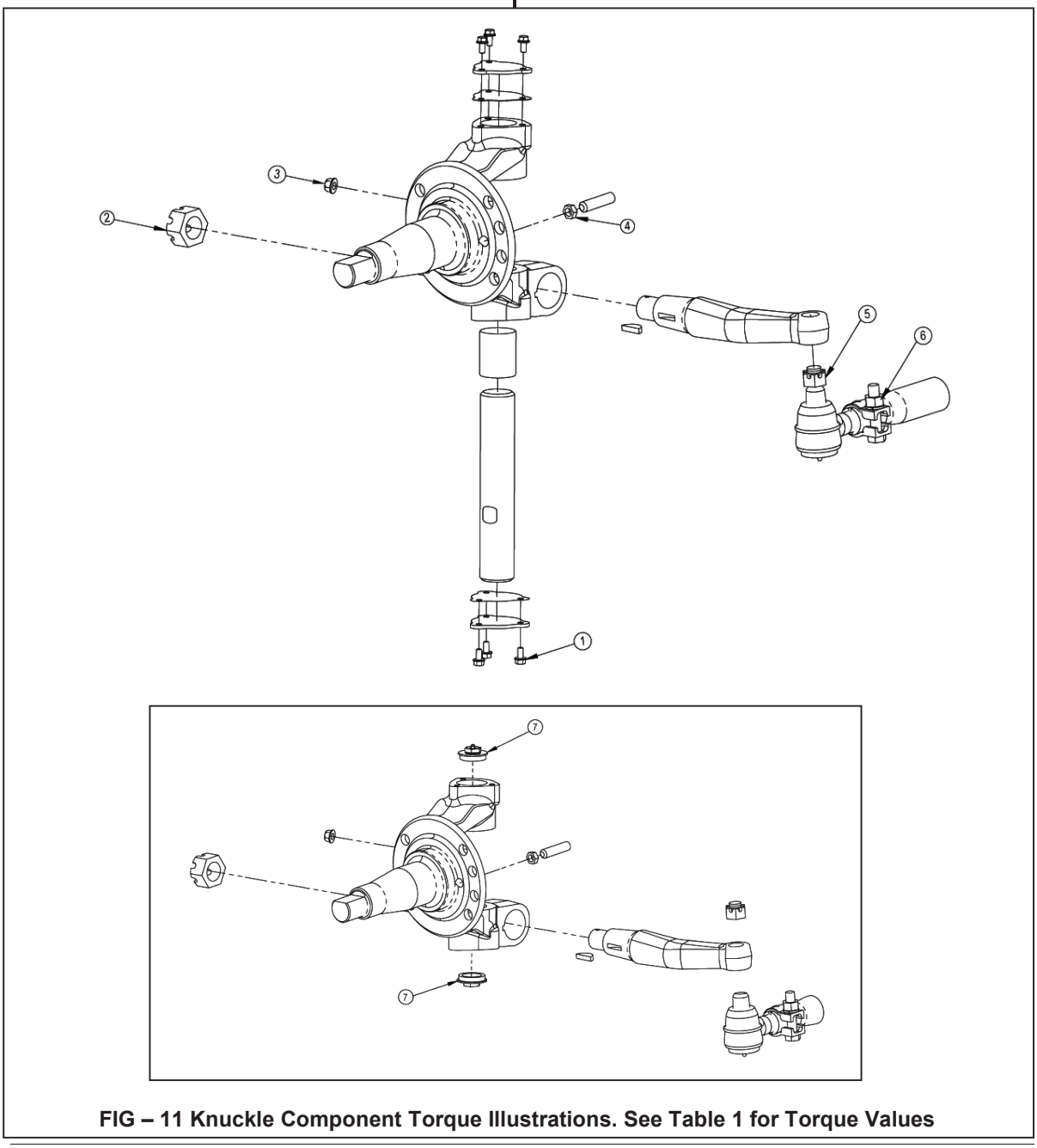


FIG – 11 Knuckle Component Torque Illustrations. See Table 1 for Torque Values

Torque Guidelines

The following table shows the proper torque requirements for the Knuckle Component cap screws and nuts described. Each type of capscrew and nut is shown in the following Tables according to the item number.

Table 1

Item #	Description	Size	Torque Range (lb.-ft.)
1	Knuckle Cap screw	5/16"–18	20–30
2	Tie Rod Arm to Knuckle Nut	7/8"–14	160–300
		1"–14	390–725
		1 1/8"–12	550–1025
		1 1/4"–12	775–1450
3	Draw Key Nut	7/16"-20	30-45
4	Stop Screw Lock/Jam Nut	5/8"–18	65-85
5	Tie Rod Arm to Tie Rod End Nut	7/8"–14	250-450
6	Cross Tube Clamp Nut	5/8"–11	40–60
		3/4"-10	155-175
7	Threaded Knuckle Cap	1 5/8"-20	70-90
		2"-20	

NOTE

Torque values in Table 2 do not apply to air springs or lower grade fasteners.

Torque Requirement Procedures

All fasteners should be re-torqued according to the following schedule.

- After 30 days
- Every 6 months thereafter

Table 2, Suspension Capscrew/bolt (Grade 8 UNF) Torque Requirements

Table 2

Cap screw/bolt Size	3/8"	1/2"	5/8"	3/4"	3/4" (Stabilizer Shock Stud)	7/8"	1"	1 1/8"
Torque minimum ft./lbs.	25	50	150	300	200	500	700	900
Torque maximum ft./lbs.	35	75	200	350	250	550	800	1000

U-bolt Torque Instructions

To re-torque U-bolts: See Table 3

1. Partially tighten bolts #1 and #2 according to figure 12.
2. Partially tighten bolts #3 and #4.

Using the same sequence, torque to the proper torque as specified below.

FIG – 12 U-Bolt Torque Pattern

U-Bolt (Non-Plated Clean Lubricated Thread) Torque Requirements.

Table 3

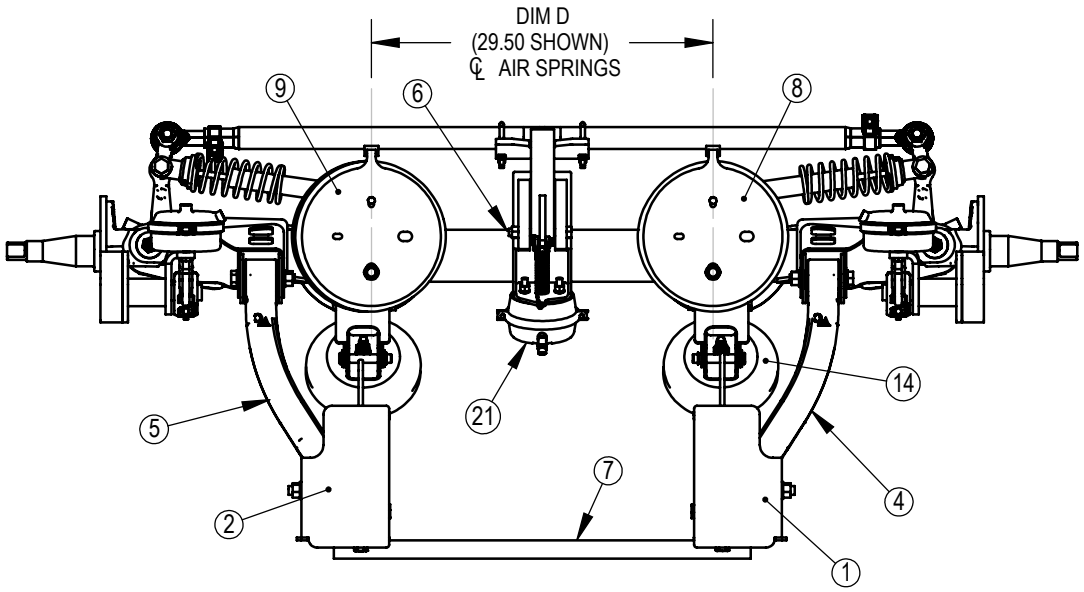
UNF Grade 8 Size	3/8”	1/2”	5/8”	3/4”	7/8”	1”	1 1/8”
U Bolt minimum ft./lbs.	15	40	120	200	400	650	800
U Bolt maximum ft./lbs.	20	60	150	250	450	750	900

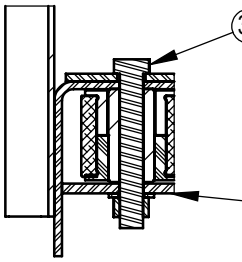
Airspring Capscrew Torque Requirements.

Table 4

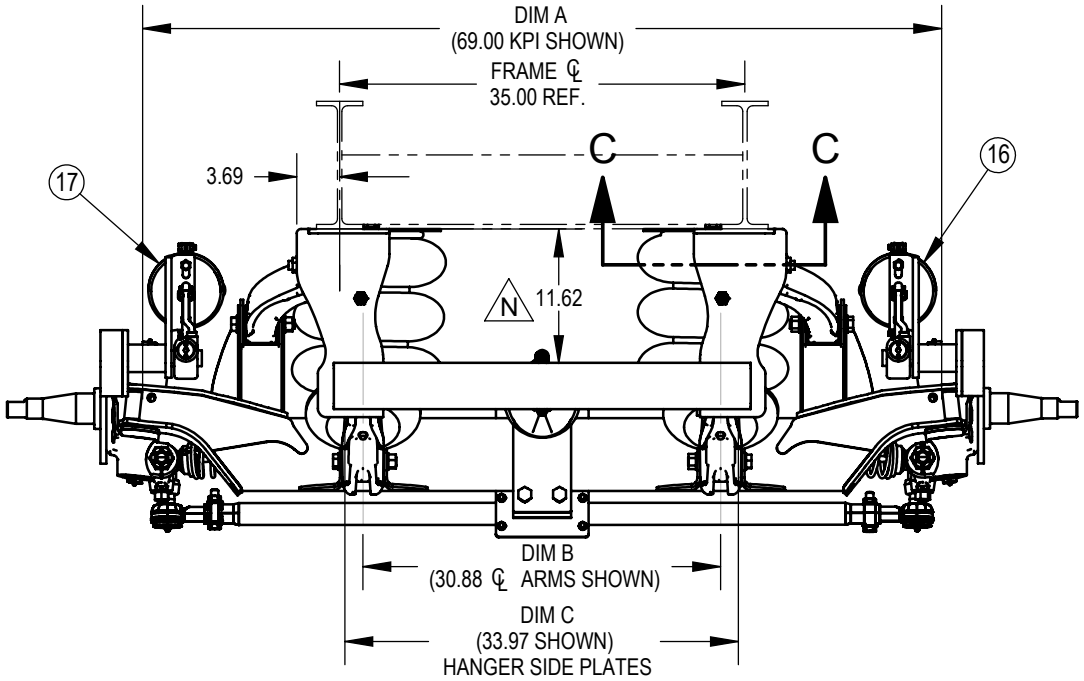
Size	Description	Max Torque Requirement (ft. /lbs.)
3/8”	UNC Blind Nuts	15-20
1/2”	UNC Bolt or Stud	25
3/4”	UNC Stud	55
3/4”	UNF Combo Stud	50

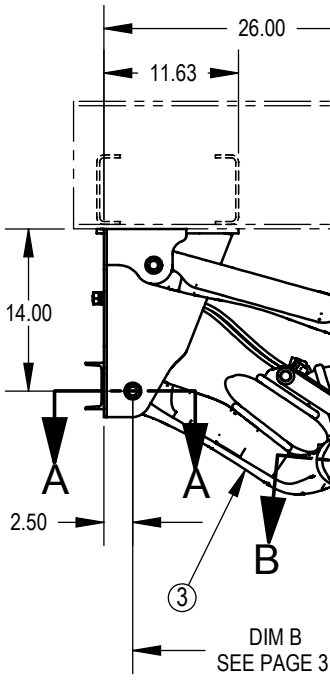
REV.	DESCRIPTION	ECN	DATE	BY
L	ITEM #10 WAS AS0048K	8146	6/8/2011	EFR
M	ADDED "13" TO PLUMBING CODE (PAGE 3); UPDATED AXLE TO 160121 SERIES (PAGE 3)	8502	5/7/2012	HDH
N	STEEL ITEM #3 WAS 930280-04, #4 WAS 930281-12, #5 WAS 930281-22 ALUM. ITEM #3 WAS 930280-02, #4 WAS 930281-11, #5 WAS 930281-21, ADDED DIM TO #7	3211	05/23/2014	WBL





SECTION A-A
SCALE 1 : 6

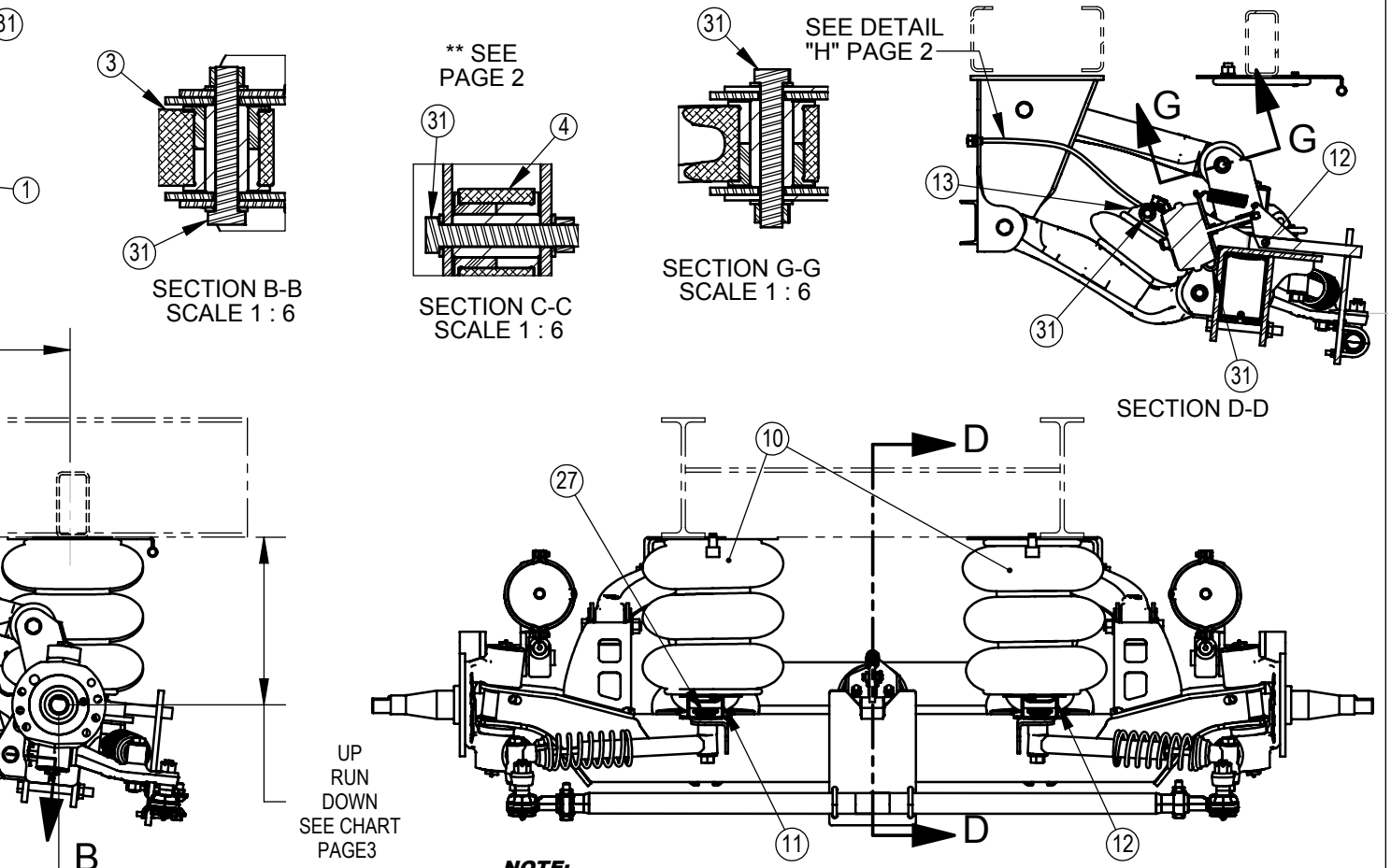




SPECIAL CHARACTERISTICS SYMBOL LEGEND	UNLESS OTHERWISE SPECIFIED	THIRD ANGLE
>X.XX< W/C CRITICAL DIM (X.XX) FOR REFERENCE ONLY **X.XX DESIGNATES A ±.125 TOL. * X.XX DESIGNATES A KEY CUSTOMER CHARACTERISTIC	DIM ARE IN INCHES TOL ON ANGLES ± 1.0° X.X±.06 X.XX±.03 X.XXX±.01 INTERPRET DIM AND TOL PER ASME Y14.5-2009	

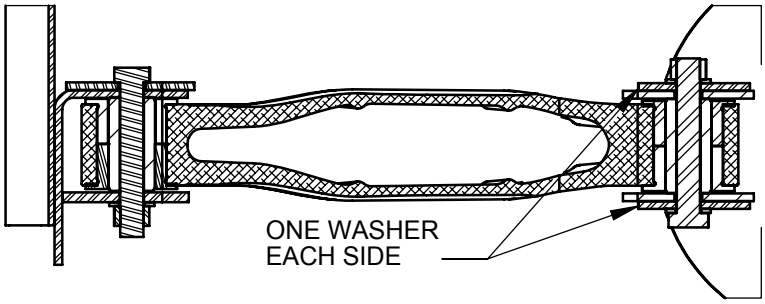
ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	CHART	HANGER ASSY 14" STL1390
2	1	CHART	HANGER ASSY 14" STL1390
3	2	CHART	ARM ASSEMBLY, LOWER
4	1	CHART	ARM ASSEMBLY, UPPER
5	1	CHART	ARM ASSEMBLY, UPPER
6	1	CHART	AXLE ASSEMBLY
7	1	CHART	CROSSBRACE WELD ON
8	1	CHART	BAG PLATE ASSY. LH
9	1	CHART	BAG PLATE ASSY. RH
10	2	AS0019	AIR SPRING LOAD
11	1	CHART	LOWER BAG PLATE ASSY R.H.
12	1	CHART	LOWER BAG PLATE ASSY R.H.
13	2	50193-01	LIFT BAG PLATE SL1190
14	2	AS0058C	AIR SPRING (6897) LIFT
15	1	CHART	KNUCKLE ASSEMBLY WESTPORT
16	1	17187-16	BRAKE ASSY LH TYPE 20 CHAMBERS
17	1	17187-26	BRAKE ASSY RH TYPE 20 CHAMBERS
18	1	CHART	LIFT BAG PLUMBING KIT

ITEM NO.	QTY	PART NUMBER	DESCRIPTION
19	1	HPSS19613	STEERING STABILIZER HARDWARE
20	2	11418	SHOCK STEERING STABILIZER
21	1	CHART	V-BAR LOCK OUT
22	1	HPLD11908	LOAD BAG HARDWARE PACK
23	1	HPPT1190CS-01	SL081190 PIVOT HDWE 8CS+
24	1	HPBM16075	ABS STD BRAKE MOUNT HDWE
25	1	HPLT16085-01	LIFT BAG HARDWARE PACK
26	12	10258	.31X.75 ZINC UNF GR8(10258)
27	12	10259	WASHER .31 STAR GR8
28	2	11437-01	BEARING #HM212049 D22 AX
29	2	11438	BEARING 13K AXLE #3782
30	2	17344	WHEEL SEALS OIL
31	2	17345ST	HUBCAP STMCO W/O GASKET
32	2	17573	HUB CAP GASKET

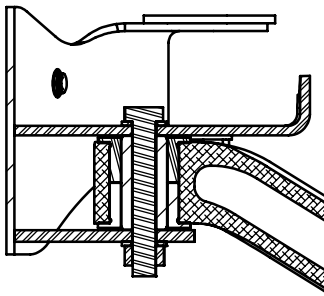


NOTE:
1. REFER TO "STL SERIES INSTALLATION AND OPERATION MANUAL.
2. CAPACITY 13,200# - ACHIEVED BY USE OF 22.5" X 8.25" WHEEL WITH OFFSET TOWARD INBOARD SIDE. USE OF OTHER WHEELS AND/OR MOUNTING WHEELS WITH OFFSET TO THE OUTSIDE IS NOT RECOMMENDED AND WILL SIGNIFICANTLY LOWER RATING.

PROJECTION	**SUSPENSION MODEL:** STL1191	**PREVIOUS ASSY:** -	**SCALE** 1:16	**WATSON AND CHALIN MANUFACTURING INC** 725 EAST UNIVERSITY DRIVE MCKINNEY TEXAS 75069	
	DATE: 08/11/08	**DRAWN BY:** TEG	**SIZE** B	**SHEET** 1 OF 3	**TITLE** MAIN ASSEMBLY WESTPORT	**DWG NO** STL1191

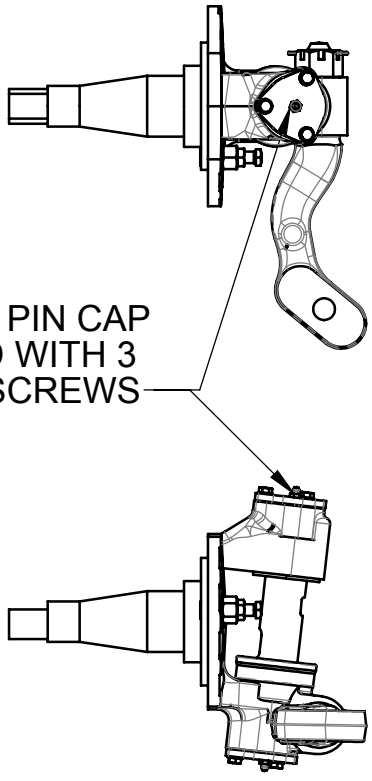


SECTION E-E
SCALE 1 : 6

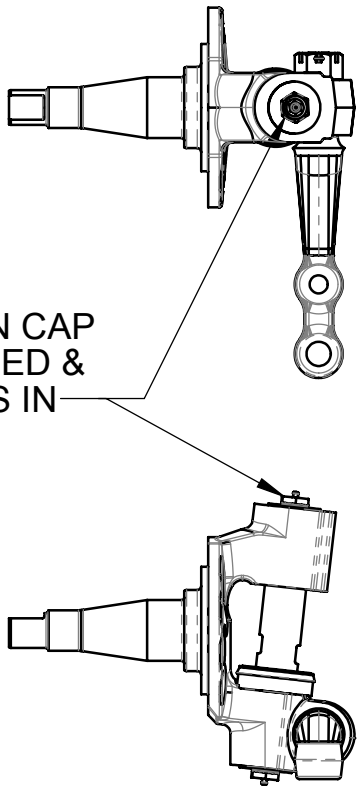


CENTER OF
VEHICLE

SECT
SCA

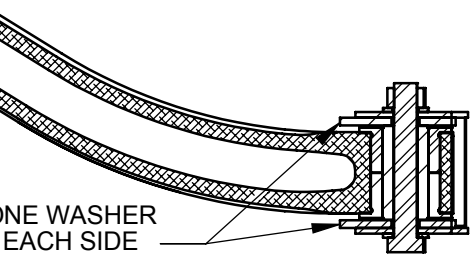


MERITOR KNUCKLE
OLD STYLE

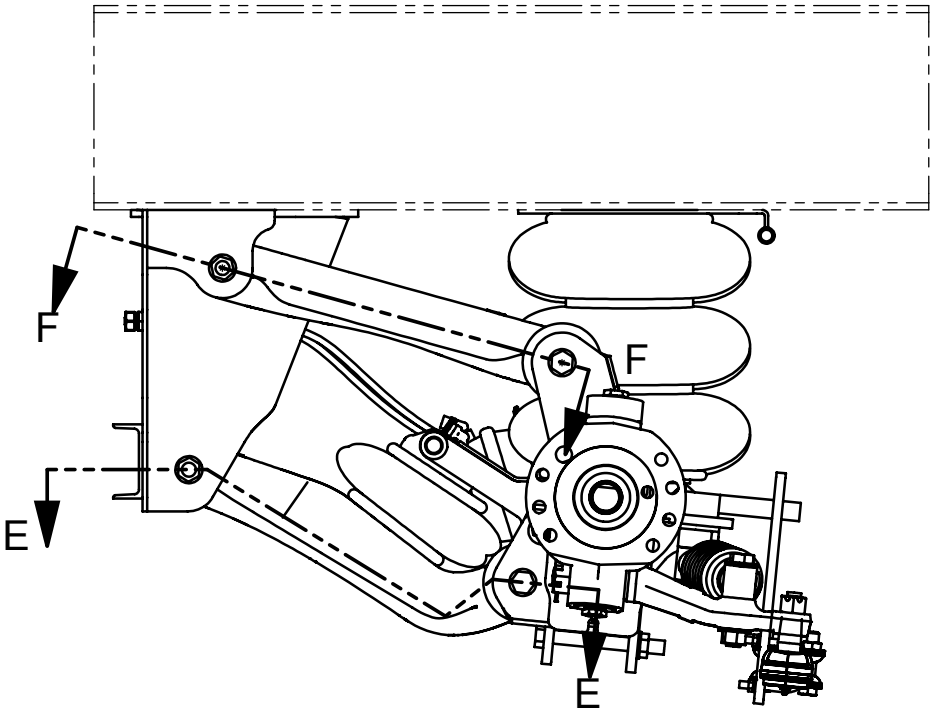


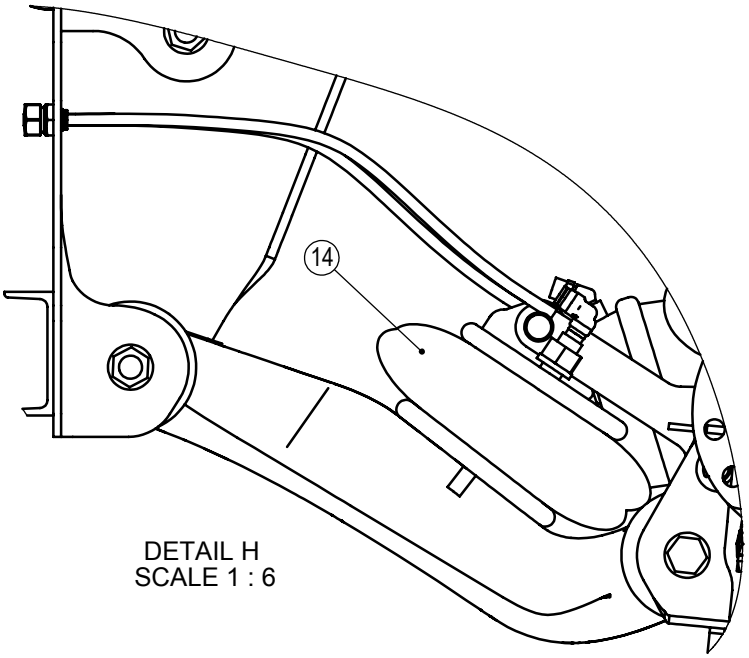
WESTPORT KNUCKLE
NEW STYLE

SPECIAL CHARACTERISTICS SYMBOL LEGEND	UNLESS OTHERWISE SPECIFIED	THIRD ANGLE
>X.XX< W/C CRITICAL DIM (X.XX) FOR REFERENCE ONLY **X.XX DESIGNATES A ±.125 TOL. * X.XX DESIGNATES A KEY CUSTOMER CHARACTERISTIC	DIM ARE IN INCHES TOL ON ANGLES ± 1.0° X.X ± .06 X.XX ± .03 X.XXX ± .01 INTERPRET DIM AND TOL PER ASME Y14.5-2009	



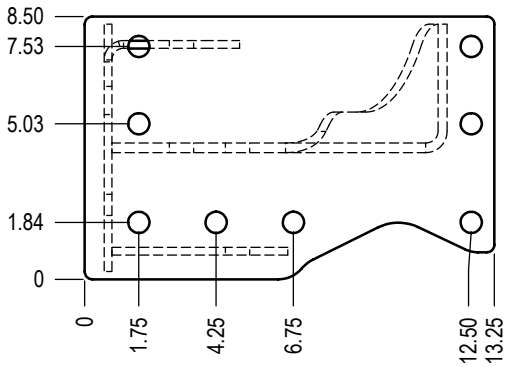
TION F-F
ALE 1 : 6





DETAIL H
SCALE 1 : 6

BOLT-ON HANGER HOLE PATTERN



PROJECTION	**SUSPENSION MODEL:** STL1191	**PREVIOUS ASSY:** -	**SCALE** 1:10	**WATSON AND CHALIN MANUFACTURING INC** 725 EAST UNIVERSITY DRIVE MCKINNEY TEXAS 75069		
	DATE: 08/11/08	**DRAWN BY:** TEG	**SIZE** B	**SHEET** 2 OF 3	**TITLE** MAIN ASSEMBLY WESTPORT	**DWG NO** STL1191

MODEL NO. - STL1191 CC DD EE - F -

CONFIGURATOR STL1191W

CC	RUN HEIGHT CODE										
	MODEL NUMBER	ITEM #11	ITEM #12	ITEM #19	DIM A	UP			RUN		
					BAG PLATE HEIGHT	WITH .19 BUMPER DEFLECTION	BUMPER CONTACT	DIM B	RUN RANGE	DIM B RANGE	
15	STL1191XX X-15	950246-11	950246-21	HPLT020LG	1.00	5.00	5.19	23.20	11.00 - 15.00	23.52 - 22.51	18.0
16	STL1191XX X-16	950246-12	950246-22	HPLT021LG	2.00	5.81	6.00	23.38	12.00 - 16.00	23.35 - 22.10	19.0
17	STL1191XX X-17	950246-13	950246-23	HPLT021LG	3.00	6.81	7.00	23.54	13.00 - 17.00	23.13 - 21.62	20.0
18	STL1191XX X-18	950246-14	950246-24	HPLT022LG	4.00	7.81	8.00	23.65	14.00 - 18.00	22.85 - 21.07	21.0
19	STL1191XX X-19	950246-15	950246-25	HPLT022LG	5.00	8.81	9.00	23.70	15.00 - 19.00	22.51 - 20.44	22.0
20	STL1191XX X-20	950246-13	950246-23	HPLT021LG	3.00	9.81	10.00	23.16	16.00 -20.00	23.07 - 21.94	23.0
22	STL1191XX X-22	950246-15	950246-25	HPLT022LG	5.00	11.81	12.00	23.33	18.00 - 22.00	22.62 - 21.00	25.0
21	STL1191XX X-21	950246-14	950246-24	HPLT022LG	4.00	10.81	11.00	23.27	17.00 - 21.00	22.97 - 21.51	24.0

DD	HANGER/UPPER BAG PLATE CODE				
	RIDE HEIGHT CODES 15 THRU 19				
	ITEM #1	ITEM #2	ITEM #8	ITEM #9	UPPER BAG PLATE SPACER
W1	920612-11	920612-21	950069-11	950069-21	0.00
B1	920741-10	920741-20			
RIDE HEIGHT CODES 20 THRU 22					
W2	920821-10	920821-20	950291-13	950291-23	3.00
B2	TBD	TBD			

EE	TRACK WIDTH							
	ITEM #6	ITEM #7	ITEM #15	DIM A	DIM B	DIM C	DIM D	APPLICATION
92	160121-69	SEE HH PLUMBING CODE	19613	69.00	30.81	33.88	29.50	92.00 HUB FACE TO HUB FACE
97	160121-74		19613-97	74.00	36.31	39.38	34.50	97.00 HUB FACE TO HUB FACE

△M

F	ARM CODE			
	ARM TYPE	ITEM #3	ITEM #4	ITEM #5
S	STEEL	930347-03	930348-12	930348-22
A	ALUMINUM	930347-01	930348-11	930348-21

SPECIAL CHARACTERISTICS SYMBOL LEGEND

>X.XX< W/C CRITICAL DIM
(X.XX) FOR REFERENCE ONLY
**X.XX DESIGNATES A ±.125 TOL.
* X.XX DESIGNATES A KEY CUSTOMER CHARACTERISTIC

UNLESS OTHERWISE SPECIFIED
DIM ARE IN INCHES
TOL ON ANGLES ± 1.0°
X.X ± .06 X.XX ± .03 X.XXX ± .01
INTERPRET DIM AND TOL
PER ASME Y14.5-2009

THIRD ANGLE

HH - II - JJ - KK

DOWN	
	DIM B
00	21.62
00	21.07
00	20.44
00	19.72
00	18.88
00	20.43
00	19.01
00	19.77

KK	HUB & DRUM CODE			
	HUB MOUNTING	HUB TYPE	LEFT HAND	RIGHT HAND
65	10 STUD - 11.25 B.C. - STUD PILOT	IRON	18229A	18230A
66	10 STUD - 11.25 B.C. - HUB PILOT FOR 19.5" WHEELS	IRON	18256A	18256A
68	10 STUD - 11.25 B.C. - HUB PILOT	IRON	18228A	18228A
69	10 STUD - 11.25 B.C. - HUB PILOT	ALUMINUM	18216A	18216A
73	6 SPOKE 20"/22.5"	IRON	18209A	18209A
78	8 STUD - 275mm B.C. - HUB PILOT	ALUMINUM	18212A	18212A
SP	SPECIAL APPLICATIONS NOT YET DETERMINED			

JJ	LOCK-OUT CODE	
	TYPE	ITEM #23
0	NO STEER LOCK-OUT	N/A
1	V-BAR STEER LOCK-OUT	980161-03

II	CONTROL PANEL CODE		
	TYPE	PANEL	VALVE
0	NO CONTROL PANEL	N/A	N/A
1	CONTROL PANEL W/12V SOLENOID	990138	INC. PANEL
2	CONTROL PANEL WITH SEPARATE PUSH/PULL	990099	17523-01
3	CONTROL PANEL WITH INTEGRATED PUSH/PULL	990022	INC. PANEL
4	NO CONTROL PANEL; WITH 12V SOLENOID AND REGULATOR	N/A	990251

HH	PLUMBING CODE		ITEM #7	
	TYPE	PLUMBING KIT	92 HF TO HF	97 HF TO HF
01	NO PPAK (PRE-PLUMBED AIR KIT) - UPPER BAG PLATE WITH COUPLER	N/A	12524-08	12524
12	PPAK50 WITH STEEL TANK INSTALLED	PPAK50-00-05	91766	91766-01
△M 13	PRE-PLUMBED WITH CONTROLS, WITH STEEL TANK INSTALLED, WITH REGULATOR, GAUGE AND CONTROL PANEL-(CAN ONLY BE USED WITH OPTION "0" IN CONTROL	PPAK250-0290		

PROJECTION	SUSPENSION MODEL:	PREVIOUS ASSY:	SCALE	WATSON AND CHALIN MANUFACTURING INC 725 EAST UNIVERSITY DRIVE MCKINNEY TEXAS 75069	
	STL1191	-	1:10		
	DATE: 06/05/07	DRAWN BY: TEG	SIZE B	SHEET 3 OF 3	TITLE STL1191 ASSEMBLY OPTION CHART	DWG NO STL1191

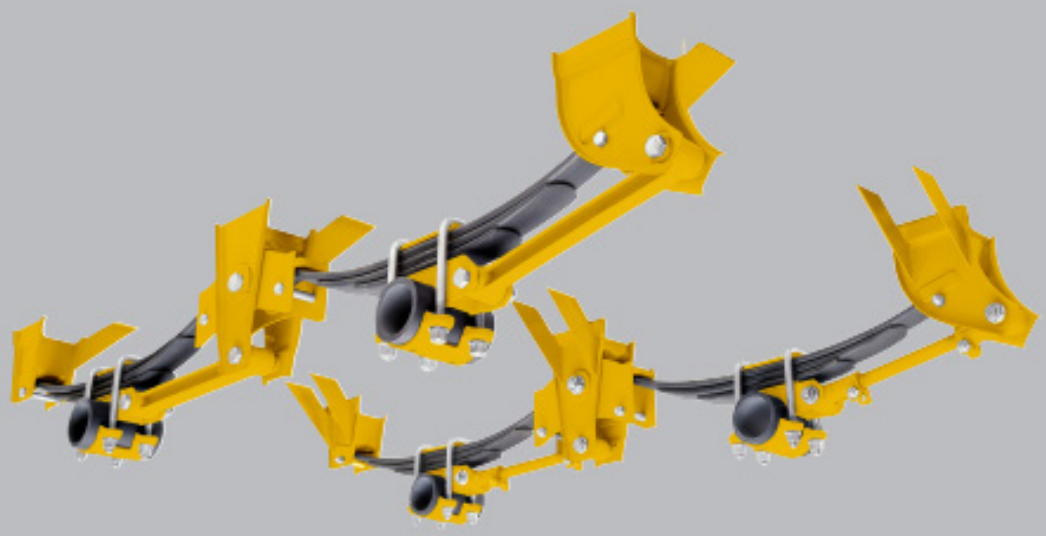
Holland®
SAF-HOLLAND Group

Installation and Maintenance Manual

BINKLEY™

DuraLite® Series

Mechanical Suspension



XL-MS175 Rev H

SAF Holland Group

Table of Contents

SAF-HOLLAND Group

Introduction

This manual provides you basic information necessary for the installation and maintenance of the DuraLite® suspension.

IMPORTANT: It is the responsibility of the installer to determine the proper location of the suspension on the frame, provide an adequate structure to support the suspension, ensure adequate clearances with other components, and to determine if the rated suspensions and axle capacity are adequate for the trailer applications.

Warranty

Refer to the complete warranty for the country in which the product will be used. A copy of the written warranty is included with the product and can be found on the SAF-HOLLAND website (www.safholland.us).

Notes, Cautions, and Warnings

You must read and understand all of the safety procedures presented in this manual before starting any work on the suspension.

Proper tools must be used to perform the maintenance and repair procedures described in this manual. Many of these procedures require special tools.

NOTE: In the United States, workshop safety requirements are defined by federal and/or state Occupational Safety and Health Act. Equivalent laws may exist in other countries. This manual is written based on the assumption that OSHA or other applicable employee safety regulations are followed by the location where work is performed.

IMPORTANT: Read this manual before using this product. Keep this manual in a safe location for future reference.

⚠WARNING Failure to follow the instructions and safety precautions in this manual can result in death or serious injury.

Throughout this manual, you will notice the terms "NOTE", "IMPORTANT", "CAUTION", and "WARNING" followed by important product information. So that you may better understand the manual, those terms are as follows:

NOTE: Includes additional information to enable accurate and easy performance of procedures.

IMPORTANT: Includes additional information that if not followed could lead to hindered product performance.

CAUTION Used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, could result in property damage.

⚠CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

⚠WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

SAF-HOLLAND Group

1. General Safety Instructions

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

⚠WARNING Failure to properly support the vehicle and axles prior to commencing work could create a crush hazard which, if not avoided, could result in death or serious injury.

Please observe the following safety instructions in order to maintain the operational and road safety of the suspension system.

1. Only the wheel and tire sizes approved by the trailer builder may be used.
2. Before operating vehicle, ensure that the maximum permissible axle load is not exceeded and that the load is distributed equally and uniformly.
3. Observe the operating recommendation of the trailer manufacturer for off-road operation of the installed suspension.

IMPORTANT: The definition of OFF-ROAD means driving on non-asphalted/non-concreted routes, e.g. gravel roads, agricultural and forestry tracks, on construction sites and in gravel pits.

IMPORTANT: Off-road operation of suspensions beyond the approved application design could result in damage and impair suspension system performance.

4. All suspension systems require routine service, inspection and maintenance in order to maintain optimum performance and operational safety as well as an opportunity to recognize wear.
5. In the event of suspension component failure, quickly reduce speed as safely as possible and remove the vehicle from traffic. If unable to remove vehicle from traffic, follow DOT safety requirements regarding emergency situations.
6. Contact a qualified towing and/or service company to assist in repairing vehicle or to move it to a qualified repair facility.

We highly recommend the use of only SAF-HOLLAND Original Parts.

A list of SAF-HOLLAND technical support locations to supply SAF-HOLLAND Original Parts can be found at www.safholland.us or contact SAF-HOLLAND Customer Service at 888-396-6501.

Updates to this manual will be published as necessary online at www.safholland.us.

2. Installation Preparation

The proper installation of the suspension is critical to assure trouble free operation. Before proceeding with suspension installation, check the tire size and trailer design to make sure that there is lateral tire clearance and a vertical tire clearance of at least 4-1/2" (114 mm) when the trailer is empty.

⚠WARNING Failure to maintain tire clearance between tires and the nearest point of contact on the suspension or vehicle could cause fire or loss of vehicle control which, if not avoided, could result in death or serious injury.

Vertical tire clearance may be adjusted by using different height spring seats or high, medium or low arch springs. HOLLAND DuraLite suspensions are rated at 22,400 pounds (358,400 kg) GAWR (Gross Axle Weight Rating) with one, two or three leaf springs and 24,000 lbs. (384,000 kg) GAWR with heavy duty leaf springs. (SAF-HOLLAND does not supply springs.)

For leaf spring selection and mounting height information, refer to appropriate Table in Section 12. Check that adequate clearance is provided to all components of the trailer, including but not limited to tires, brakes and air lines.

IMPORTANT: The suspension hangers must be on the same centers as the spring seats and springs, within the tolerances shown. The springs must be square with the axles and located the same distance from the axle centerline within the tolerances shown.

IMPORTANT: Improperly installed suspension components can lead to the following trailer problems: trailer lean, improper tracking, premature tire wear and shortened suspension life.

CAUTION Failure to correctly install suspension components will reduce suspension performance which, if not avoided, could result in premature suspension failure.

SAF-HOLLAND Group

3. Welding Standards

3.1 Scope

Your SAF-HOLLAND suspension has been designed to be installed onto a trailer frame. When welding the suspension observe the requirements below. Customers may not weld on an SAF-HOLLAND suspension without our prior approval, including the application of the American Welding Society standards by SAF-HOLLAND engineering. This specification applies to all components supplied by SAF-HOLLAND, and its products. The customer assumes all responsibility for weld integrity if weld material and procedure differ from those listed below.

3.2 Material

Frame attachment components made from low carbon or high strength alloy steel are to be welded with AWS filler metal specification AWS A5.18, filler metal classification ER-70S-3, ER-70S-6 or equivalent unless specified on the installation drawing.

NOTE: Any substitution for filler material from the above standard must comply, as a minimum, with the following mechanical properties:

Tensile Strength - 72k psi (496 MPa)
Yield Strength - 60k psi (414 MPa) o F (-17.7o C)
% Elongation - 22%

The recommended welding gas for gas metal arc welding (GMAW) is 90% Argon / 10% CO2. If a different gas is used, welds must comply with penetration requirements in shown below. Where the installation drawing specifies different than above, the drawing shall prevail.

3.3 Procedures

Tack welds used for positioning components are to be located in the center of the final weld, where practical. Tack weld should be completely fused to the finish weld. DO NOT break arc at the end of the weld. Back up all finish welds at least 1/2" (12 mm) or a sufficient amount to prevent craters at the end of the weld. Where weld is shown to go around corners, it is assumed the corner represents a stress concentration area. DO NOT start or stop weld within 1" (25 mm) of the corner. Particular care should be taken to prevent undercutting in this area.

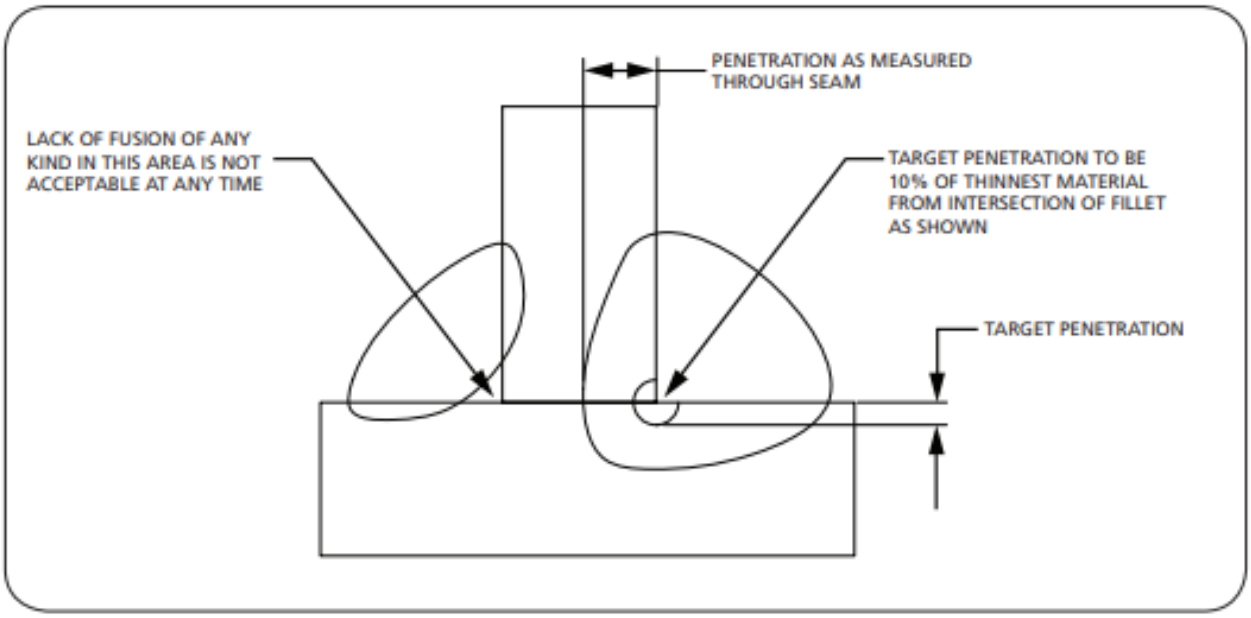
3.4 Workmanship

It is the responsibility of the Customer to provide good workmanship when attaching components to the frame structure.

3.5 Weld Size

If weld size is not specified, the effective throat of the weld must be a minimum of the thinnest material being welded ***(Figure 1)***.

Figure 1



SAF-HOLLAND Group

Installation Instructions

4. Trailer Frame Hanger Brackets Location – All Styles

The DuraLite suspension is available in five hanger bracket mounting styles: under mount, flange mount, straddle mount, side mount and straddle/under mount. The DuraLite suspension may be used as a single axle, tandem axle or triple axle. The base suspension is the single axle – adding a multi-axle conversion kit converts the single axle to a tandem and a second multi-axle kit will make a triple axle suspension. The DuraLite suspension is available in overslung (axle below the spring) or underslung (axle above the spring) configuration.

NOTE: The following instructions for hanger bracket location apply to all hanger bracket styles listed above. After the hanger brackets have been properly located and tack welded to the trailer frame, proceed to the appropriate bracket type in this section for installation instructions.

1. Measure and mark hanger bracket locations on bottom of trailer frame referencing the dimensions provided for single axle ***(Figure 2a)***, tandem axle ***(Figure 2b)*** or triple axle ***(Figure 2c)***.

- Hanger spacing is always measured from center line to center line of hanger ***(Figure 2)***.
- The front and rear hangers are always located an equal distance from the center hanger and should not vary from dimension shown more than plus or minus 1/16" (1 mm).
- Hangers must be located on both sides of sub-frame in exactly the same distances from front and rear of trailer frame.
- Hangers on one side of sub-frame must not be in front of or behind corresponding hangers on other side of sub-frame by more than plus or minus 1/16" (1 mm).

IMPORTANT: Frame surface where hanger brackets are to be attached must be clean and free of any surface rust. Use wire brush or light-duty grinder to clean surface.

2. Position hanger brackets on frame according to location marks determined in Step 1. Position and tack weld all hangers in position and double check dimensions before completing welding of hangers ***(Figure 2a, 2b and 2c).***

IMPORTANT: Hangers must be mounted in proper alignment with one another and must not be cocked or tilted in respect to the sub frame mounting surface.

Figure 2

Figure 2a (Under mount style shown)

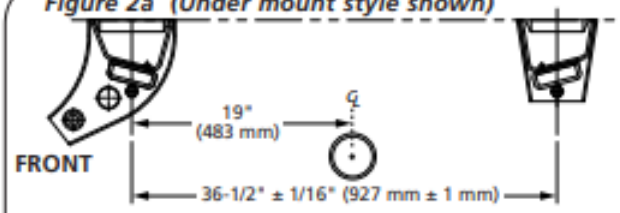


Figure 2b (Under mount style shown)

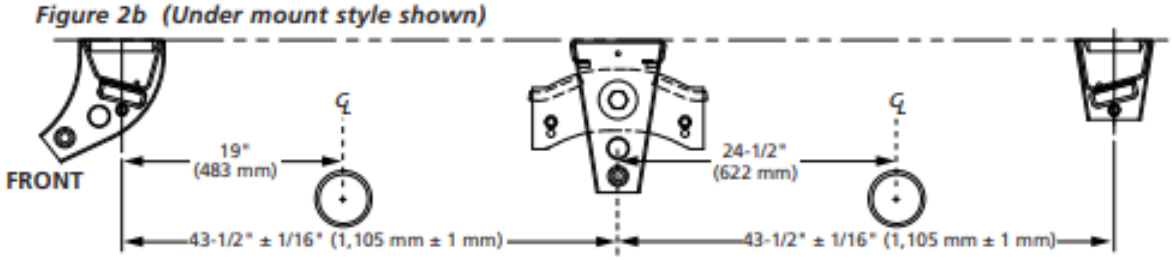
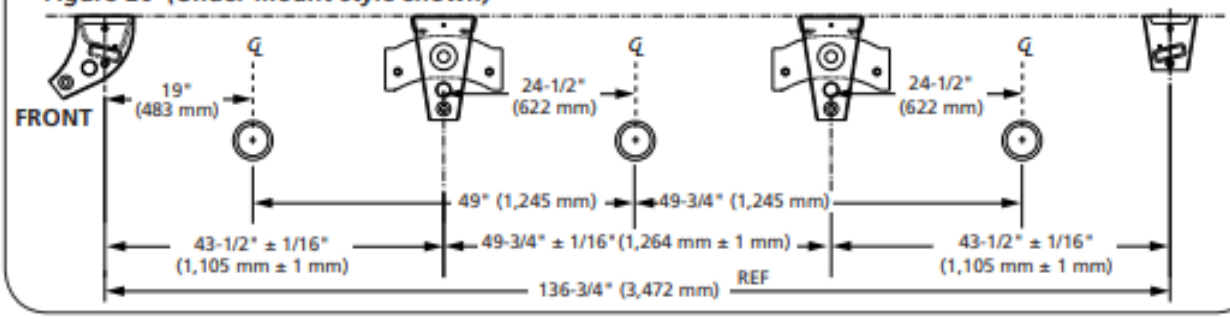


Figure 2c (Under mount style shown)



Installation Instructions

SAF-HOLLAND Group

Under Mount Hanger Brackets Installation

NOTE: For flange, straddle, sidemount or straddle/under style brackets installation, refer to specific instructions later in this section.

IMPORTANT: The under mount style hanger brackets must be located on the trailer frame to match the axle spring center ***(Figure 3)***.

1. Install a 1-1/4" schedule 40 pipe or 1.66 O.D. x .109 standard mechanical tubing through the front and center hangers. The pipe brace should be 6" (152 mm) longer than the spring centers that will provide approximately 3" (76 mm) of pipe to protrude equally on each side. Tack weld the pipe brace in place ***(Figure 3)***.
2. Add 3/16" (4 mm) minimum diagonal braces between the front, center and rear hangers and the frame of the trailer ***(Figure 3)***.
3. Re-verify position of hanger and pipe bracket.
4. Weld the suspension hangers in place ***(Figures 4a, 4b and 4c)***. Weld the pipe braces and diagonal braces in place ***(Figure 3)***.

Figure 3

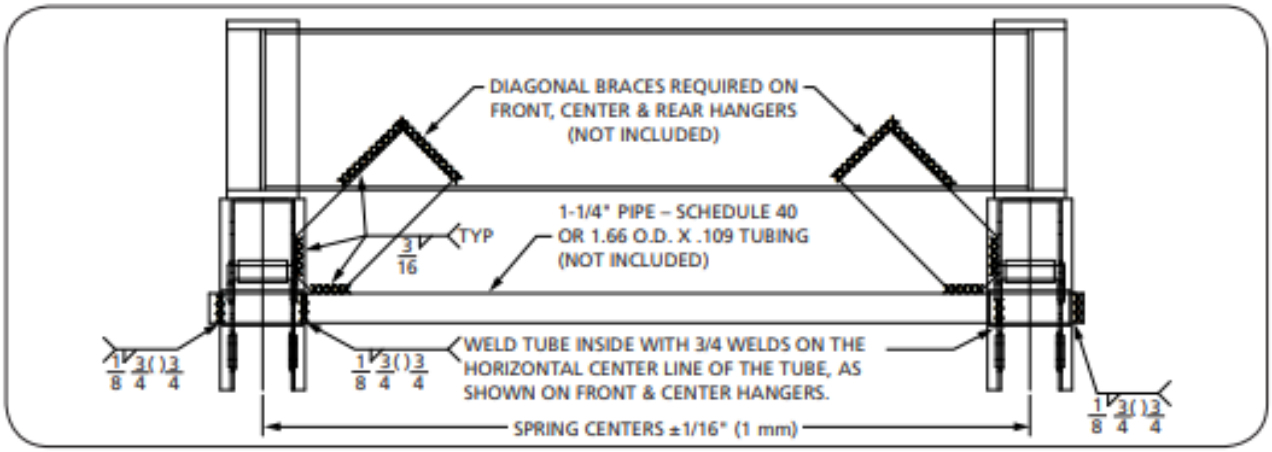
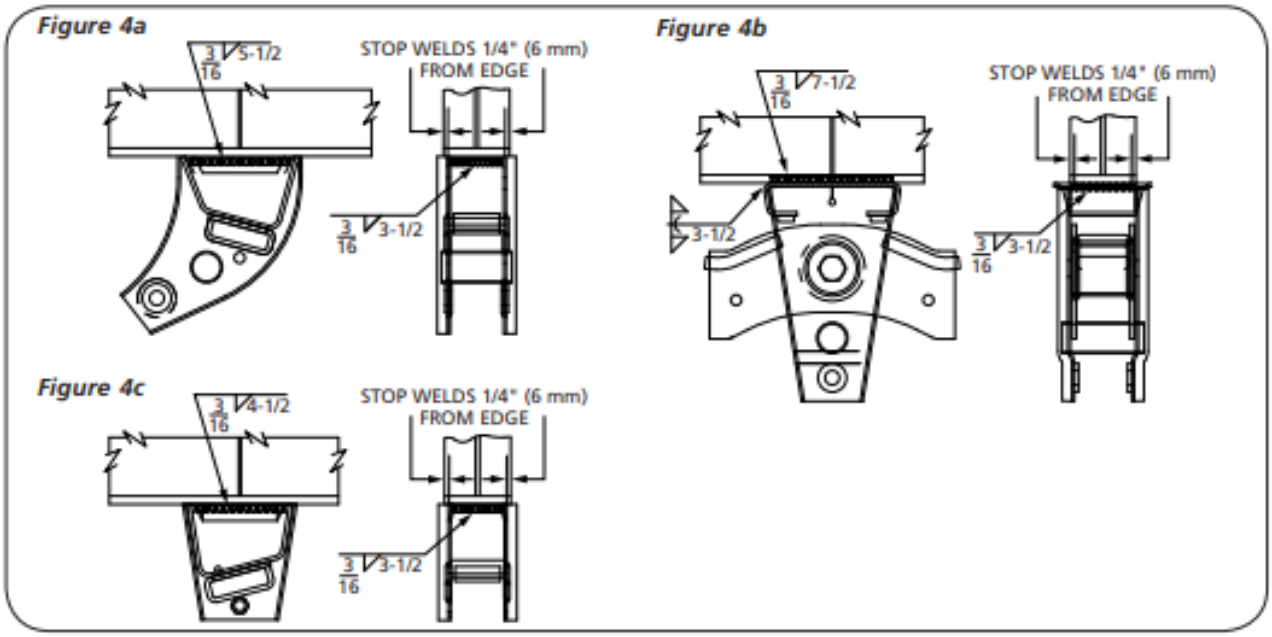


Figure 4



SAF-HOLLAND Group

Installation Instructions

Flange Hanger Brackets Installation

1. Install a 1-1/4" schedule 40 pipe or 1.66 O.D. x .109 standard mechanical tubing through the front and center hangers. The pipe brace should be 6" (152 mm) longer than the spring centers that will provide approximately 3" (76 mm) of pipe to protrude equally on each side. Tack weld the pipe brace in place ***(Figure 5)***.
2. Add 3/16" (4 mm) minimum diagonal braces between the front, center and rear hangers and the frame of the trailer ***(Figure 5)***.
3. Re-verify position of hanger and pipe bracket.
4. Weld the suspension hangers in place ***(Figures 6a, 6b and 6c)***. Weld the pipe braces and diagonal braces in place ***(Figure 5)***.

Figure 5

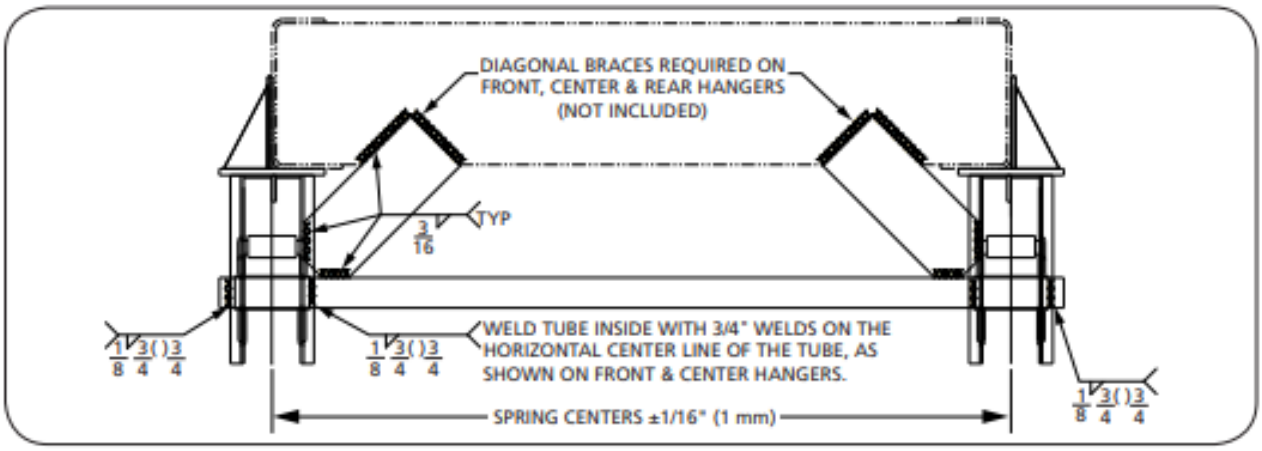


Figure 6

Figure 6a

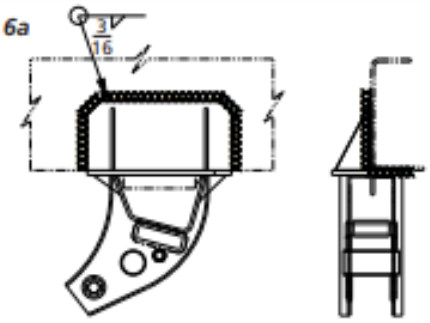


Figure 6b

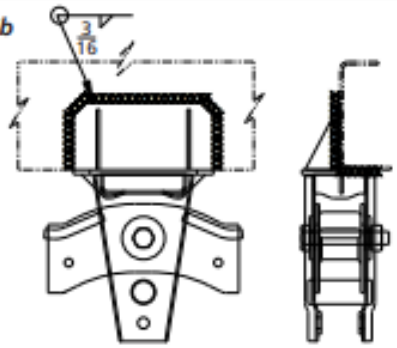
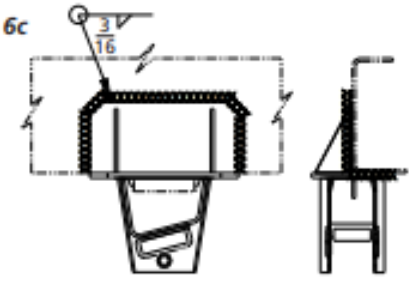


Figure 6c



Installation Instructions

SAF-HOLLAND Group

Straddle Hanger Brackets Installation

1. Install a 1-1/4" schedule 40 pipe or 1.66 O.D. x .109 standard mechanical tubing through the front and center hangers. The pipe brace should be 6" (152 mm) longer than the spring centers that will provide approximately 3" (76 mm) of pipe to protrude equally on each side. Tack weld the pipe brace in place ***(Figure 7)***.
2. Re-verify position of hanger and pipe bracket.
3. Weld the suspension hangers in place ***(Figures 8a, 8b and 8c)***. Weld the pipe braces in place ***(Figure 7)***.

Figure 7

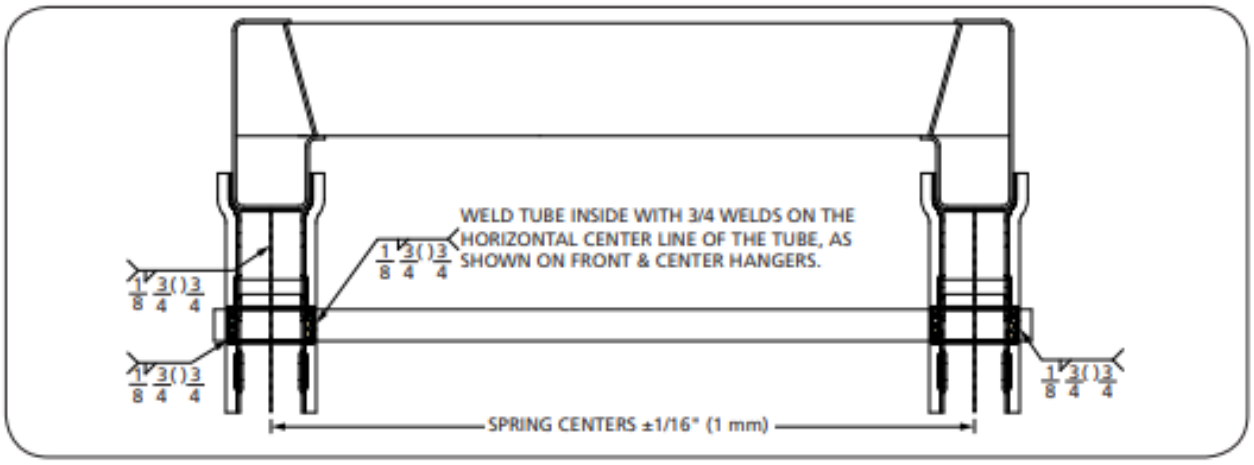
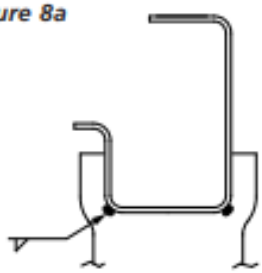


Figure 8

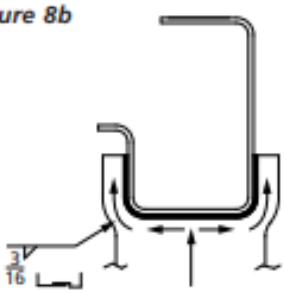
Figure 8a



WELD NO. 1

TACK WELD 4 PLCS PER HANGER

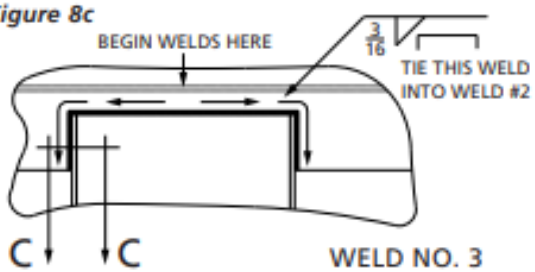
Figure 8b



WELD NO. 2

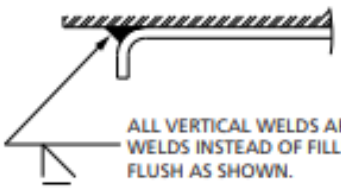
TYP 2 PLCS PER HANGER (WELDS MUST BE CONTINUOUS - **DO NOT** STOP AND RESTART)

Figure 8c



WELD NO. 3

TYP 2 PLCS PER HANGER (WELDS MUST BE CONTINUOUS - **DO NOT** STOP AND RESTART)



SECTION C-C

TYP 12 PLCS

SAF-HOLLAND Group

Installation Instructions

Side Mount

1. Install a 1-1/4" schedule 40 pipe or 1.66 O.D. x .109 standard mechanical tubing through the front and center hangers. The pipe brace should be 6" (152 mm) longer than the spring centers that will provide approximately 3" (76 mm) of pipe to protrude equally on each side. Tack weld the pipe brace in place ***(Figure 9)***.
2. Re-verify position of hanger and pipe bracket.
3. Weld the suspension hangers in place ***(Figures 10a, 10b and 10c)***. Weld the pipe braces in place ***(Figure 9)***.

Figure 9

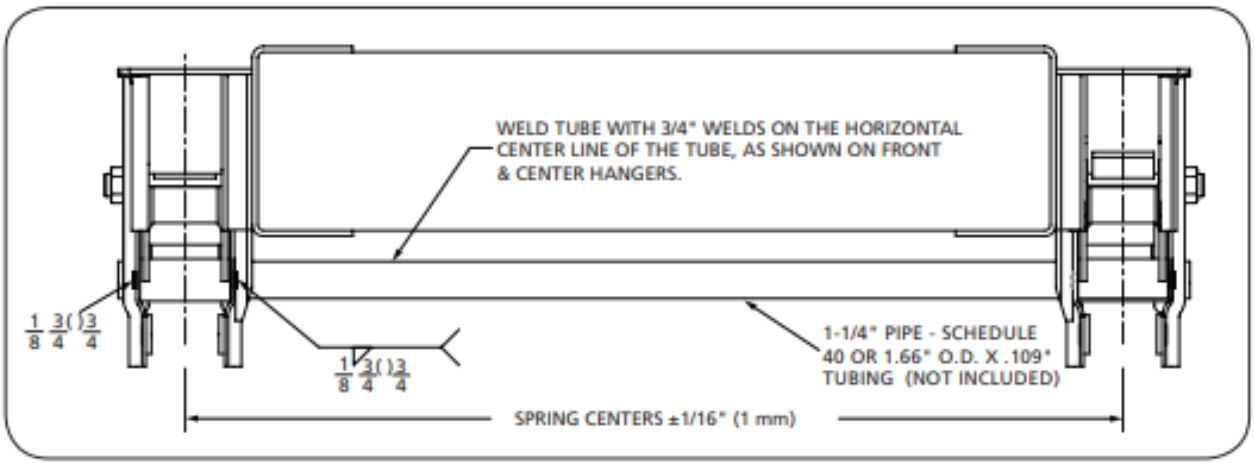


Figure 10

Figure 10a

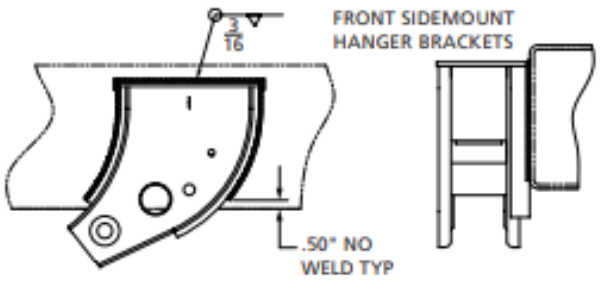


Figure 10b

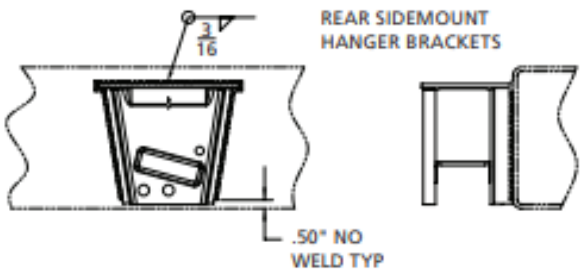
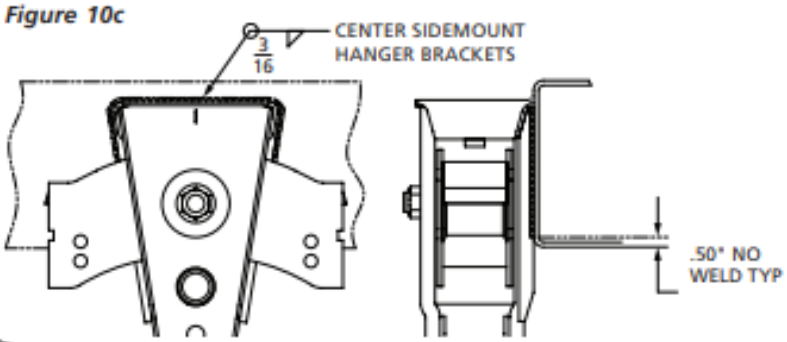


Figure 10c



Installation Instructions

SAF-HOLLAND Group

Straddle/Under Mount

1. Install 3/16" thick angle braces at Front, Center, and Rear hangers. Brace should be at approximately a 45° angle and extend at least to the mid-point of the hanger. Tack weld the braces in place. ***(Figure 11)***.
2. Re-verify position of hanger and angle braces.
3. Weld the suspension hanger brackets in place ***(Figures 12a, and 12b)***. Weld the angle braces in place ***(Figure 11)***.

Figure 11

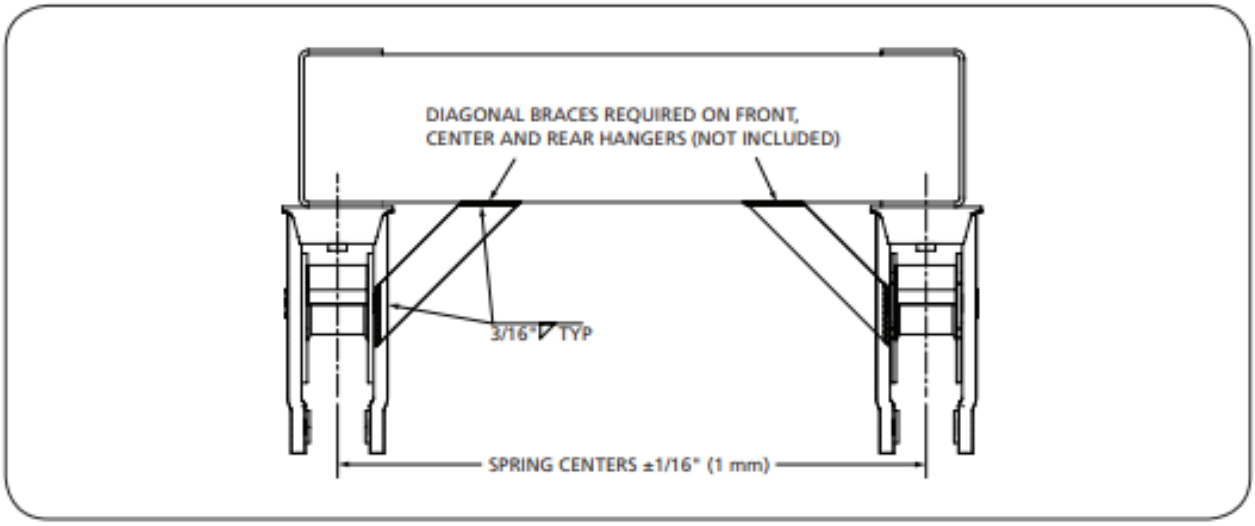
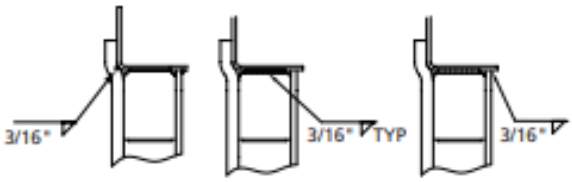


Figure 12

Figure 12a

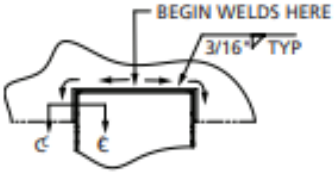
FRONT AND REAR STRADDLE HANGER BRACKETS



WELD NO. 1
TACK WELD 4 PLCS PER HANGER

WELD NO. 2

WELD NO. 3



WELD NO. 4

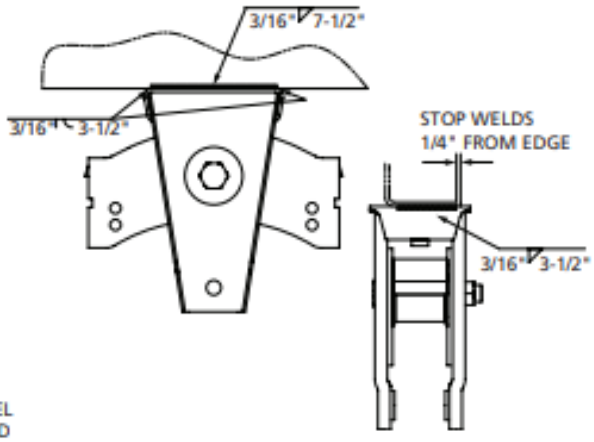
(WELDS MUST BE CONTINUOUS - **DO NOT** STOP AND RESTART)

SECTION C-C
TYP 12 PLACES

ALL VERTICAL WELDS ARE BEVEL WELDS INSTEAD OF FILLETS AND FLUSH AS SHOWN.

Figure 12b

CENTER UNDERMOUNT HANGER BRACKETS



5. Weld Axle Seats To Axles Instructions

IMPORTANT: The axle seats and bottom plates that are welded to the axle are compatible with all low hydrogen welding processes suitable for welding to steel axles.

Overslung Axle Style

1. The axle seats should be located on the spring centers within .06" (1 mm). The axle seats should be the same distance from the center of the axle within .03" (.7 mm). The camshaft should be oriented per the axle manufacturer's specification.

NOTE: When the cams are forward, the cam must be below the horizontal centerline when axle seats of 2" (51 mm) or shorter height are used.

2. Clamp the axle seats and bottom plates to the axle. The axle MUST contact the axle seat and bottom plate at the top and bottom center of the adapters or contact at least two points no more than 1-1/2" (38 mm) from center of the axle ***(Figure 13)***.

3. Verify correct connection. Using a .006" (0.15 mm) feeler gage be sure it is NOT able to slide between axle and spring seat or bottom plate more than 1/4" (6 mm) in contact area ***(Figures 14a and 14b)***. If a greater gap is present, these parts may be clamped to the axle or adjusted to fit by grinding the axle seat.

⚠WARNING Failure to maintain proper clearance between the axle and parts welded to it may result in premature weld failure, which if not avoided, could result in death or serious injury.

4. Following the axle manufacturer's recommendations, weld the axle seats and bottom plates to the axles ***(Figures 14a and 14b)***.

Figure 14a

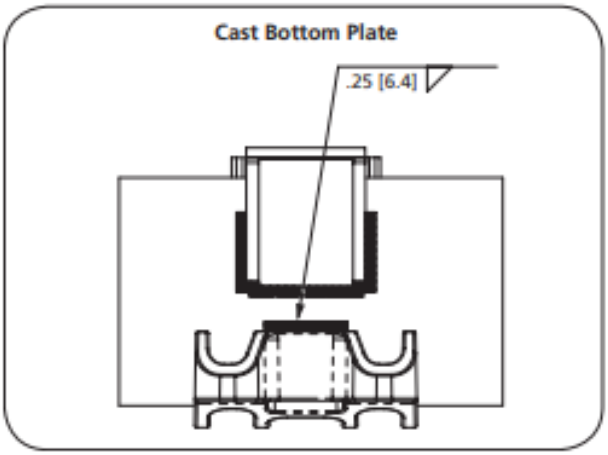


Figure 13

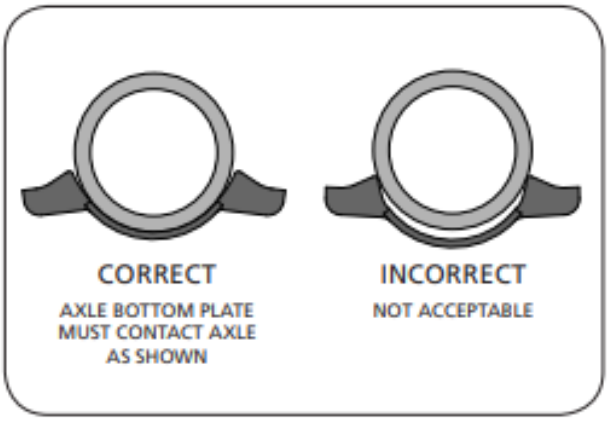
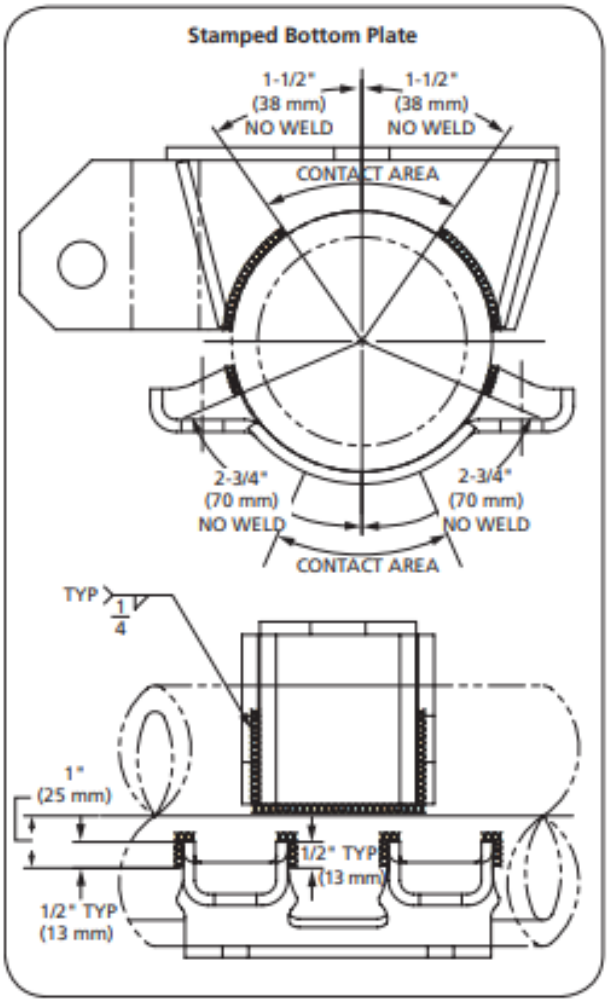


Figure 14b



SAF-HOLLAND Group

Underslung Axle Style

IMPORTANT: The axle seats and bottom plates that are welded to the axle are compatible with all low hydrogen welding processes suitable for welding to steel axles.

1. The axle seats should be located on the spring centers within .06" (1 mm). The axle seats should be the same distance from the center of the axle within .03" (.7 mm). The camshaft should be oriented per the axle manufacturer's specification.

NOTE: When the cams are forward, the cam must be below the horizontal centerline when axle seats of 2" (51 mm) or shorter height are used.

2. Clamp the axle seats and bottom plates to the axle. The axle MUST contact the axle seat and bottom plate at the top and bottom center of the adapters or contact at least two points no more than 1-1/2" (38 mm) from center of the axle ***(Figure 15)***.

3. Verify correct connection. Using a .006" (0.15 mm) feeler gage be sure it is NOT able to slide between axle and spring seat or bottom plate more than 1/4" (6 mm) in contact area. If a greater gap is present, these parts may be clamped to the axle or adjusted to fit by grinding the axle seat.

⚠WARNING Failure to maintain tire clearance between tires and the nearest point of contact on the suspension or vehicle could cause fire or loss of vehicle control which, if not avoided, could result in death or serious injury.

4. Following the axle manufacturer's recommendations, weld the axle seats and bottom plates to the axles ***(Figure 16)***.

Figure 15

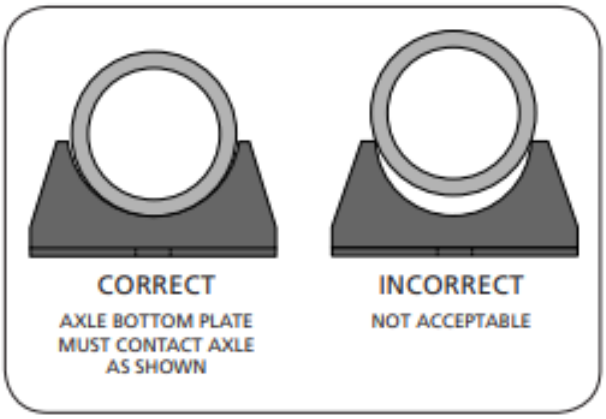
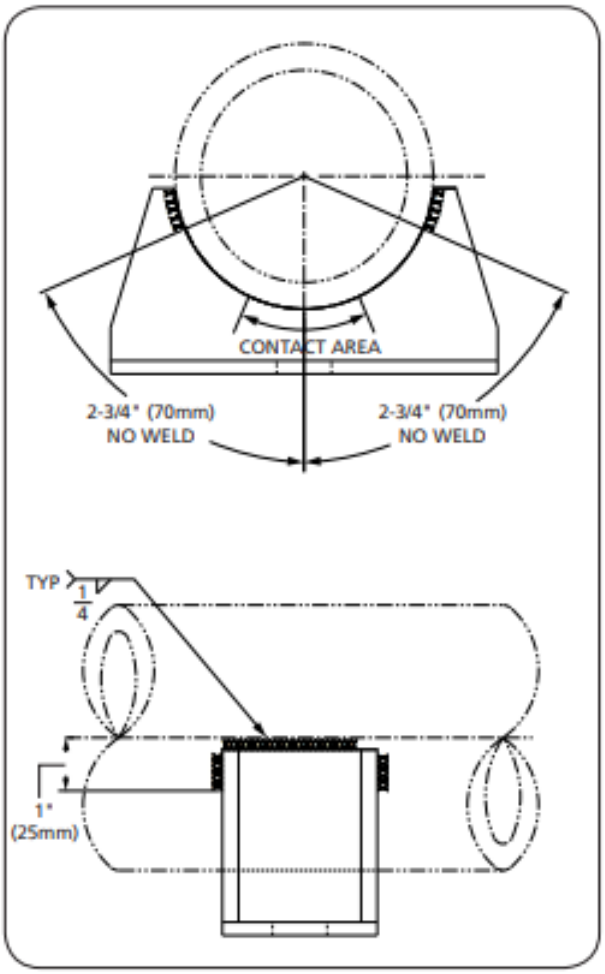


Figure 16



SAF-HOLLAND Group

6. Leaf Springs and Torque Arms Assembly

Overslung Axle Style

NOTE: It is recommended that fasteners be installed with the nuts on the outside (closest to tires).

NOTE: Torque specifications are with clean lubricated/coated threads. All new SAF-HOLLAND fasteners come pre-coated from the factory.

IMPORTANT: The use of special lubricants with friction modifiers, such as Anti-Seize or Never-Seize, without written approval from SAF-HOLLAND Engineering, will void warranty and could lead to over torquing of fasteners or other component issues.

Torque Arms and Springs Installation

1. Position the supplied spring liner on top of the springs and set it on top of the axle spring seat ***(Figure 17)***. Place the top plate on top of the spring.
2. Install the springs on the axles with the appropriate U-bolts, nuts and washers. The U-bolts will fit into the detents stamped into the top plate ***(Figure 17)***.

IMPORTANT: On tandem axle suspensions the big hook end of the spring should be arranged to fit in the equalizer ***(Figure 18a)***. On single axle suspensions it should point to the rear ***(Figure 18)***. Arrange the springs so that they are on the correct centers ±.03" (1 mm) and perpendicular to the axle.

3. Tighten the U-bolts to 275-300 ft.-lbs. (373-407 N•m) of torque using an alternating pattern ***(Figure 17a)***. Check the spring centers and adjust if necessary.

⚠CAUTION DO NOT hit steel parts with a steel hammer as parts could break, sending flying steel fragments in any direction creating a hazard which, if not avoided, could result in minor to moderate injury.

4. Install the axles with springs into the suspension hangers. Install the 5/8" spring retainer bolts and spacers in the front and rear hangers, and the equalizer on tandem axles to hold the springs in place. Tighten 5/8" bolts to 35-50 ft.-lbs. (47-68 N•m) ***(Figure 18)***.

IMPORTANT: DO NOT overtighten as this may damage the spacers.

5. Install the torque arms between the hangers and the spring seats on the axles. It is recommended that the adjustable torque arms be installed on the roadside and the fixed (cast) torque arms be installed on the curbside ***(Figure 19)***. Install the 7/8" nuts and bolts to secure the torque arms in place and torque to 275-300 ft.-lbs. (373-407 N•m) ***(Figure 19)***.
6. With the suspension installed, check that there is 1/8" ± 3/32" (3 mm ± 2 mm) clearance between the springs and the sides of the hangers and that all the springs are contacting the bottoms of the hangers ***(Figure 19a)***.
7. Position the decal, XL-MS189-01, in clear view on the roadside of the vehicle as close as practical to the suspension.

Figure 17

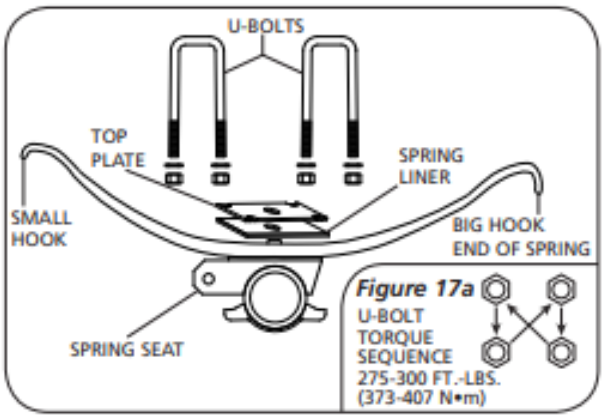


Figure 18

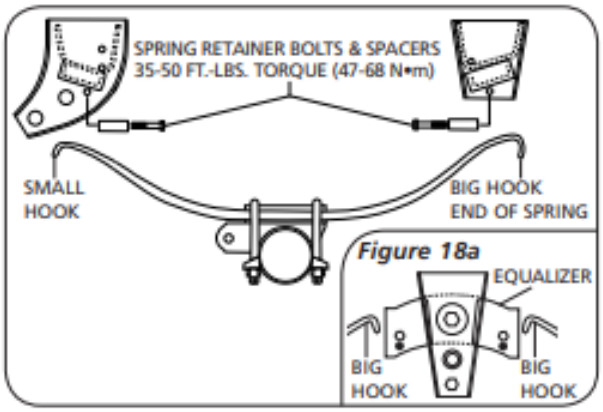
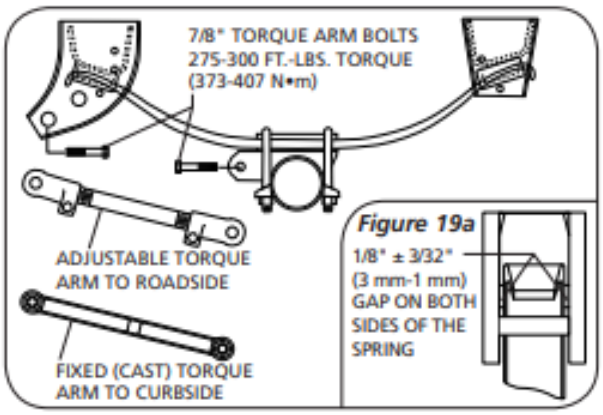


Figure 19



SAF-HOLLAND Group

Underslung Axle Style

NOTE: It is recommended that fasteners be installed with the nuts on the outside (closest to tires).

NOTE: Torque specifications are with clean lubricated/coated threads. All new SAF-HOLLAND fasteners come pre-coated from the factory.

Torque Arms and Springs Installation

1. Assemble the springs. Position the supplied spring liner on top of the springs and set it on top of the axle spring seat ***(Figure 9)***. Place the top plate on top of the spring.
2. Install the springs to the axles with the appropriate U-bolts, nuts and washers.

IMPORTANT: On tandem axle suspensions the big hook end of the spring should be arranged to fit in the equalizer ***(Figure 21a)***. On single axle suspensions it should point to the rear ***(Figure 21)***. Arrange the springs so that they are on the correct centers ±.03" (1 mm) and perpendicular to the axle.

3. Tighten the U-bolts to 275-300 ft.-lbs. (373-407 N•m) of torque using an alternating pattern ***(Figure 20a)***. Check the spring centers and adjust if necessary.

⚠CAUTION DO NOT hit steel parts with a steel hammer as parts could break, sending flying steel fragments in any direction creating a hazard which, if not avoided, could result in minor to moderate injury.

4. Install the axles with springs into the suspension hangers. Install the 5/8" spring retainer bolts and spacers in the front and rear hangers, and the equalizer on tandem axles to hold the springs in place. Tighten 5/8" bolts to 35-50 ft.-lbs. (47.68 N•m) ***(Figure 21)***.

IMPORTANT: DO NOT overtighten as this may damage the spacers.

5. Install the torque arms between the hangers and the bottom plates on the axles. It is recommended that the adjustable torque arms be installed on the roadside and the fixed torque arms be installed on the curbside ***(Figure 22)***. Install the 7/8" nuts and bolts to secure the torque arms in place and torque to 275-300 ft.-lbs. (373-407 N•m) ***(Figure 22)***.
6. With the suspension installed, check that there is 1/8" ± 3/32" (3 mm ± 2 mm) clearance between the springs and the sides of the hangers and that all the springs are contacting the bottoms of the hangers ***(Figure 22a)***.
7. Position the decal, XL-MS189-01 in clear view on the roadside of the vehicle as close as practical to the suspension.

Figure 20

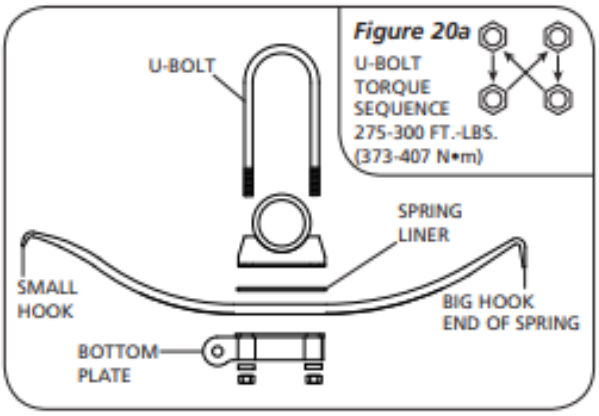


Figure 21

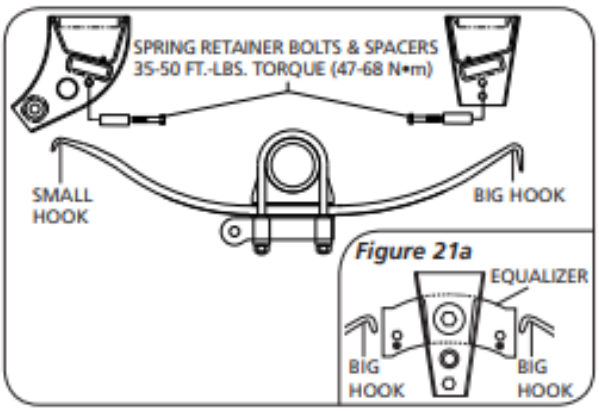
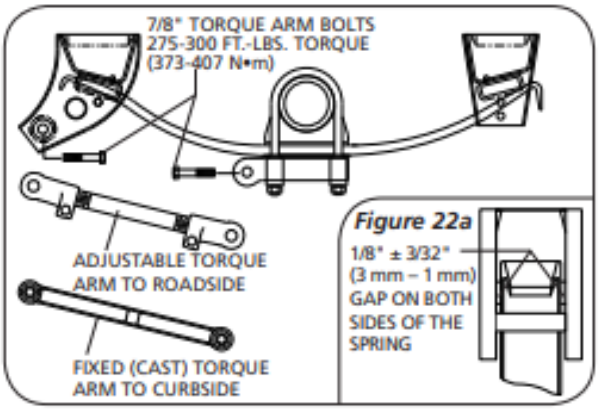


Figure 22



7. Axle Alignment

IMPORTANT: Axle alignment should always be done while the trailer is empty.

1. Pull the trailer in a straight line for a sufficient distance to ensure there are no binds in the suspension.
2. Engage the trailer park brakes.
3. Check that the ends of the springs are contacting the bottom wear pads in all hangers.
4. Loosen the 5/8" clamp bolts on the adjustable torque arms.
5. Disengage the trailer parking brakes and ensure the trailer is empty.
6. Manually measure or use an optical device specifically designed for alignment measuring to determine the following:
   a. Measure the distance from the king pin to the centerline of the front axle spindles. It is recommended that spindle extensions be utilized.
   b. Dimensions A and B ***(Figure 23)*** must be equal to within 1/8" (3 mm).
   c. Measure the distance from the centerline of the front axle spindles to the centerline of the rear axle spindles.
   d. Dimensions C and D ***(Figure 23)*** must be equal to within 1/16" (1 mm).
7. Tighten the clamp bolts on the adjustable torque arm to 85-95 ft.-lbs. (108-129 N•m) of torque.

8. Final Inspection

1. Verify that the hanger brackets to mounting sub-frame and axle seat welds have been completed per specifications, refer to Section 4.
2. Check all suspension fastener connections for proper torque settings ***(Figures 25)***.
3. Check adjustable torque arm clamp nuts to be certain that 85-95 ft.-lbs. (115-129 N•m) torque is maintained.
4. Check for proper suspension mounting height.
5. Check for proper 4-1/2" (114 mm) vertical tire clearance ***(Figure 24)***.
6. Verify that the front axle alignment does not exceed a maximum variation of 1/8" (3 mm) kingpin to front axle and a maximum variation of 1/16" (1 mm) axle to axle on any additional axles ***(Figure 15)***.

9. Operating Recommendations

1. Observe the operating recommendation of the trailer manufacturer for off-road operation of the installed axles, refer to Section 1.

Figure 23

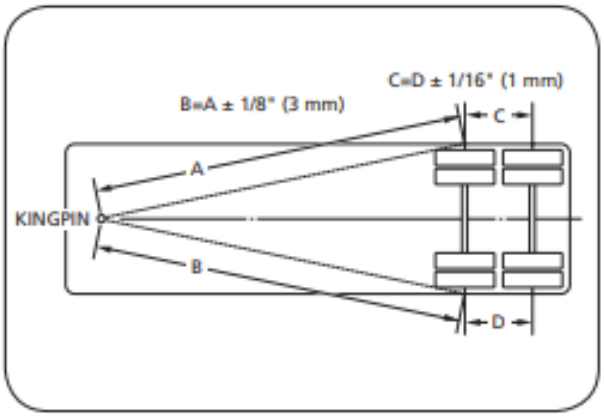
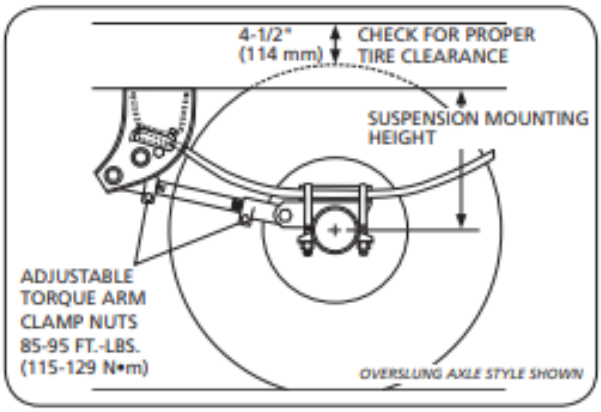


Figure 24



10. Routine Maintenance and Daily Inspection

DuraLite® suspensions, by design, require a minimum of maintenance. However, suspensions require periodic checks to be certain of continued trouble free performance.

- Daily or before each trip, check the suspension to be sure it is fully operational.
- Inspect all decals to ensure they are clearly legible and intact. Clean with a terry cloth towel, soap and water.
- After an initial break-in period of 1,000 miles (1,609 km), re-check the trailer alignment and correct as necessary.

10.1 Routine Physical/Visual Inspections

All fasteners, torque arms, springs, hangers and welds should be visually inspected at 25,000 miles (40233 km) intervals and at all inspections for excessive wear, deformation and structural soundness.

IMPORTANT: A schedule for physical and visual inspections should be established by the operator based on severity of operation or damage to the vehicle could occur.

IMPORTANT: During each pretrip and safety inspection of the vehicle, a visual inspection of the suspension should be done or damage to the vehicle could occur.

NOTE: Failure to maintain proper fastener torque values could result in suspension component damage and loss of vehicle control which, if not avoided, could result in death or serious injury.

IMPORTANT: The use of special lubricants with friction modifiers, such as Anti-Seize or Never-Seize, without written approval from SAF-HOLLAND Engineering, will void warranty and could lead to over torquing of fasteners or other component issues.

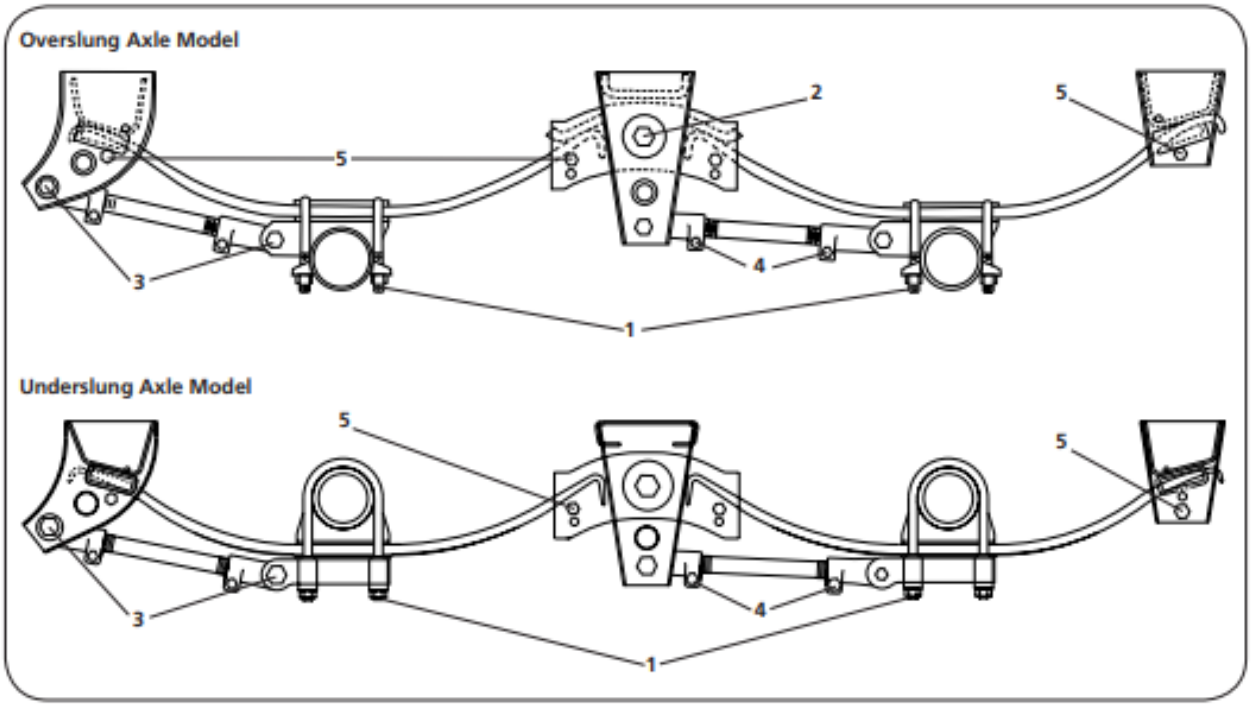
Visually check for:

- Loose, damaged or missing fasteners. Repair or replace as needed.

⚠WARNING Loose, damaged, or missing fasteners can cause loss of vehicle control which, if not avoided, could result in death or serious injury.

- Cracked parts or welds.
- Check 3/4"-16 U-bolt nuts to be certain that 275-300 ft.-lbs. (373-407 N•m) torque is maintained.
- Check 1-14" equalizer bolt to be certain that 450-500 ft.-lbs. (610-678 N•m) torque is maintained
- Check 7/8"-14 torque arm bolts to be certain that 275-300 ft.-lbs. (373-407 N•m) torque is maintained.
- Check adjustable torque arm clamp nuts to be certain that 85-95 ft.-lbs. (115-129 N•m) torque is maintained.
- Check spring retainer bolts to be certain that 35-50 ft.-lbs. (47-68 N•m) torque is maintained.

Figure 25



11. Leaf Spring Selection

⚠WARNING Failure to maintain tire clearance between tires and the nearest point of contact on the suspension or vehicle could cause fire or loss of vehicle control which, if not avoided, could result in death or serious injury.

SAF-HOLLAND DuraLite suspensions are rated up to 25,000 lbs. (11,340 kg) GAWR with proper springs, axles and brakes. The following widely available SAF-HOLLAND leaf springs are suitable for use with DuraLite suspensions:

SPRING TYPE	SINGLE LEAF	TWO LEAF	THREE LEAF	THREE LEAF HD
Low Arch	SP0363	SP0326	SP0356	SP9365-01
Medium Arch	–	SP0325	SP0355	–
High Arch**	SP0360*	SP0324	SP0354	SP0365

* Not approved for single axle applications.
** SAF-HOLLAND does NOT recommend use of high arch springs in single axle applications.

IMPORTANT: It is the installer's responsibility to select the correct mounting height. There should be 4-1/2" (114 mm) of vertical tire clearance with an unloaded vehicle. In addition, clearance must be provided at the side, front, and rear of the tires to prevent tire contact during suspension movement. The mounting heights, shown below, are nominal values and may vary due to variations in the leaf springs and other components.

SAF-HOLLAND ORIGINAL PARTS

From fifth wheel rebuild kits to suspension bushing repair kits, SAF-HOLLAND Original Parts are the same quality components used in the original component assembly.

SAF-HOLLAND Original Parts are tested and designed to provide maximum performance and durability. Will-fits, look-a likes or, worse yet, counterfeit parts will only limit the performance potential and could possibly void SAF-HOLLAND's warranty. Always be sure to spec SAF-HOLLAND Original Parts when servicing your SAF-HOLLAND product.

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SAF-HOLLAND Group

Wheel-End Lubrication

This section provides information on lubricating Meritor trailer axle wheel-ends with oil. Figure 14.2.

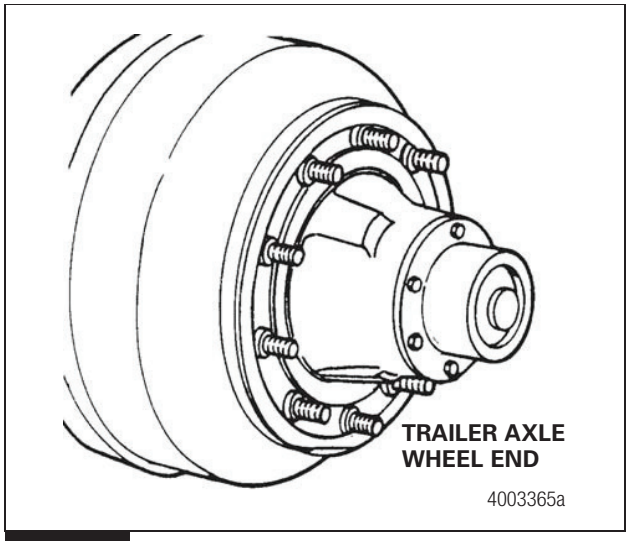


Figure 14.2

Oil Lubricated

1. The most common oils used in Meritor trailer axle wheel-ends have a designation of API-GL-5 (American Petroleum Institute – Gear Lubricant No. 5). This oil is also approved under military specification MIL-2105D. Refer to Table L in this section.

2. In addition to the GL-5 oils listed, oils with API grades GL-1, GL-2, GL-3 and GL-4 can also be used in trailer axle wheel-ends. These oils cannot be used in drive axles, or any application which employs hypoid, amboid, spiral, bevel, or planetary gearing.

3. Oil viscosity should be suitable for the climate in which the axle will be operated.

   a. Low viscosity single grade gear oils, such as SAE 75W (Society of Automotive Engineers), should only be used in cold climates. Oil seals must be in excellent condition when using low viscosity oils to insure against loss of these thin fluids.

   b. Multigrade oils, such as 80W/90, should be used where vehicles operate in both warm and cold climates.

4. Do not use thinning agents such as kerosene, gasoline, or other solvents that lower the viscosity of lubricants.

5. The recommended frequency of wheel-end oil changes depends on such factors as environment, speeds, and loads imposed on axle. For example, applications such as container chassis service put limited stress on wheel-end lubricant, allowing maintenance intervals to be extended. Other applications, such as off-highway dump trailer service, put severe stress on the wheel-end lubricant, requiring that maintenance be performed more frequently. The following information is therefore intended as a general guideline:

   a. General – Change oil whenever it is contaminated or when wheel-end cavity is disrupted by removing spoke wheel or hub.

   b. Standard-Duty Service – For standard-duty on-highway service, change oil every 100,000 miles or 12 months, whichever comes first.

   c. Heavy-Duty Service – For heavy-duty on-highway, off-highway or combined on/off highway service, change oil every 30,000 miles or 6 months, whichever comes first.

6. Guidance for lubricating a wheel-end with approved gear oil (Table L) is as follows:

   a. Coat bearing cones with oil.

   b. Apply a light film of NLGI #1 or #2 grease (not oil) to axle spindle bearing journals to help protect them from fretting corrosion. Figure 14.3.

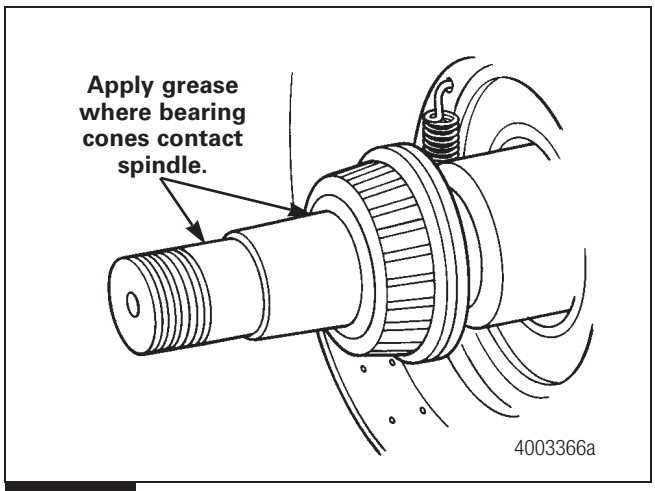


Figure 14.3

CAUTION

It is important not to overfill the wheel-end cavity with lubricant. Wheel-end oil level should never exceed the middle of the hubcap. Also, make sure any excess oil is wiped away since it can contaminate brake linings and cause poor brake performance.

c. Fill wheel-end with an approved gear oil to hubcap fill line. Note that oil must be given sufficient time to settle prior to final check of oil level. This is especially important in cold conditions. Figure 14.4.

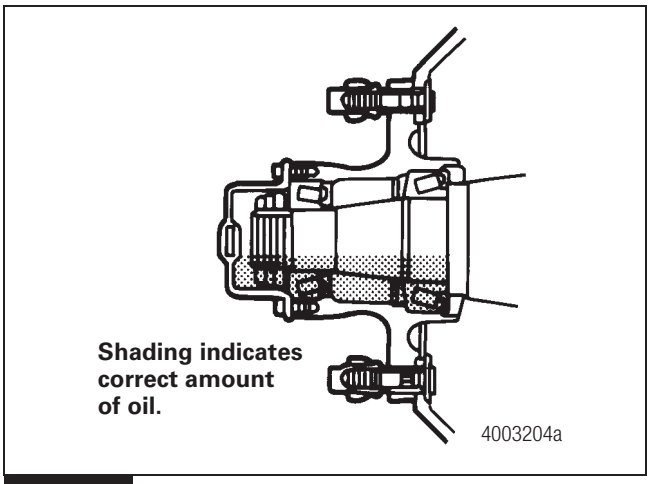


Figure 14.4

Hinges on Back Door(s)

Generously grease hinges monthly. This will help to force moisture and dirt from the hinges.

7. Inspect wheel-end oil level at least every 1,000 miles (1,600 km). To check, make sure vehicle is on level ground then clean hubcap window and observe oil level. Add lubricant if oil level is down more than 0.25 inch (6.3 mm) from fill line. Figure 14.5.

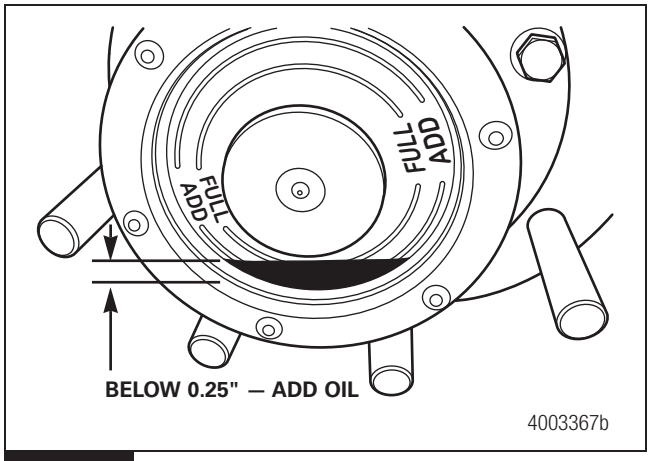
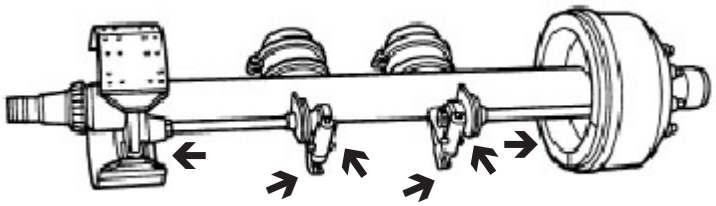


Figure 14.5

Greasing the Axle

On each axle there are six grease zerks that need to be greased every six months or every 10,000 miles. The grease zerks are located by the arrows shown below.



CAUTION

Make sure any excess grease or oil is wiped away since it can contaminate brake linings and cause poor brake performance. If necessary, clean the disc or the drum and replace contaminated linings.

Conventional Trailer Axle Wheel-End Lubrication Intervals and Specifications

Table L: Conventional Trailer Axle Wheel-End Oil Change Intervals and Specifications

Check Oil Level	Oil Change*	Meritor Specification	Specification Approval	Oil Description	Outside Temperature °F Min.	°F Max.	°C Min.	°C Max.
1,000 miles (1600 km)	**Linehaul and General Service:** For 100,000 miles (160 000 km) or more a year, change the oil every 100,000 miles (160 000 km). For less than 100,000 miles (160 000 km) a year, change the oil once a year. **Heavy Service:** For 60,000 miles (96 000 km) or more a year, change the oil every 30,000 miles (48 000 km). For less than 60,000 miles (96 000 km) a year, change the oil every six months. **Conditions That Require an Oil Change:** Change the oil if the wheel end is disturbed during wheel or hub removal or if the oil is contaminated.	0-76-A Gear Oil	MIL-PRF-2105-E and SAE J2360	GL-5 SAE 85W/140	–10	None	–12	None
		0-76-D Gear Oil		GL-5 SAE 80W/90	–15	None	–26	None
		0-76-E Gear Oil		GL-5 SAE 75W/90	–40	None	–40	None
		0-76-J Gear Oil		GL-5 SAE 75W	–40	35	–40	2
		0-76-L Gear Oil		GL-5 SAE 75W/140	–40	None	–40	None
		0-76-M Full-Synthetic Gear Oil		GL-5 SAE 75W/140	–40	None	–40	None
		0-76-N Full-Synthetic Gear Oil		GL-5 SAE 75W/90	–40	None	–40	None
		0-81 Full-Synthetic Oil		SAE 50	–40	None	–40	None

*The recommended oil change interval is based on operating conditions, mileage, speeds and loads. Limited service applications may allow the recommended interval to be increased. Severe or heavy service applications may require the recommended interval to be reduced. For more information, contact the Meritor OnTrac™ Customer Call Center at 866-668-7221.

NOTES

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