

Installation and Operation Manual

Self Steering Axle with Stabilizing Damper

- Disc Brake Axles
SIL9-22K01, SIL11-22K01, ZIL11-22K01
- Drum Brake Axles
SL9-16570, SL11-16570, ZL11-16570



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Introduction

This manual provides you with information necessary for the care, maintenance, inspection and safe operation of the SAF Self-Steering Axle. SAF axles are designed and engineered to provide trouble-free service.

NOTE: This literature only covers the SAF Self-Steering Axle. Refer to other SAF-Holland literature for brakes, suspensions and other axle system components on our website www.safholland.us or contact customer service at 888-396-6501.

Warranty

Refer to the complete warranty for the country in which the product will be used. A copy of the U.S. Warranty can be downloaded from the SAF-HOLLAND Web Site (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/axle.

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, work shop 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.

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 Used with the safety alert symbol, 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.

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.

NOTE: Several maintenance procedures in this manual require re-positioning of the brake chamber, brake calipers and/or ABS system. Consult the manufacturer's manual for procedures on the proper operation of brake chamber, brake calipers and/or ABS system.

IMPORTANT: Key components on each axle's braking system, including friction material, rotors and drums, are intended to wear over time. Worn parts should be replaced in sets on both the road and curb side of an axle.

⚠ WARNING Failure to follow manufacturers' instructions regarding spring pressure or air pressure control may allow uncontrolled release of energy 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 your SAF axles:

1. The contact surfaces between the wheel and hub must not have any paint added to them. The contact surfaces must be clean, smooth and free from grease.

⚠ WARNING Failure to keep wheel and hub contact surfaces clean and clear of foreign material could allow rim/hub separations which, if not avoided, could result in death or serious injury.

2. Only the wheel and tire sizes approved by the trailer manufacturer may be used.
3. Before operating vehicle, ensure that the maximum permissible axle load is not exceeded and that the load is distributed equally and uniformly.
4. Ensure that the brakes are not overheated by continuous operation.

⚠ WARNING Failure to minimize the use of brakes during overheating conditions could result in deterioration of brake efficiency which, if not avoided, could result in death or serious injury

5. The parking brake must not be immediately applied when the brakes are overheated, as the brake drums or discs may be damaged by different stress fields during cooling.
6. Observe the operating recommendation of the trailer manufacturer for off-road operation of the installed axles.

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

IMPORTANT: Off-road operation of SAF axles beyond the approved application design may result in damage and impair axle and suspension system performance.

7. SAF axles require routine service, inspection and maintenance in order to maintain optimum performance, operational and road safety, and to be able to recognize natural wear and defects before they become serious.
8. In the event of suspension air loss, reduce speed quickly and remove the vehicle from traffic if possible. If unable to remove the vehicle from traffic, follow DOT safety requirements regarding emergency situations.
9. Contact a qualified towing and/or service company to assist in repairing vehicle or to move it to a qualified repair facility. DO NOT operate the vehicle in the absence of suspension air pressure.

⚠ WARNING Operating the vehicle without proper air pressure can cause tire failure, fire, or loss of vehicle control which, if not avoided, could result in death or serious injury.

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

A list of SAF-HOLLAND distributor/dealer locations to supply SAF-HOLLAND Original Parts can be found at www.safholland.us or you can SAF-HOLLAND Customer Service Group at 888-396-6501.

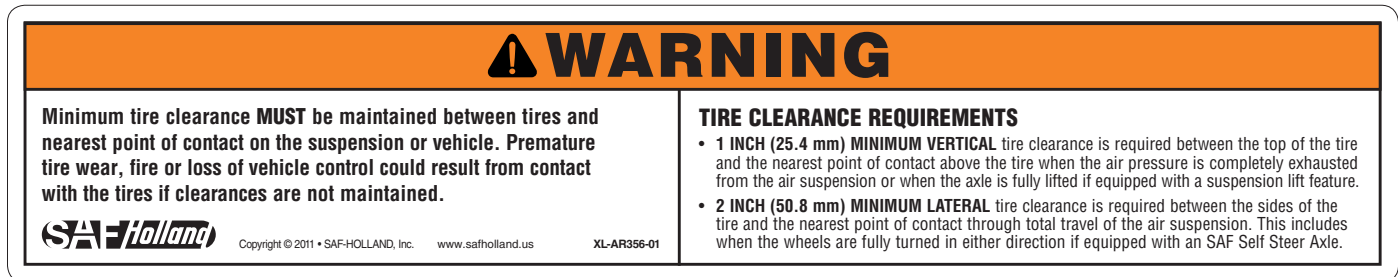
Updates to this manual will be published as necessary online at: www.safholland.us

2. Standard Decal Requirements

The following decal must be properly installed on the Axle prior to putting it in service: Tire Clearance Warning Decal, XL-AR356-01 (**Figure 1**).

It is the responsibility of the end user to periodically inspect all decals and ensure that they are clean and completely legible. If any decals are missing, loose, damaged or difficult to read, contact SAF-HOLLAND Customer Service at 888-396-6501 to order replacements immediately.

Figure 1



3. Self-Steering Axle Model Identification

The Self-Steering Axle Serial Tag is located near the center of the axle tube (**Figure 2**).

4. Model Nomenclature

The sample tag shown will help you interpret the information on the SAF-HOLLAND, Inc. serial number tag. The axle version, type, test report number, serial number, identification number, axle capacity, and max speed is listed on the tag (**Figure 3**).

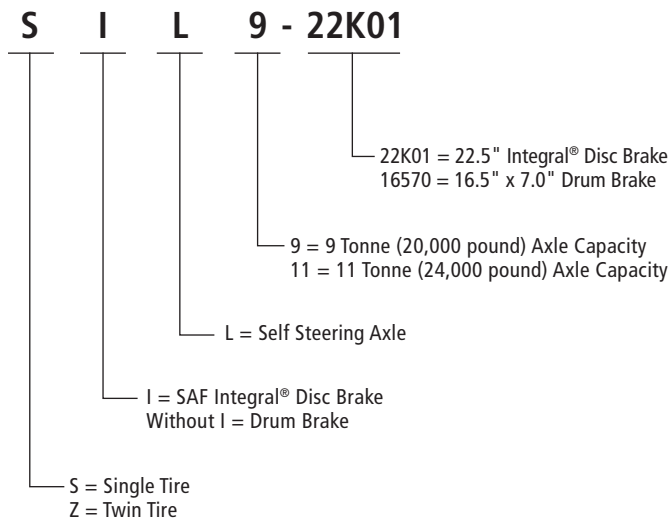


Figure 2

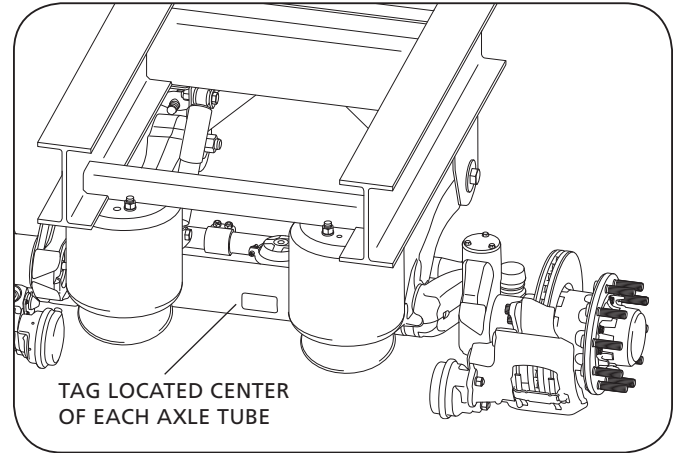


Figure 3

SAF-HOLLAND GMBH D-63856 BESENBAACH • GERMANY			
Version	SIL11-22K01	Serial No.	51 11 156 0020
Type	SBK2243-13S01	Ident No.	171 11 02 750 10
Test Report	3611203	Perm. axle cap. stat.	11000kg
Made in Germany		V max. 105 km/h	
AN 3335528		SN 11091560020	

5. Suspension Installation

Install suspension per CBX23/CBX25 Series Suspension Installation and Operation Manual XL-AS114060M-en-US, available at: www.safholland.us.

6. Ride Height

With the suspension properly installed, apply air to the trailer and verify the ride height of the self-steer assembly. If adjustment is required, refer to XL-AS114060M-EN-US, available at: www.safholland.us.

7. Axle Alignment

Perform axle alignment with the steer axle locked in the straight ahead position per XL-AS114060M-en-US, available at: www.safholland.us.

8. Toe-In

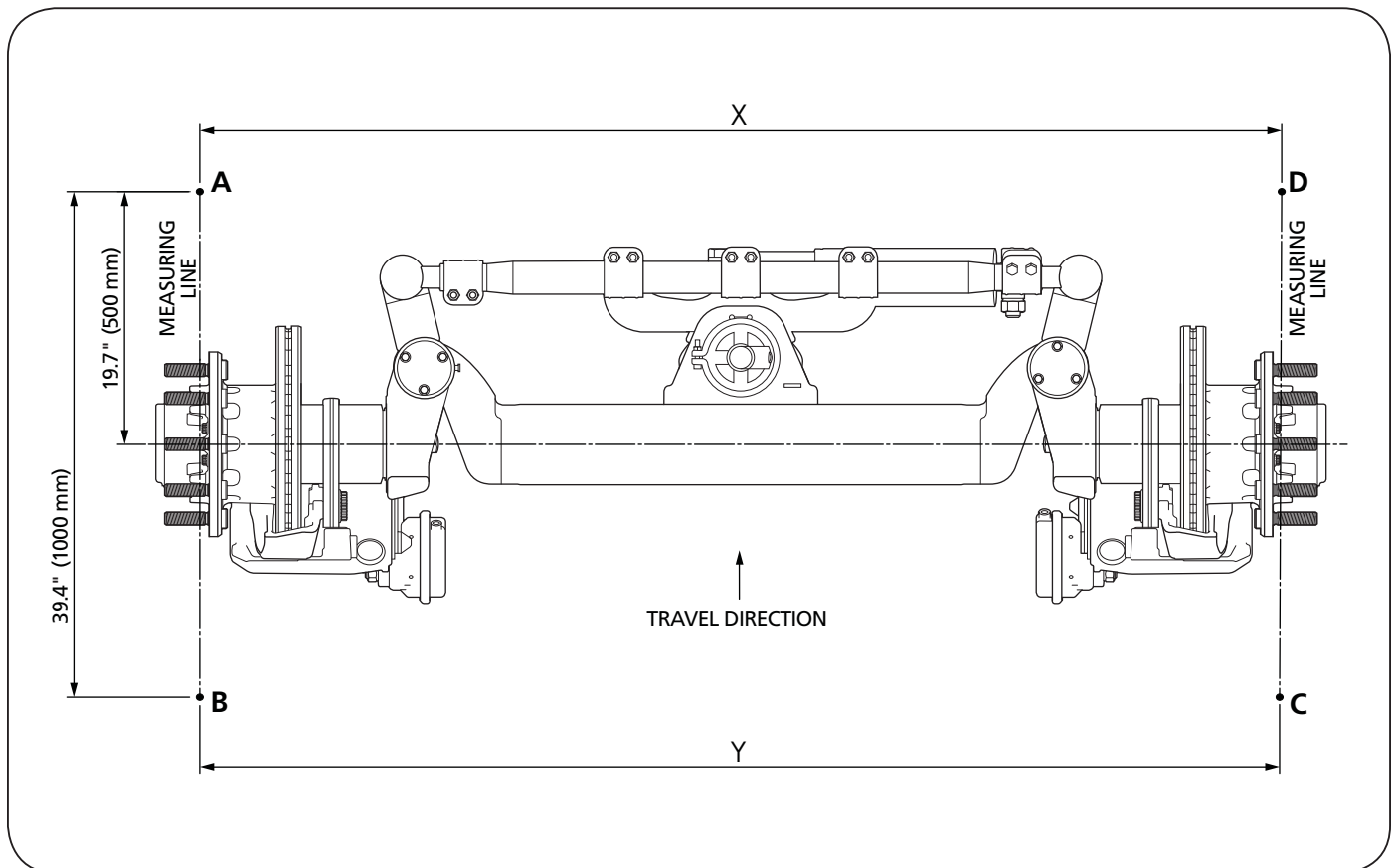
SAF Self-Steer Axle toe-in is factory set to orient the wheels slightly inward during normal operation, $Y - X = 5/32"$ (4 mm) to $9/32"$ (7 mm) (**Figure 4**).

During the course of normal axle maintenance it may become necessary to check and/or re-adjust the axle toe-in. To adjust toe-in:

1. The trailer must be unloaded.
2. Remove the wheels and support the axle at normal ride height using appropriate jack stands.

⚠ WARNING Failure to properly support the Self Steering Axle during maintenance could create a crush hazard which, if not avoided, could result in death or serious injury.

Figure 4



3. Loosen all tie rod retaining clamp bolts (**Figure 5**).

4. Rotate tie rod (**Figure 5**) to obtain specification $Y - X = 5/32''$ (4 mm) to $9/32''$ (7 mm).

To measure axle toe-in, use a $39-3/8''$ (1 m) horizontally oriented straight edge on each hub surface and a plumb-bob to create ground marks that are located $19-5/8''$ (500 mm) in front and rear of each wheel. The distance between the front ground marks (X) should be from $5/32''$ (4 mm) to $9/32''$ (7 mm) shorter than the distance between the rear ground marks (Y) resulting in a slightly inward biased wheel direction (0.2° to 0.4° included angle).

5. Ensure that stabilizer damper is in the neutral (strain free) condition and that the locking actuator is in alignment with the locking notch on the tie rod assembly (**Figure 5**).

6. Tighten tie rod retaining clamp bolts to 90 ft.-lbs. (120 N•m).

8. Recheck toe-in and re-adjust taking into account changes noted (if any) when retaining clamps are tightened.

9. Reinstall wheels.

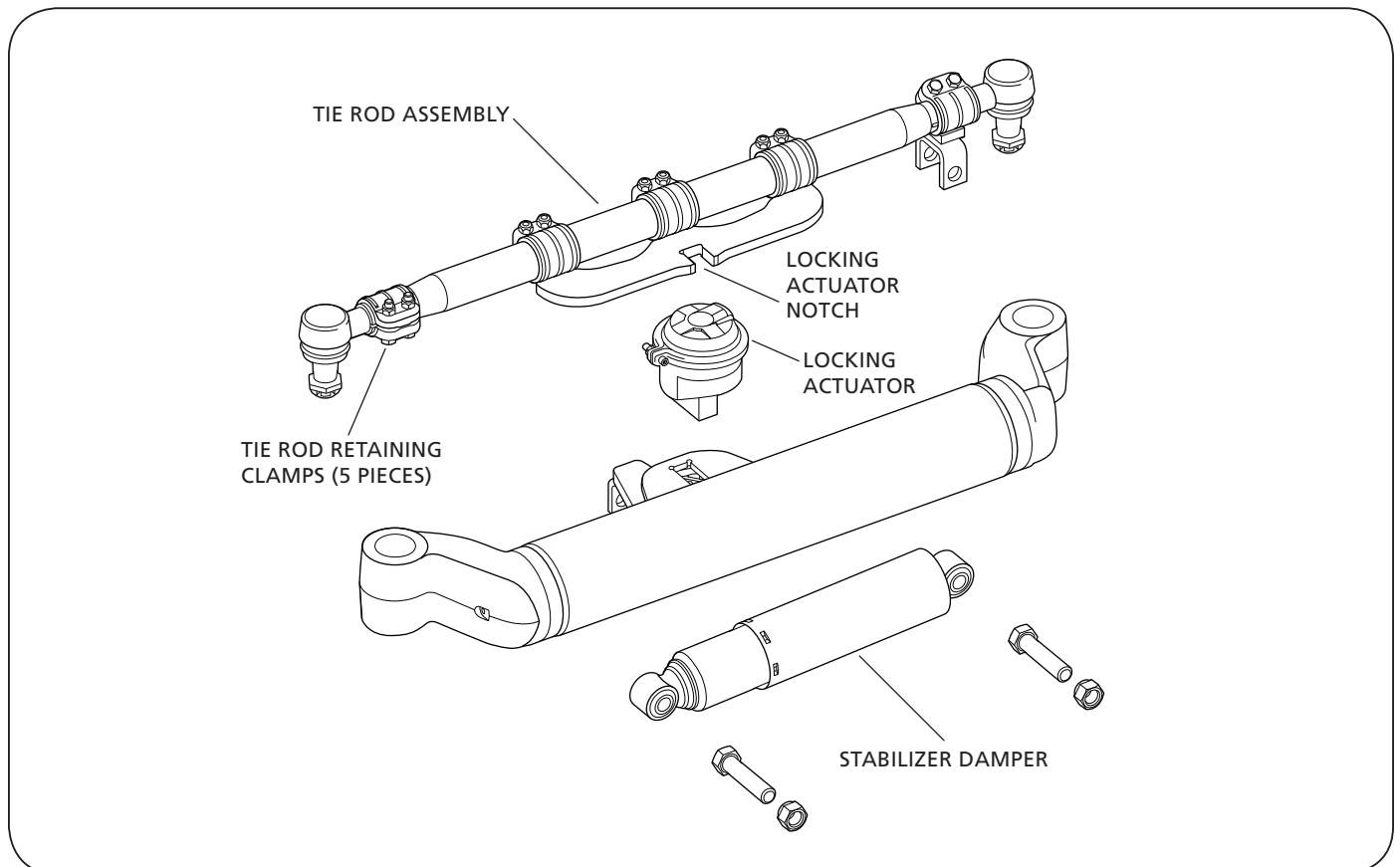
9. Caster

SAF Self Steer Axle caster is set at the factory at 0° with a tolerance of $+3^\circ/-1^\circ$ and cannot be adjusted.

10. Camber

SAF Self Steer Axles have a camber specification of 1.2° with an unloaded trailer. This is set at the factory and cannot be adjusted.

Figure 5



11. Steering Angle

SAF Self Steer Axles are equipped with an adjustable steer angle feature and are preset at their maximum steering angle, depending on the model number, of either 20° or 30°.

It is important to limit the self steer axle steering angle to prevent interference between the wheels and chassis components.

12. Tire Clearance

Verify minimum tire clearance from closest vehicle component of 2" (50.8 mm) from the side of each tire when the axle is fully turned in either direction, and 1" (25.4 mm) from the top of each tire when the suspension is lifted.

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

To adjust the steering angle on the SAF Self Steer Axle equipped with an adjustable steer angle:

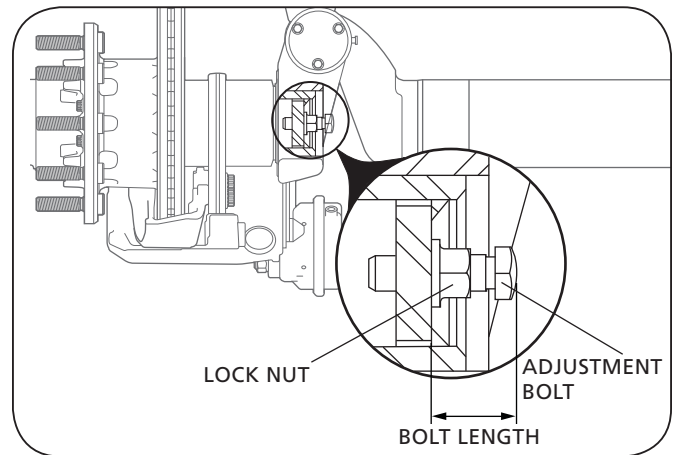
1. Loosen lock nut on steering knuckle bolt (**Figure 6**).
2. Adjust steering adjustment bolt (**Figure 6**) dimension corresponding with the chart below.
3. Tighten locknut to 60 ft.-lbs. (80 N•m).
4. Repeat 1 through 4 for other end of the axle.

STEERING ADJUSTMENT BOLT LENGTH

STEERING ANGLE	20° AXLE		30° AXLE	
	INCH	mm	INCH	mm
8° *	2-9/16	65	3-7/8	98
10° *	2-3/8	60	3-11/16	93
12° *	2-3/16	55	3-7/16	88
14° *	2	50	3-1/4	83
16° *	1-3/4	45	3-1/16	78
18° *	1-9/16	40	2-7/8	73
20°	1-3/8	35	2-11/16	68
25°	–	–	2-3/16	56
28°	–	–	1-7/8	48
30°	–	–	1-11/16	43

IMPORTANT: Angle values marked (*) are for tire clearance purposes only and are not SPIF (ONTARIO REGULATION 413/05) compliant.

Figure 6



13. Operation

The SAF Self Steering Axle is designed to operate in self steer mode only with the vehicle moving in a forward direction. When operating a vehicle equipped with the SAF Self Steering Axle in reverse, the self steering axle must be raised, or locked in a straight ahead position.

IMPORTANT: To prevent significant misalignment of tires while backing up, the SAF Self Steering axle must be raised, or locked in a straight ahead position prior to moving the trailer backwards.

CAUTION Failure to either raise or lock the SAF Self Steer Axle in a centered position prior to backing up will result in reversed self steering geometry which, if not avoided, could result in severe tire or axle damage.

If reversing of the vehicle is necessary with the SAF Self Steering Axle supporting load, ensure that it is locked in the straight ahead position by venting the air pressure from the locking actuator (**Figure 7**), and then driving the vehicle straight ahead until the locking actuator is in engagement with the tie rod assembly locking actuator notch (**Figure 7**).

CAUTION Failure to lock the SAF Self Steer Axle in a centered position prior to backing up with the axle under load will result in reversed self steering geometry which, if not avoided, could result in severe tire or axle damage.

14. Maintenance Procedure

14.1 Lubrication

SAF Self Steer Axles are lubricated at the factory. Once placed in service, they do require periodic lubrication. Lubricate after one (1) month in service, and then every six (6) months at the locations shown (**Figure 8**). The steering axle should be in the raised position during lubrication. Use high quality chassis grease.

14.2. Visual Inspection

Inspect the components for proper function every six (6) months.

Figure 7

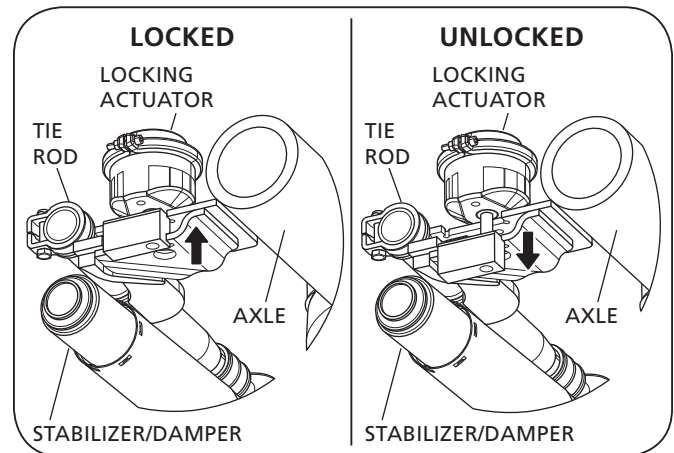
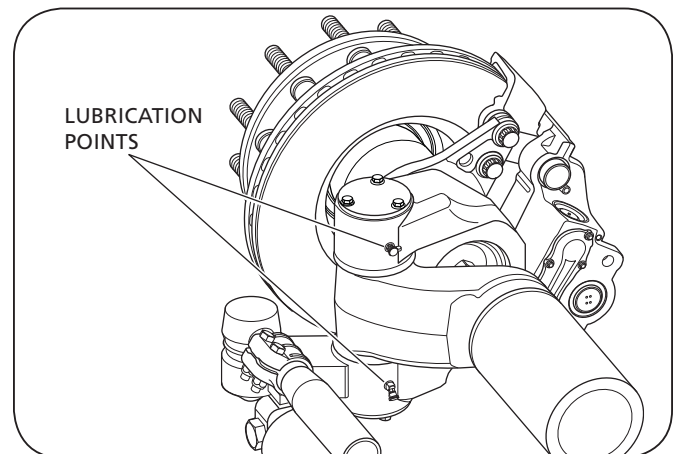


Figure 8



15. Service Parts

NO.	DESCRIPTION	PART NUMBER	QTY. PER AXLE
1*	Bearing D65 / 60 x 70	04230017000Z	4
2*	Steering Bolt	01217001900Z	2
3*	Pressure Plate-Upper	01101000900Z	2
4*	Pressure Plate-Lower	01101001102Z	2
5*	O-Ring D84 x 11	04315001100Z	4
6*	Cover Plate	01091003600Z	4
7*	Gasket	01093001700Z	4
8*	Hexagon Screw M8	04343101588Z	12
9*	Lock Washer A8	04141000100Z	12
10*	Grease Fitting AM8 x 1	04201000100Z	2
11*	Grease Fitting BM8	04201000200Z	2
12A	Tie Rod Assembly 56.7" - 59.0"	03357021100Z	1
12B	Tie Rod Assembly 61.4" - 63.75"	03357021300Z	1
13	Tie Rod End - LH	02205000300Z	1
14	Tie Rod End - RH	02205000400Z	1
15	Axle Lock Actuator	03454112570Z	1
16	Stabilizing Damper	02376101300Z	1
17**	M-24 x 110 Grade 8.8 Bolt	04343002388Z	2
18**	Class 8 Nylon Insert Lock Nut	04247401480Z	2

* Available only in kit form 03434365700Z, Knuckle Repair Kit
 ** Available only in kit form 03341002319Z, Stabilizing Damper Fastener Kit
Note: Kits available from your local SAF-HOLLAND Distributor.

Figure 9

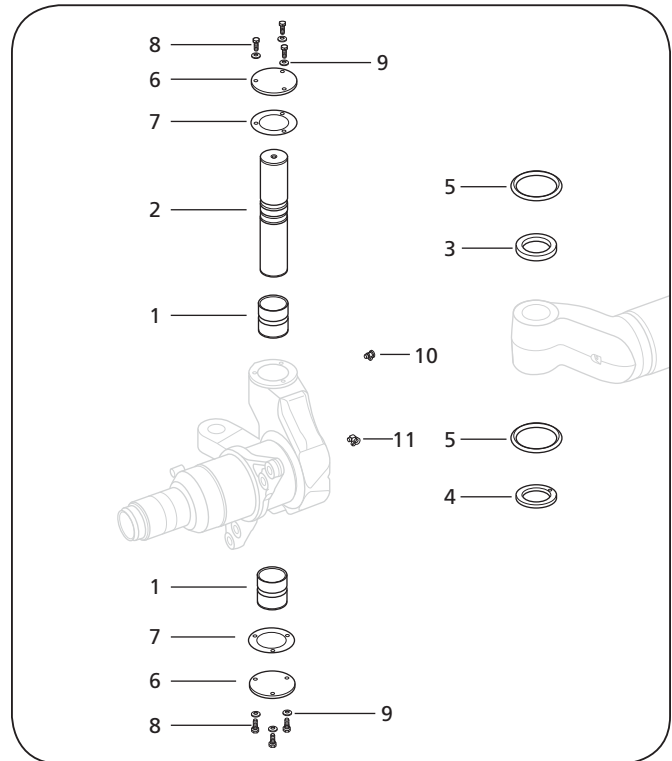
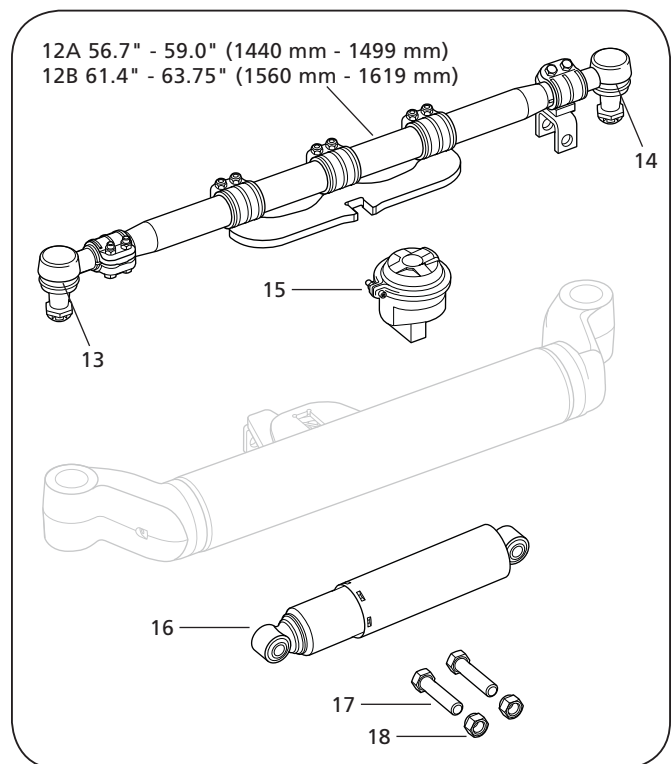


Figure 10



16. Fastener Torque Specifications

IMPORTANT: When servicing the SAF Self Steer Axle, tighten fasteners (**Figure 10**) according to the torque values chart.

⚠ WARNING Failure to tighten SAF Self Steer Axle components to proper torque values could result in loss of steer axle components which, if not avoided, could result in death or serious injury.

Fastener Torque Values

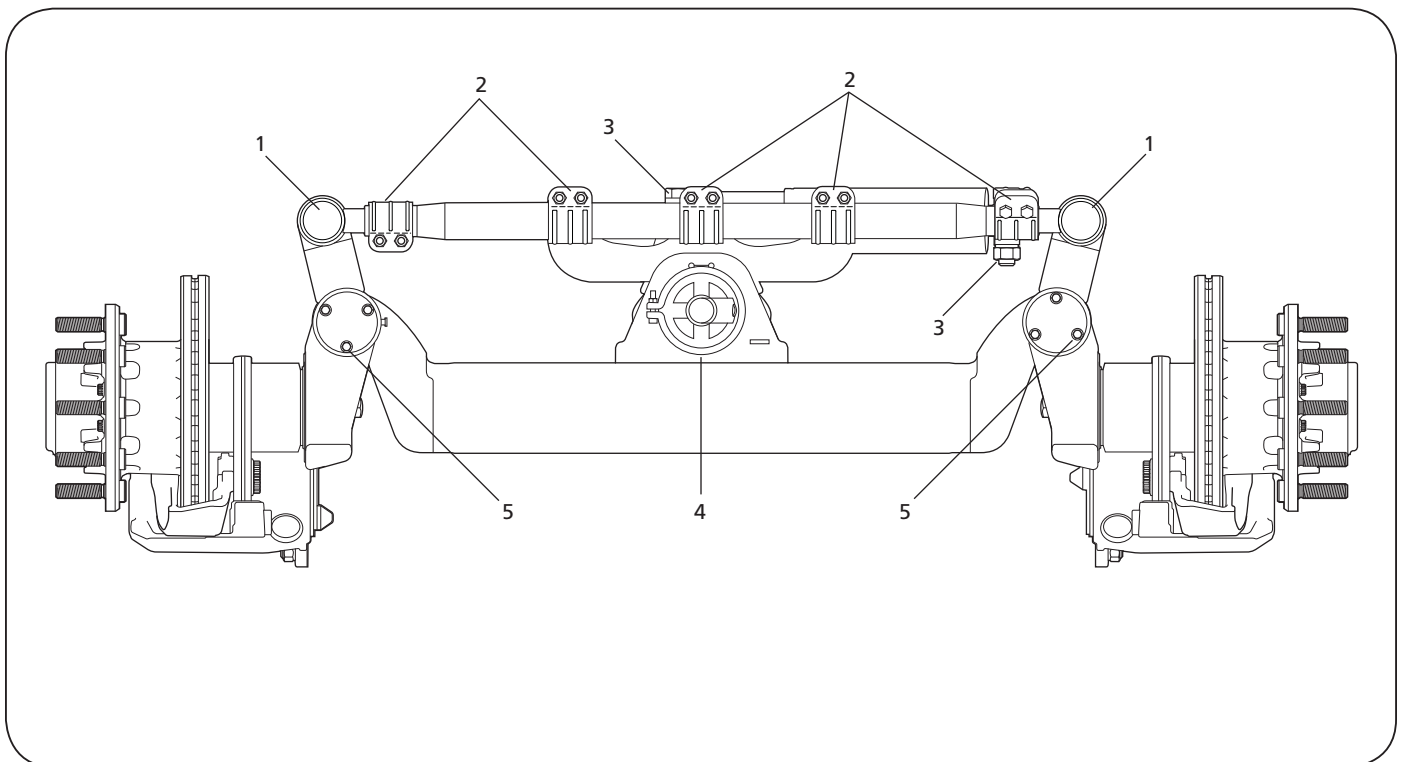
NO.	DESCRIPTION	THREAD	NUMBER PER AXLE	TORQUE	
				FT.-LBS	N•m
1	Tie Rod End Castellated Nut	M30	2	250	340
2	Retaining Clamp Bolts	M12	10	90	120
3	Stabilizing Damper Bolts	M24	2	440	600
4	Axle Lock Actuator Nuts	M6	2	90	120
5	Cover Plate Bolts	M8	12	20	25

17. Wheel End Service

For CBX23 and CBX25 Suspensions with Drum Brake Systems refer to SAF-HOLLAND Drum Brake Axle Service Manual, XL-TA100060M, available at: www.safholland.us.

For CBX23 and CBX25 Suspensions with Disc Brake Systems refer to SAF Disk Brake Axle Service Manual, XL-SA100590M, available at: www.safholland.us.

Figure 11





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-alikes 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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