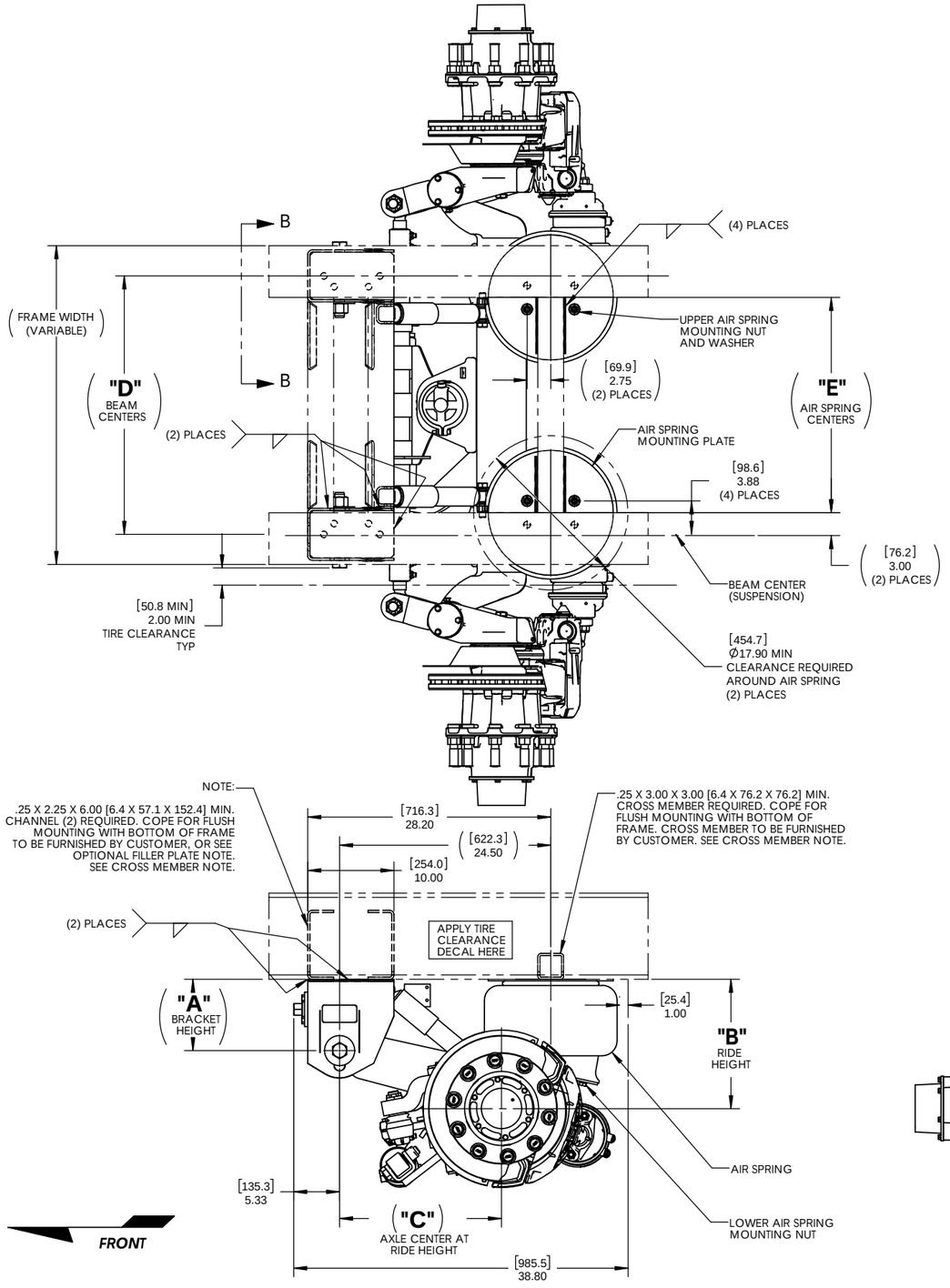
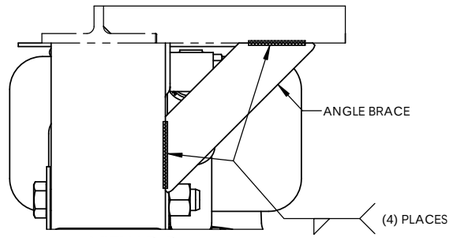
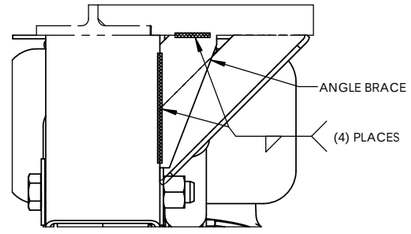
CHANGE RECORD				
LTR.	DESCRIPTION OF CHANGE	BY	E.C.N.	DATE
-	NEW RELEASE	CH	305107	2016-07-14





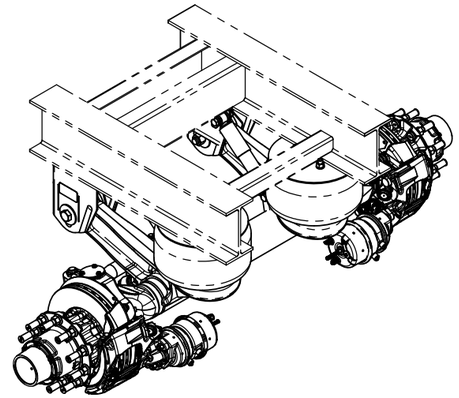
VIEW B-B
SCALE 1 : 4

ROTATED FOR CLARITY
REQUIRED BRACING FOR FRONT & REAR GUSSET ON 85.4 [2169] & 87.1[2212] TRACK



VIEW B-B
SCALE 1 : 4

ROTATED FOR CLARITY
REQUIRED BRACING FOR FRONT & REAR GUSSET ON 77.5 [1969] TRACK



SEE INSTALLATION AND OPERATION MANUAL #XL-AA10006BM-en-US FOR MORE INFO ON SELF-STEER AXLE SET UP

SEE IMPORTANT INFO #XL-AA20005WI-en-US FOR INFORMATION ON APPROVED OFFSETS AND DE-RATING FOR WBS TIRES

USE ONLY APPROVED WHEELS AS SHOWN ON IMPORTANT INFO #XL-SA10070WI-en-US

TIRE CLEARANCE NOTE:

PROVIDE 1.00 [25.4] OF TIRE CLEARANCE ABOVE TOP OF TIRE WHEN THE SUSPENSION IS IN FULL UP TRAVEL POSITION.

SWING ALIGN PIVOT CONNECTION INSTALLATION NOTE:

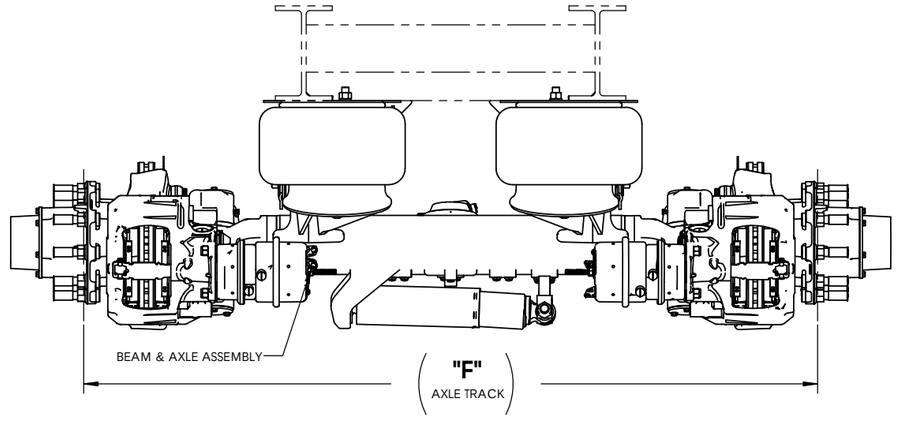
1. TORQUE THE SWING ALIGN PIVOT CONNECTION NUT TO 400±25 FT-LB [542±34 Nm]
2. TURN THE SWING ALIGN ADJUSTMENT BOLT FIVE(5) TURNS CLOCKWISE, THEN TEN(10) TURNS COUNTER CLOCKWISE, AND THEN FIVE(5) TURNS CLOCKWISE, SUCH THAT THE SWING ALIGN IS CENTERED.
3. RE-TORQUE THE PIVOT CONNECTION NUT TO 575±25 FT-LB [780±34 Nm]

CROSS MEMBER NOTES:

1. ALTERNATIVE TO COPING CROSS MEMBERS CAN BE ACHIEVED BY INSTALLING A FILLER PLATE BETWEEN THE CROSS MEMBER & SUSPENSION COMPONENTS AT INBOARD EDGE OF FRAME.
2. ALL CROSS MEMBERS TO BE DETERMINED & SUPPLIED BY CUSTOMER.
3. ALL CUSTOMER SUPPLIED CROSS MEMBERS MUST PROVIDE BACK UP TO SUSPENSION COMPONENTS AS WELL AS SUPPORT TO FRAME. SIZES SHOWN ARE MINIMUM SIZES REQUIRED FOR SUSPENSION COMPONENTS.

NOTES:

1. WELD WHERE INDICATED BY ▨ .25[6.4] MIN WELD SIZE DO NOT WELD WITHIN .50[12.7] FROM RAW EDGE OF FRAME.
2. ALL WELDING PER ENGINEERING STANDARDS XL-AR353-01 UNLESS OTHERWISE SPECIFIED.
3. FOR AIR CONTROLS KIT W/O INTEGRAL DUMP USE VALVE KIT 90560137 AND INSTALLATION DRAWING 42210004. FOR AIR CONTROL KIT W/ INTEGRAL DUMP USE VALVE KIT 90560138 AND INSTALLATION DRAWING 42210003.
4. ALL DIMENSIONS TO BE ±.06 [1.5] UNLESS OTHERWISE SPECIFIED.



3/4"-16	UPPER AIR SPRING	40-50 FT-LB [54-61 Nm]
1/2"-13	LOWER AIR SPRING	30-40 FT-LB [41-54 Nm]
SIZE	LOCATION	LUBRICATED TORQUE

TORQUE SPECS

ITEMS ASSEMBLED BY SAF-HOLLAND ARE PRE-TORQUED

MODEL	DIM ("A") BRACKET HEIGHT		DIM "B" RIDE HEIGHT						DIM ("C") AXLE CENTER AT RIDE HEIGHT		AXLE TRAVEL					
			NOMINAL		MAXIMUM (+3° KP ANGLE)		MANIMUM (-1° KP ANGLE)				UP		DOWN		TOTAL	
	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM
CBX25/30 -14 W/245	7.25	184.2	14.00	355.6	15.0	381	13.7	348	18.8	478	3.3	84	3.9	99	7.2	183
CBX25/30 -15 W/245	8.25	209.6	15.00	381.0	16.0	406	14.7	373	18.7	475	4.1	104	3.5	89	7.6	193
CBX25/30 -16 W/245	10.00	254.0	16.00	406.4	17.0	432	15.7	399	19.0	483	4.0	102	4.2	107	8.2	209
CBX25/30 -17 W/245	10.00	254.0	17.00	431.8	18.0	457	16.7	424	18.7	475	5.0	127	3.2	81	8.2	208

SUSPENSION / AXLE CONFIGURATIONS						
DIM ("D") BEAM CENTERS		DIM ("E") AIR SPRING CENTERS		DIM ("F") AXLE TRACK		MAX STEER ANGLE
INCH	MM	INCH	MM	INCH	MM	
30.00	762.0	24.0	610	77.5	1967	20°
40.00	1016.0	34.0	864	85.4	2169	20°
37.00	939.8	31.0	787			30°
41.00	1041.4	35.0	889	87.1	2212	20°
39.00	99.6	33.0	838			30°

UNSPECIFIED TOLERANCES FOR DIMENSIONS

ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ]

SEE NOTE 4

ANGLES ±1°

THIRD ANGLE PROJECTION

EST. WEIGHT: SEE CHART

SCALE: 1:12

SAF-HOLLAND

TITLE: SUSPENSION INSTALLATION-CBX25/30 w245

MATL:

MATL.#:

PART NUMBER: 10100266

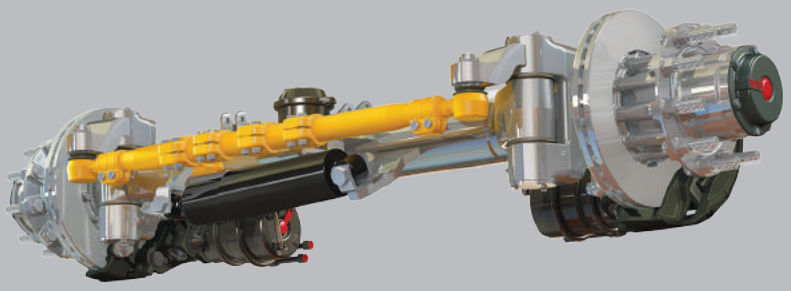
REV. -

SAF-HOLLAND Group

Installation and Operation Manual

Self Steering Axle with Stabilizing Damper

- Disc Brake Axles
- Drum Brake Axles



XL-AA10006BM-en-US Rev B

SAF Holland Group

SAF-HOLLAND Group

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 — 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.

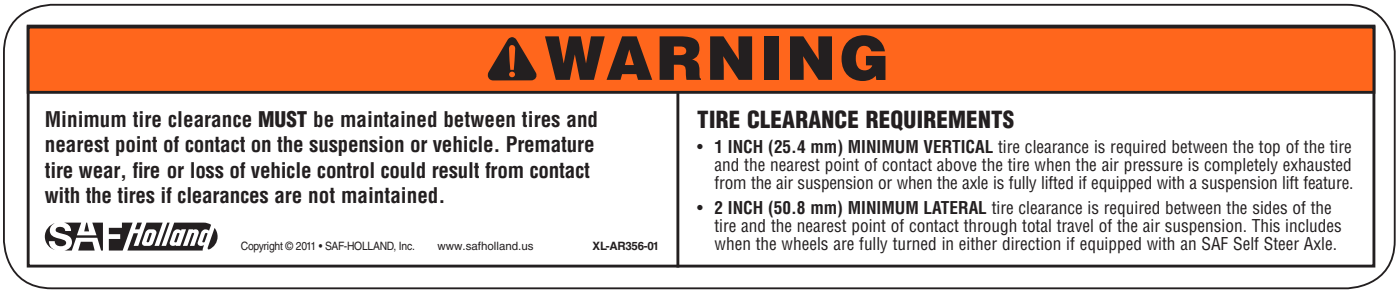
Updates to this manual will be published as necessary online at: www.safholland.us

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)***.

S I L 9 - 22K01

- S = Single Tire
  Z = Twin Tire
- I = SAF Integral® Disc Brake
  Without I = Drum Brake
- L = Self Steering Axle
- 9 = 9 Tonne (20,000 pound) Axle Capacity
  11 = 11 Tonne (24,000 pound) Axle Capacity
- 22K01 = 22.5" Integral® Disc Brake
  16570 = 16.5" x 7.0" Drum Brake

Figure 2

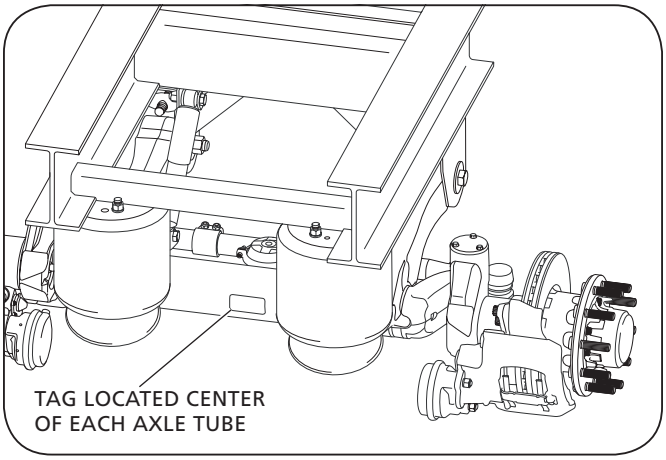
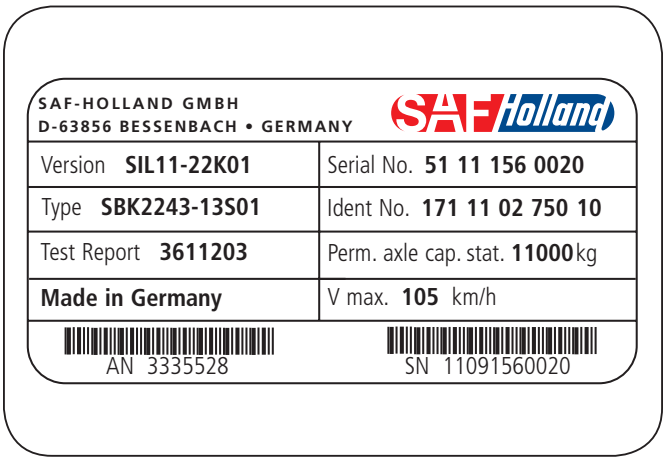


Figure 3



5. Suspension Installation

Install suspension per CBX23/CBX25 Series Suspension Installation and Operation Manual XL-AS11406OM-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-AS11406OM-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-AS11406OM-en-US, available at: www.safholland.us.

8. Toe-In

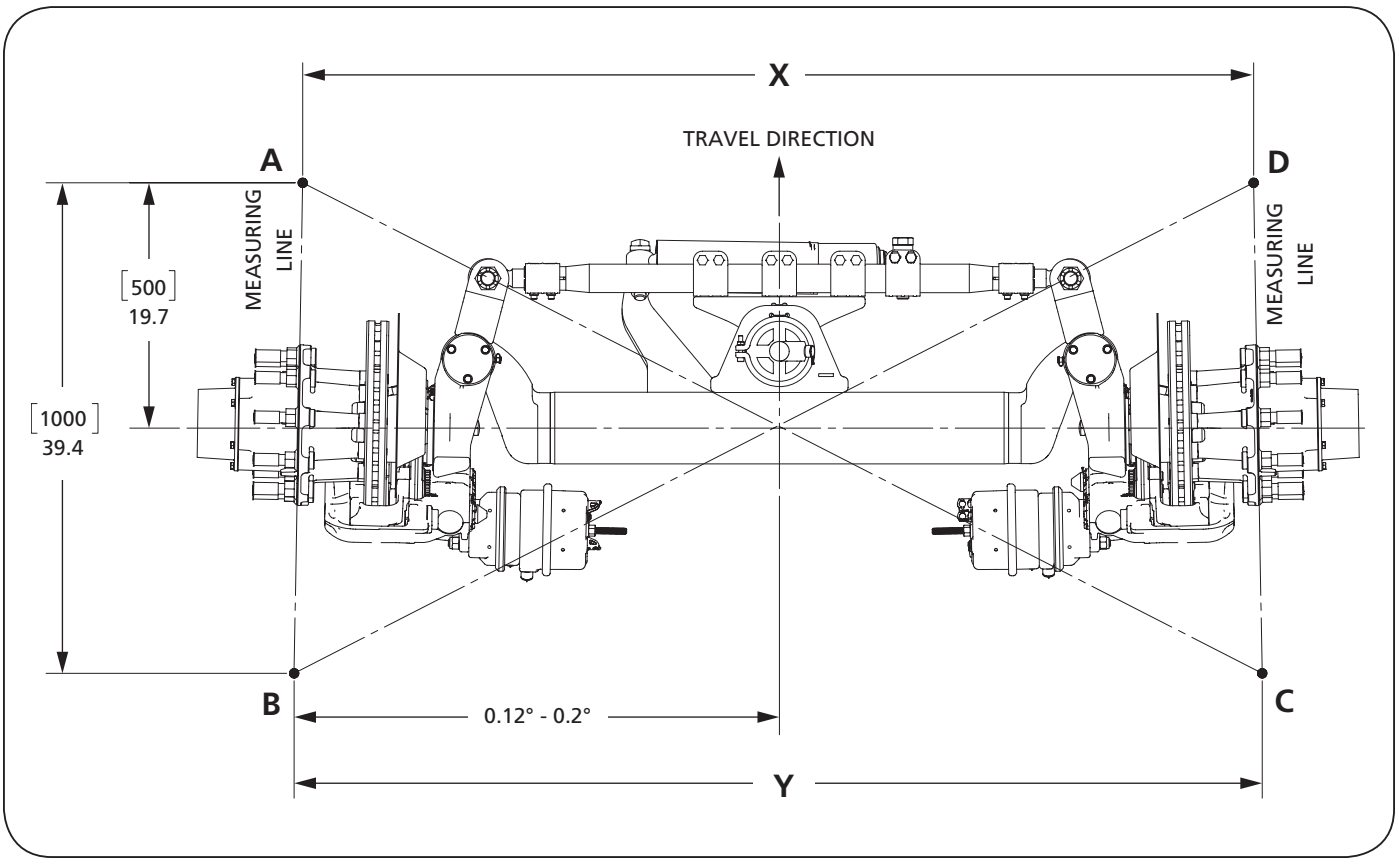
SAF Self-Steer Axle toe-in is factory set to orient the wheels slightly inward during normal operation, Y - X = 5/32" (4 mm) to 9/32" (7 mm) ***(Figure 4)***.

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



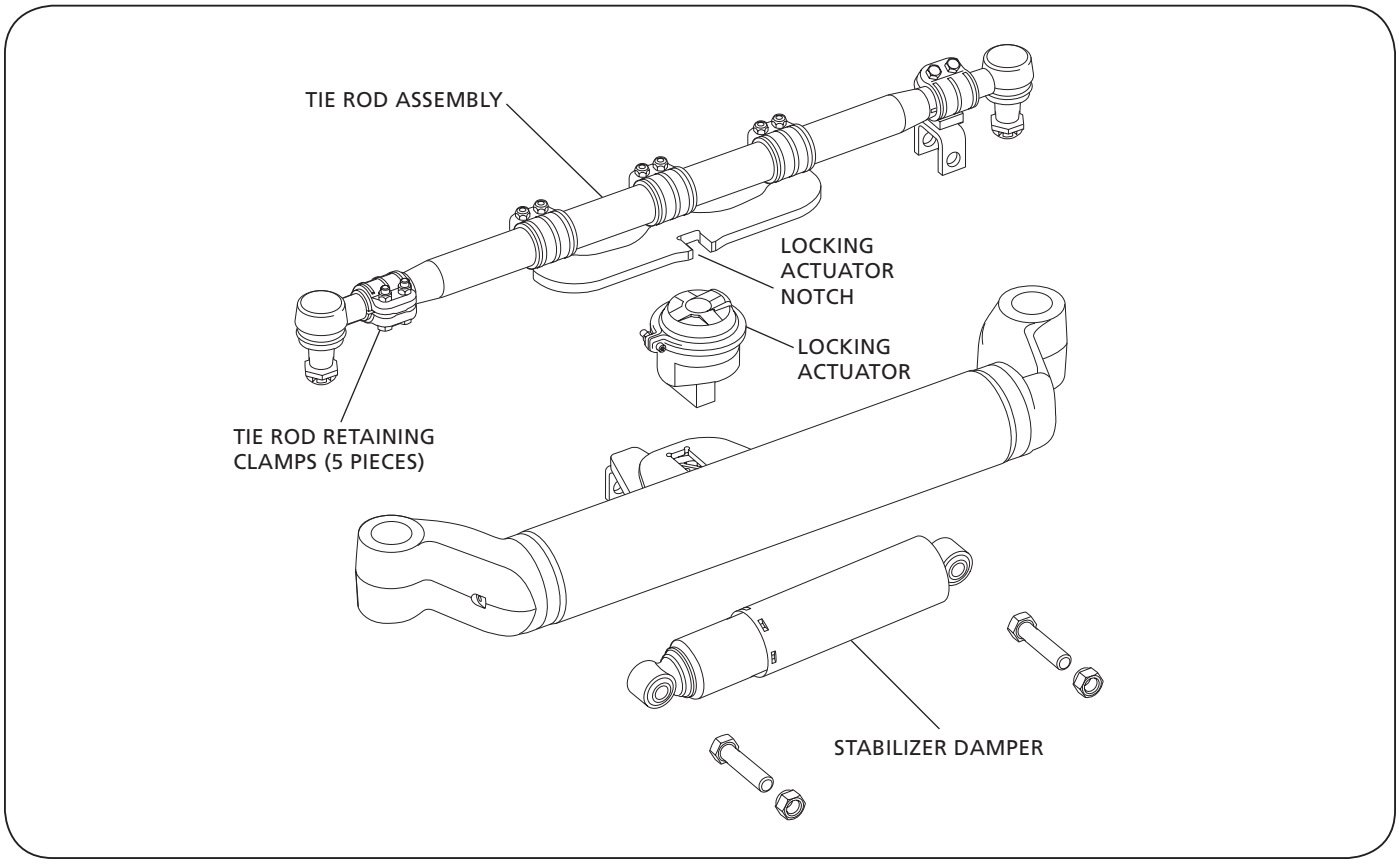
3. Loosen all tie rod retaining clamp bolts ***(Figure 5)***.
4. Rotate tie rod ***(Figure 5)*** to obtain specification Y - X = 5/32" (4 mm) to 9/32" (7 mm).

   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 (0.12° - 0.20° as illustrated in ***Figure 4***).
5. Diagonally measure A-C and B-D. These measurements shall be equal to ensure curbside and roadside toe-in is equal and centered.
6. 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)***.

IMPORTANT: Improper axle alignment may result in damage and hindered product performance.

7. 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.

Figure 5



9. Caster

SAF-HOLLAND Self Steer Axles are designed to have a 0° caster with a tolerance of +3° / -1° and cannot be adjusted ***(Figure 6)***.

CAUTION

Changing tire diameters on the SSA or the primary suspensions will affect the SSA caster position.

Changing the tractor fifth wheel height will affect the SSA caster position.

Adjusting the suspension ride height from the factory specification will affect the SSA caster.

Operating with a caster measurement outside of the specified +3°/-1° range may result in damage and hindered product performance.

10. Camber

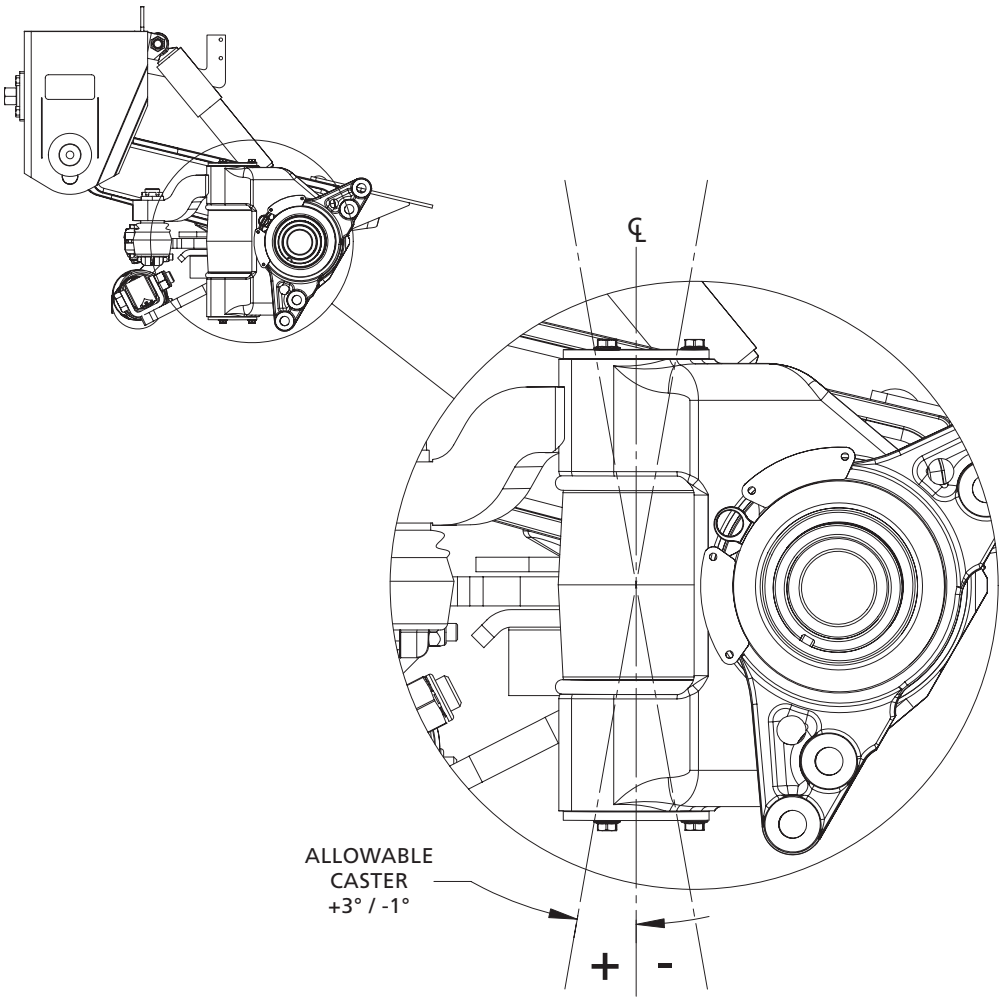
SAF Self Steer Axles have a camber specification of 1.2° with an unloaded trailer. This is set at the factory and cannot be adjusted.

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.

Figure 6



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:

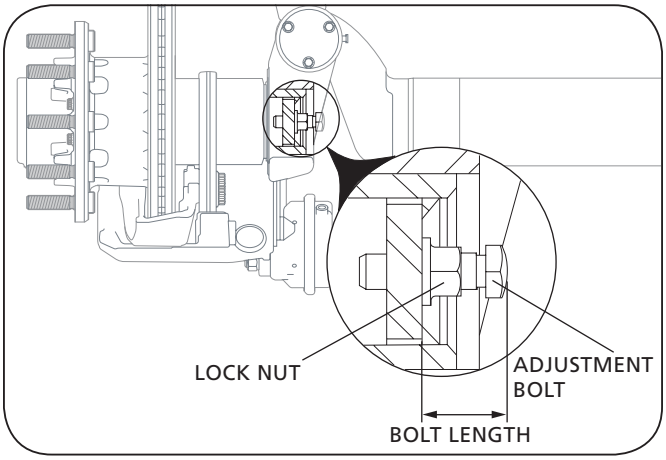
1. Loosen lock nut on steering knuckle bolt ***(Figure 7)***.
2. Adjust steering adjustment bolt ***(Figure 7)*** dimension corresponding with the chart below.
3. Tighten locknut to 60 ft.-lbs. (80 N•m).
4. Repeat 1 through 4 for other end of the axle.

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 7



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.

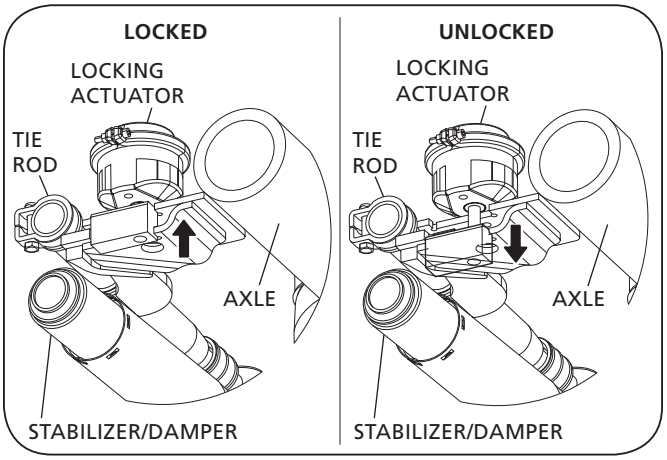
IMPORTANT: To prevent significant misalignment of tires while backing up, the SAF Self Steering axle must be raised, or locked in a straight ahead position prior to moving the trailer backwards.

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 8)***, and then driving the vehicle straight ahead until the locking actuator is in engagement with the tie rod assembly locking actuator notch ***(Figure 8)***.

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.

Figure 8



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 illustrated ***(Figure 9)***. 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.

14.2.1 - Stabilizer Damper Inspection

Visually inspect the stabilizer damper for any of the following conditions. Replace if necessary.

- Leaking oil.
- Separation of upper and lower housings.
- Visual damage (i.e. cracking, dents, missing parts).

14.2.2 - Kingpin Inspection

Visually inspect the kingpin for any of the following conditions. Replace if necessary.

- Vertical play >0.12" (3 mm).
- Visual damage (i.e. cracking, missing parts, seized knuckle).

14.2.3 - Tierod End Inspection

Visually inspect the tierod end for any of the following conditions. Replace if necessary.

- Missing cotter pin.
- Verify castellated nut is torqued per specification.
- Verify the tierod end does not move in any direction other than rotation. Check by applying moderate force but avoid using pry bars.
- Verify that the tierod is not seized.
- Visual damage (i.e. cracking, bent, missing parts).

14.3. Stabilizer Damper Installation and Operation

Install the stabilizer damper such that the red dot on the identification sticker faces down, and the larger diameter end of the stabilizer is mounted to the fixed bracket on the axle as illustrated in ***Figure 10***.

15. Service Parts

Refer to XL-AA20027PM-en-US for Service Parts.

Figure 9

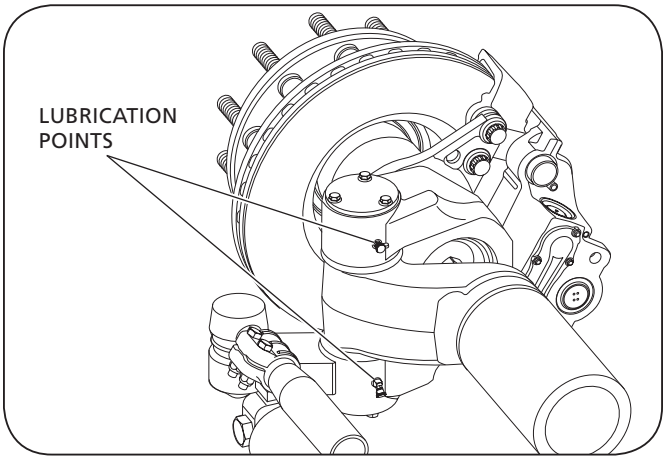
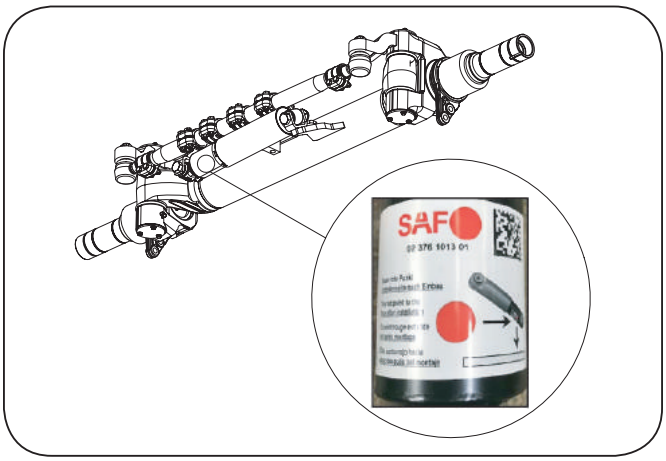


Figure 10



16. Fastener Torque Specifications

IMPORTANT: When servicing the SAF Self Steer Axle, tighten fasteners ***(Figure 11)*** 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

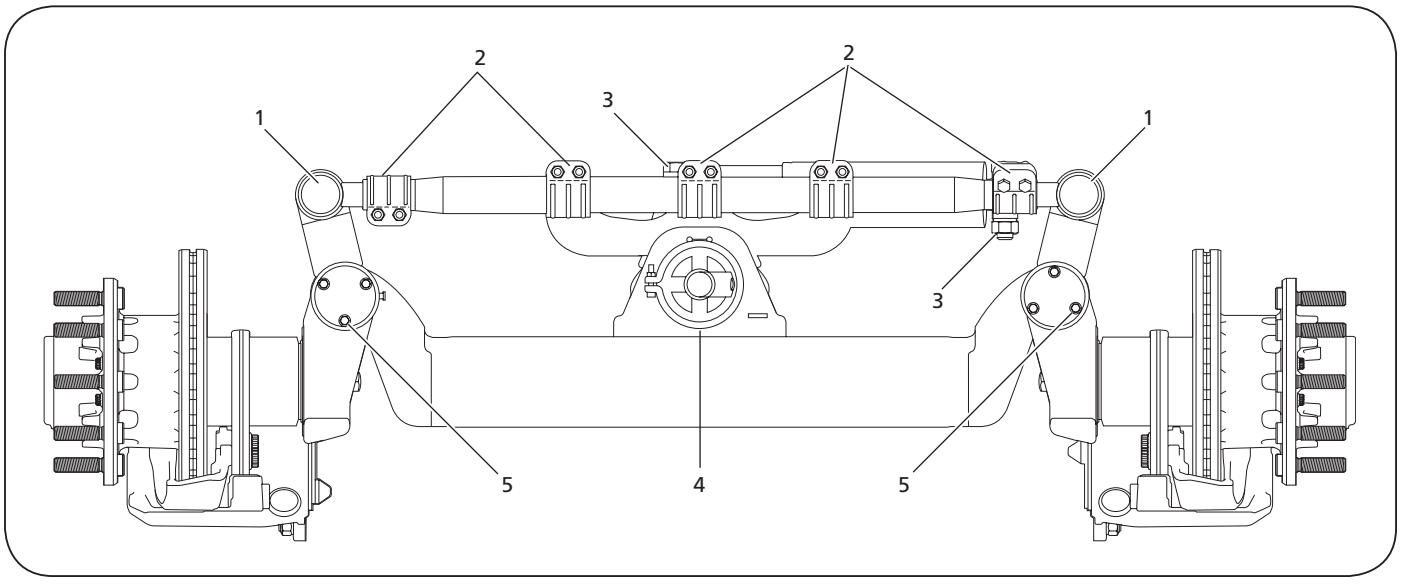
NO.	DESCRIPTION	THREAD	NUMBER PER AXLE	TORQUE FT.-LBS	TORQUE N•m
1	Tie Rod End Castellated Nut	M30	2	250	340
2	Retaining Clamp Bolts	M12	10	90	120
3	Stabilizing Damper Bolts	M24	2	440	600
4	Axle Lock Actuator Nuts	M6	2	90	120
5	Cover Plate Bolts	M8	12	20	25

17. Wheel End Service

For Suspensions with Drum Brake Systems refer to SAF-HOLLAND Drum Brake Axle Service Manual, XL-TA10006OM-en-US, available at: www.safholland.us.

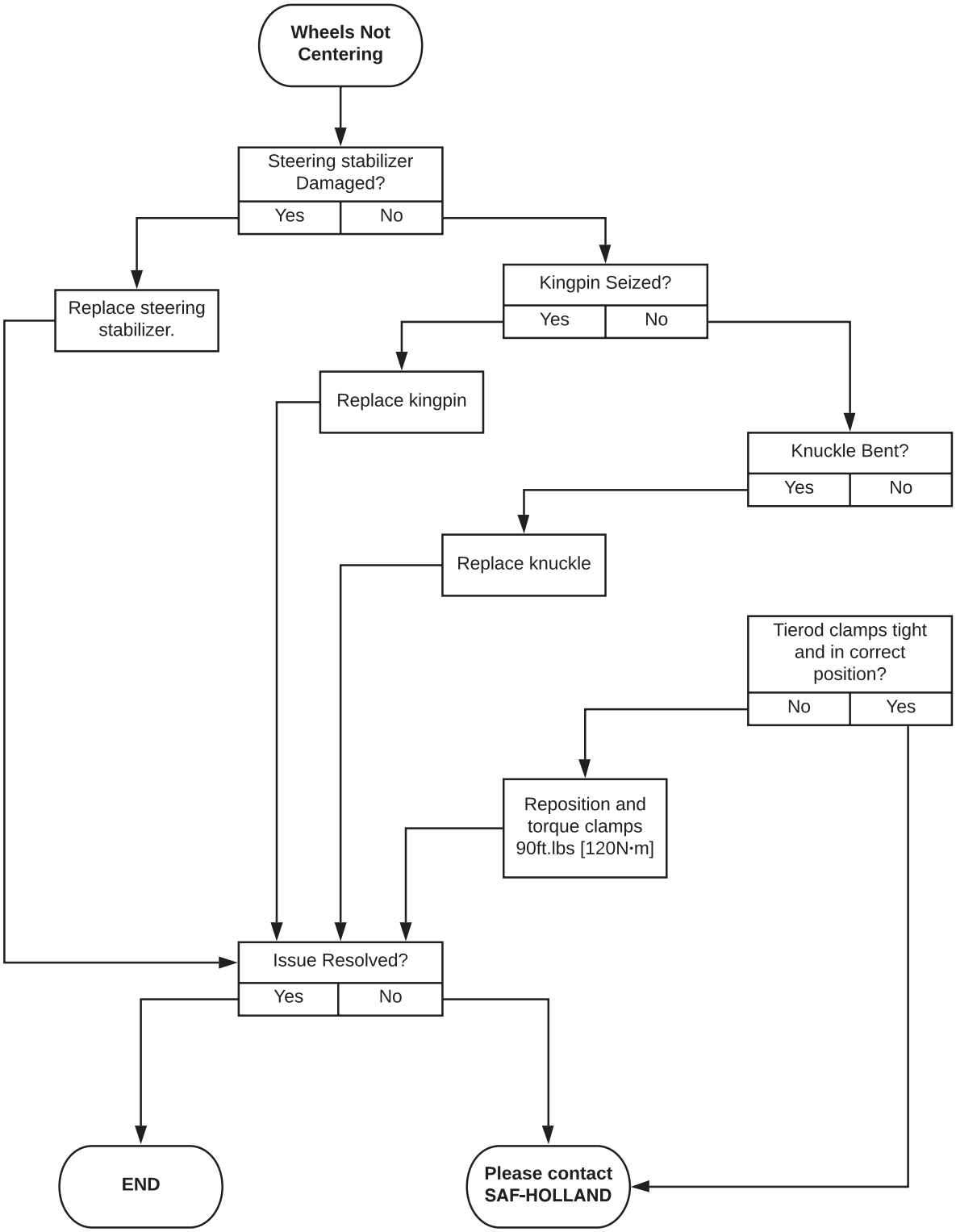
For Suspensions with Disc Brake Systems refer to SAF Disk Brake Axle Service Manuals:
Integral Disc Brake Axles: XL-SA10059OM-en-US,
P89 Disc Brake Axles: XL-SA20018UM-en-US,
P89 Plus Disc Brake Axles: XL-SA20024UM-en-US,
available at: www.safholland.us.

Figure 11

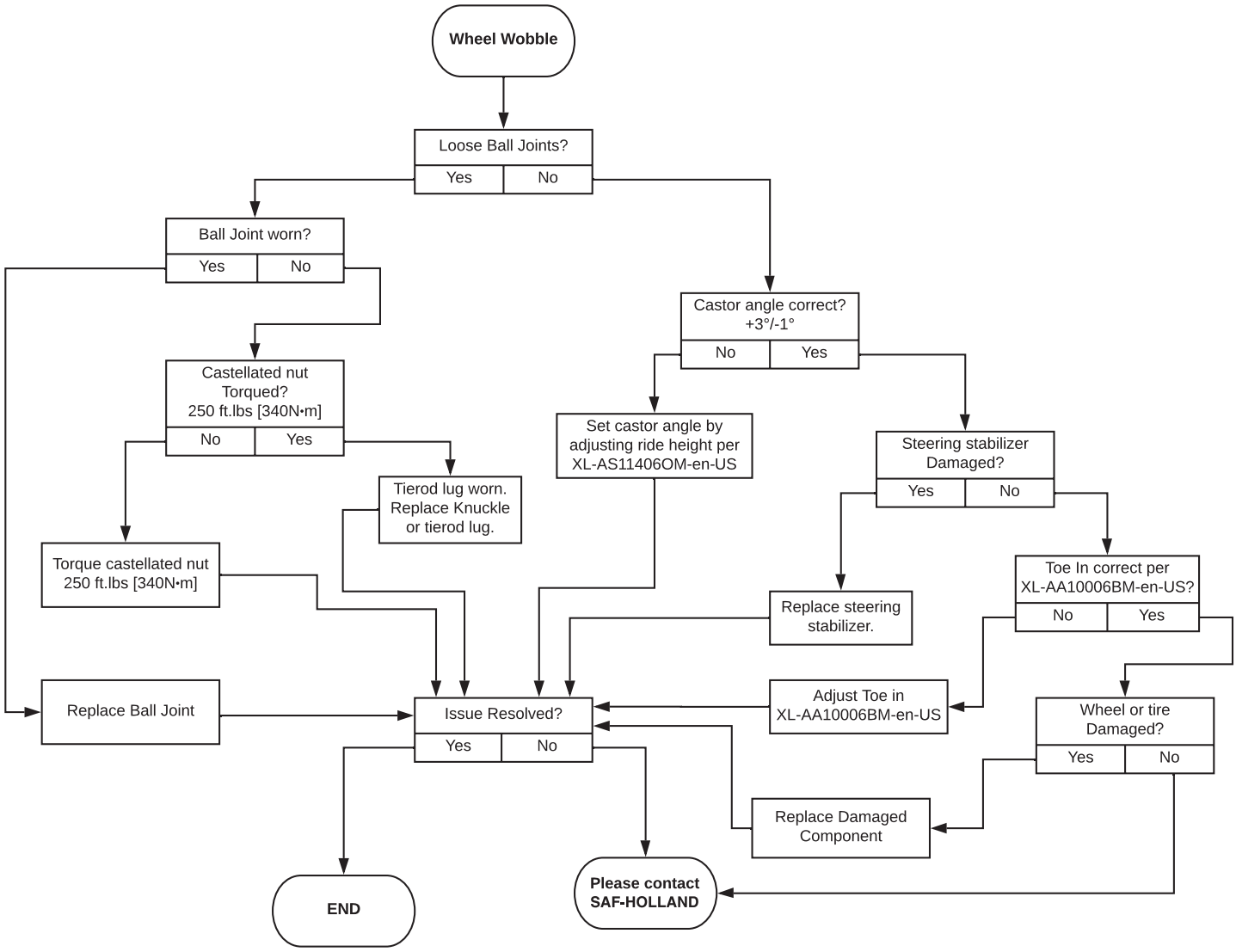


18. Troubleshooting Flow Charts

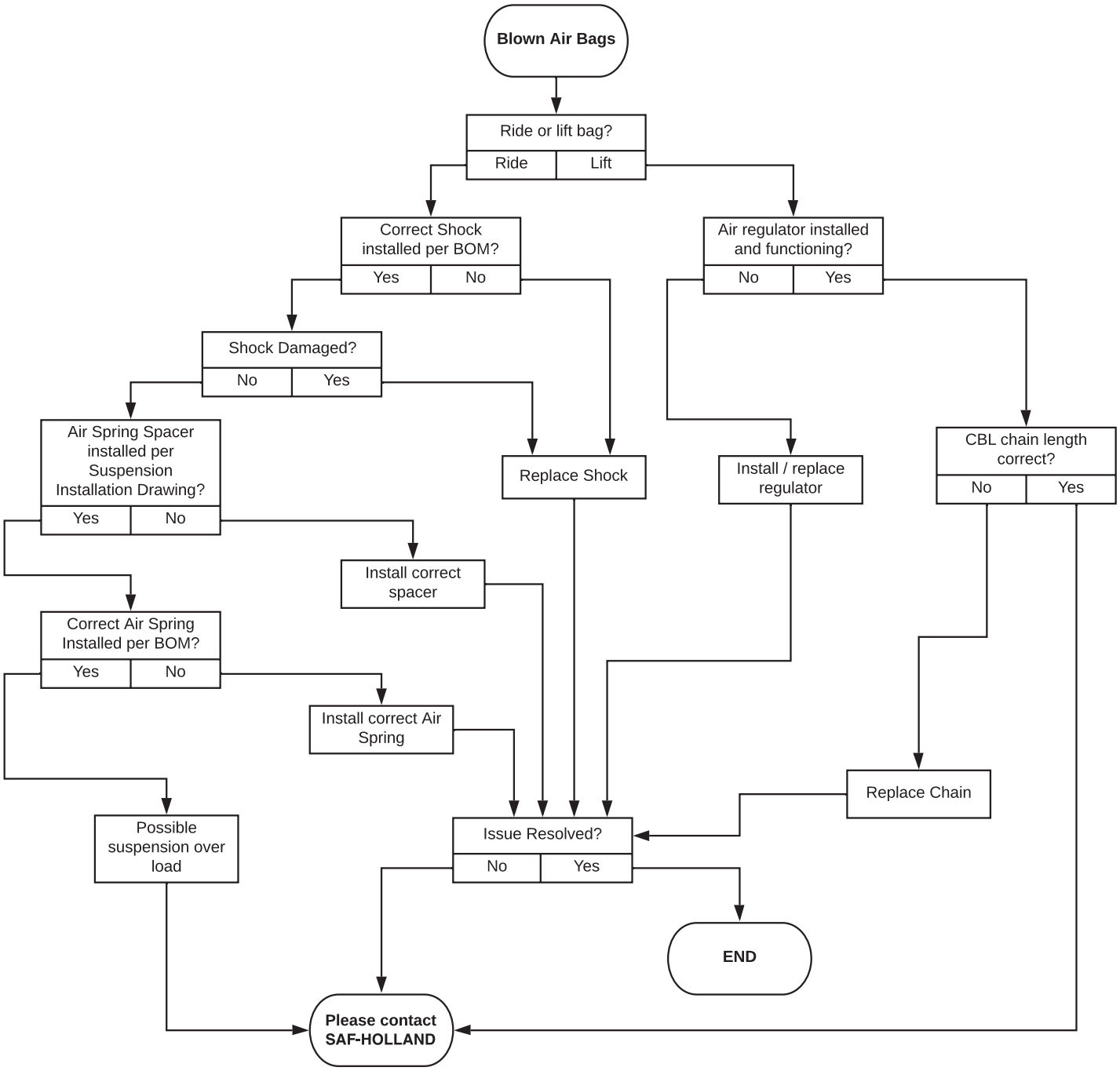
18.1 – Wheels Not Centering



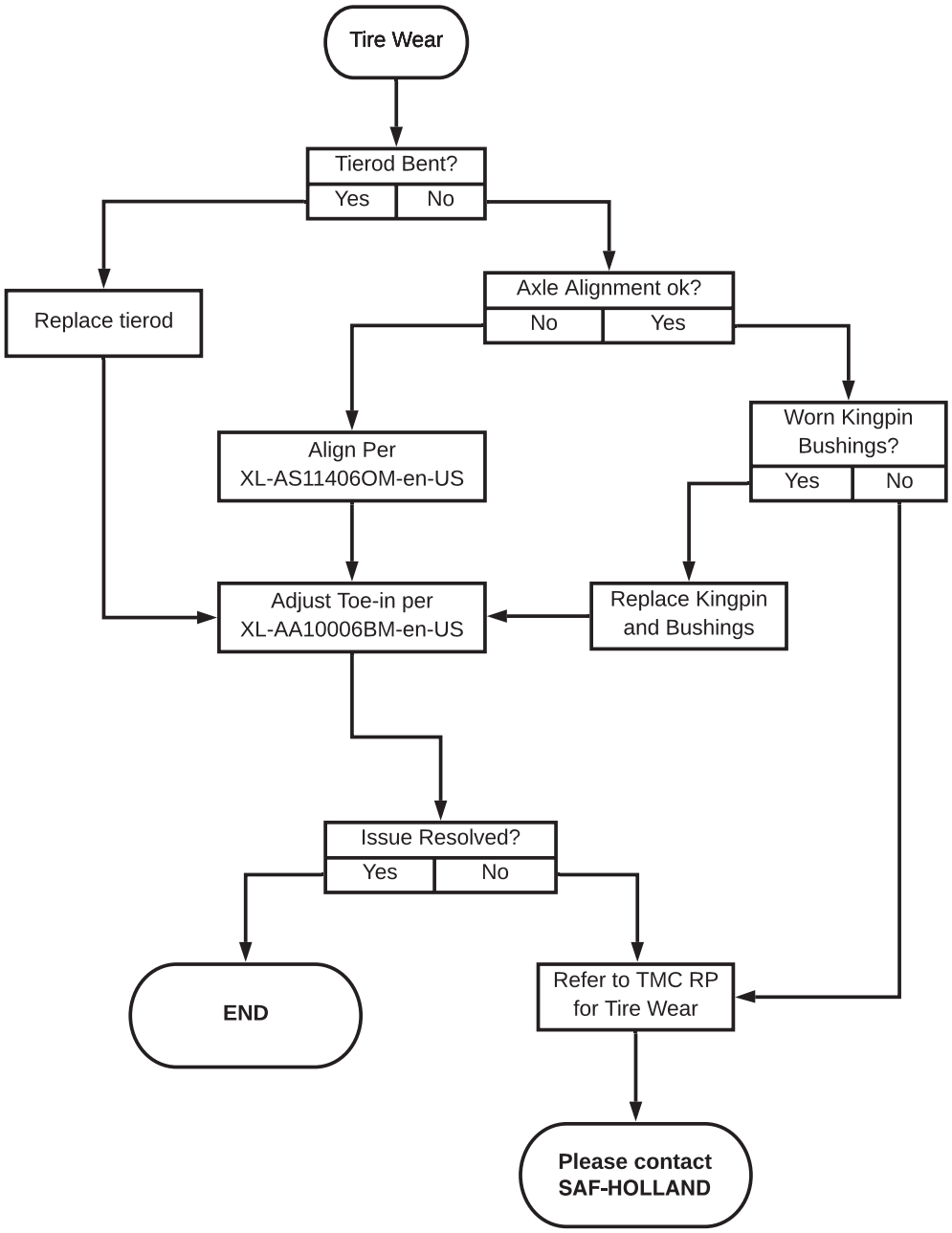
18.2 – Wheel Wobble



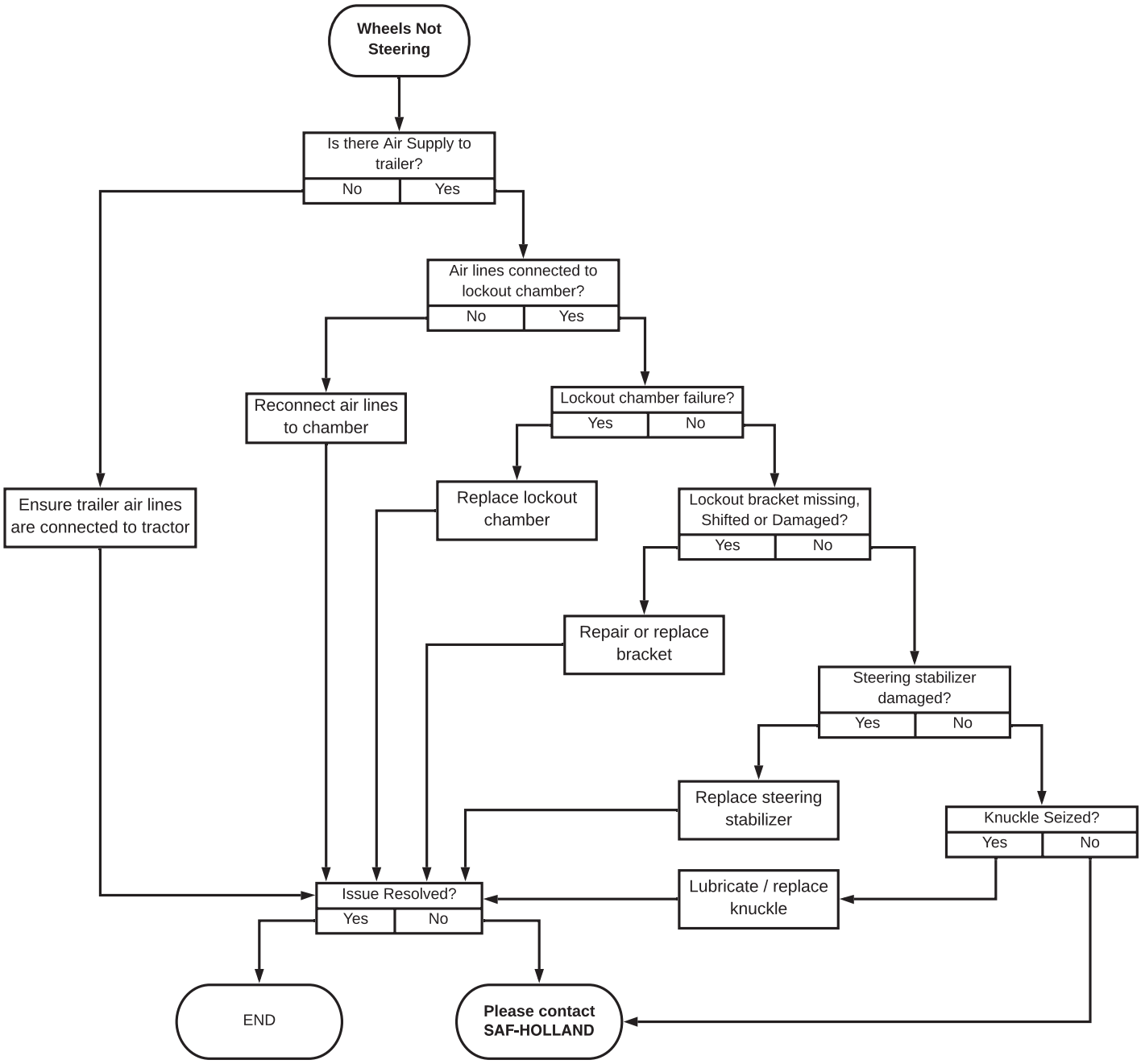
18.3 – Blown Air Bags



18.4 – Tire Wear



18.5 – Wheels not Steering



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-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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www.safholland.com.mx

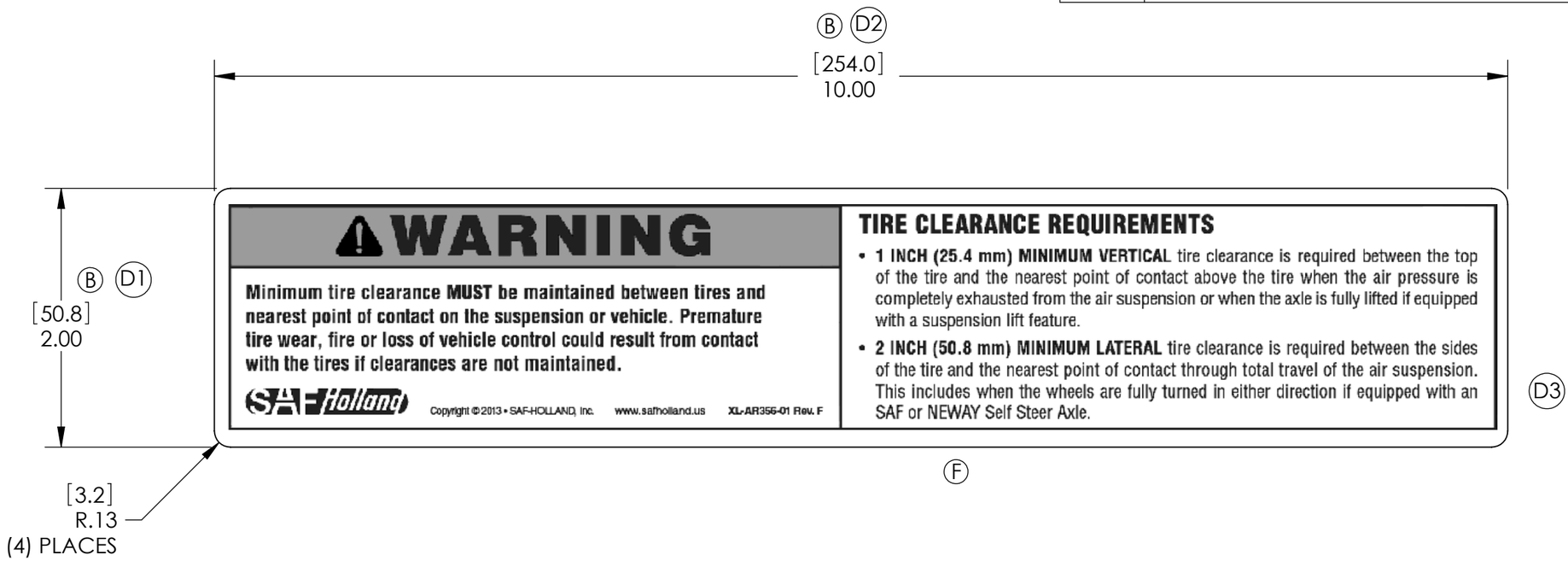
info@safholland.com

SAF-HOLLAND USA, INC.
1950 Industrial Blvd., Muskegon, MI 49442
www.safholland.com

SAF-HOLLAND Group

CHANGE RECORD

LTR.	DESCRIPTION OF CHANGE	BY	E.C.N.	DATE
-	CREATED	MB	4479	
A	SKIPPED PER NEW REVISION POLICY	CR	26094	
B	UPDATED DECAL PER HOLLAND ART WORK; DIM 6.00 WAS 5.00; DIM 4.00 WAS 3.00; ADDED NOTES; ADDED XL-AR356-01; REDRAWN IN SOLIDWORKS	CR	26094	21JAN04
C	UPDATED DWG & LABEL WITH UPDATED SAF-HOLLAND LOGO	EH	38512	25AUG09
D	D1-2.00 WAS 4.00; D2-10.00 WAS 6.00; D3-REVISED DECAL IMAGE & REMOVED LETTERING NOTES; D4-DESCRIPTION 'DECAL, TIRE CLEARANCE' WAS 'LITERATURE LABEL'	CN	61500	30JUN11
E	REMOVED NOTE 2: PREMASK MATERIAL	SEB	62340	26OCT11
F	ADDED "NEWAY" TO LATERAL CLEARANCE REQUIREMENTS	MRJ	66235	31JULY13



ⒺⒷ NOTES:

1. DECAL MATERIAL PER SPEC. NS-65-91
2. ARTWORK BY SAF-HOLLAND AS SHOWN, WITH WHITE BACKGROUND AND BLACK LETTERS.
3. DECAL MUST PERMANENTLY ADHERE TO PAINTED SURFACE.
4. ORIGINAL ARTWORK ON FILE IN SAF-HOLLAND COMMUNICATIONS DEPT.

UNSPECIFIED TOLERANCES FOR DIMENSIONS

ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ]

X[X] =±.125[3.18]

.X[X] =±.060[1.52]

.XX[X.X] =±.030[0.76]

.XXX[X.XX] =±.010[0.25]

ANGLES ±1°

THIRD ANGLE PROJECTION

WEIGHT: 0.02#

SCALE: 1:1

SAF-HOLLAND

TITLE: DECAL,TIRE CLEARANCE Ⓓ4

MATL:

MATL.#: -

PART NUMBER: XL-AR356-01

REV. F

CHANGE RECORD				
LTR.	DESCRIPTION OF CHANGE	BY	E.C.N.	DATE
A	CREATED	CJS	30870	21MAR06
B	B1-REPLACED DECAL; B2- 2.00 WAS 4.00, 10.00 WAS 6.00; B3-WT. 0.17 WAS 0.20	RC	61501	11JUL11

B1

SWING ALIGN® NON-WELDED AXLE ALIGNMENT PROCEDURES

ALIGNMENT BOLT IS ON THE FRONT OF THE ROADSIDE FRAME BRACKET:

STEP 1. To properly align the suspension, the trailer should be pulled in a straight line for a sufficient distance to insure there are no binds in the suspension.

STEP 2. Check to verify trailer is empty and emergency brakes are **NOT** engaged.

STEP 3. Rotate bolt **CLOCKWISE** to move axle forward (A arrows); **COUNTERCLOCKWISE** to move axle rearward (B arrows).

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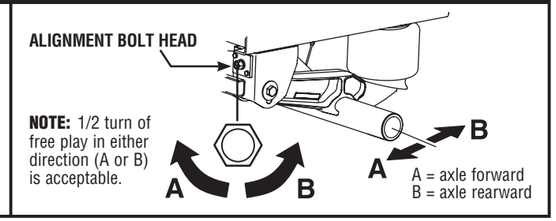
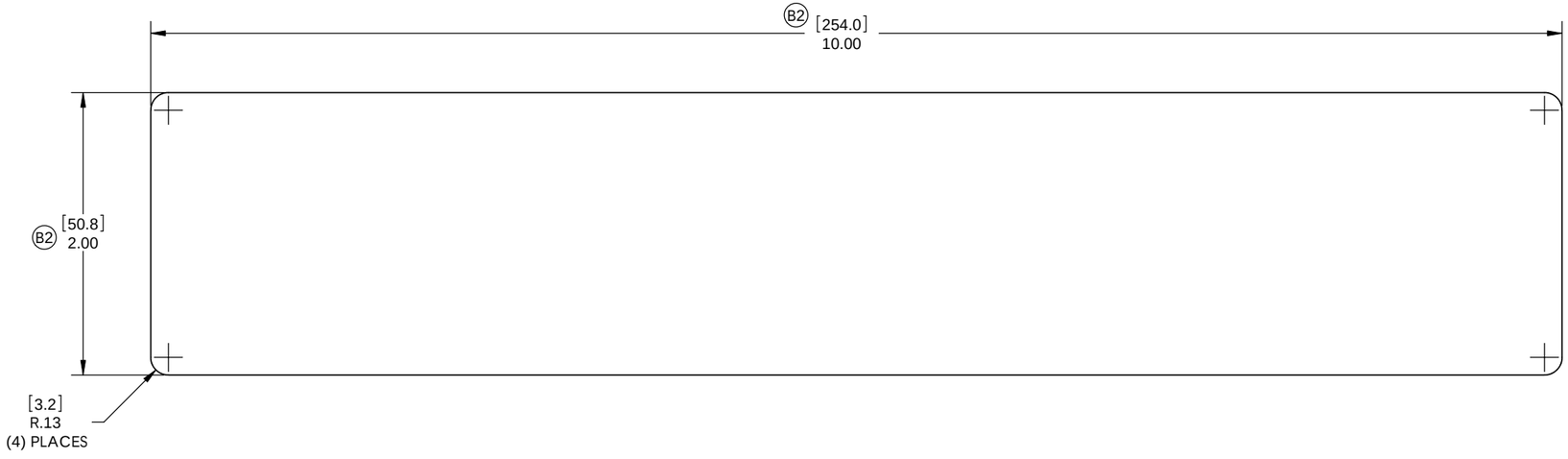
XL-AR435 Rev. B





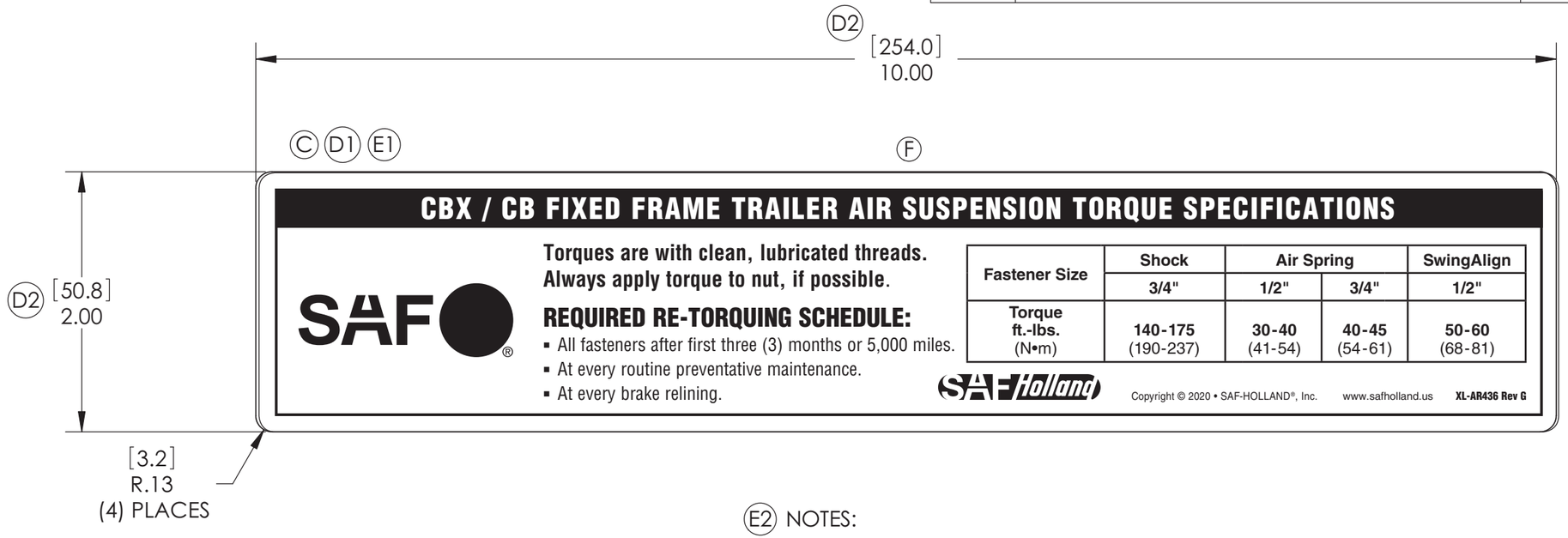
NOTES:

1. DECAL MATERIAL PER SPEC. NS-65-91
2. DECAL TO HAVE PREMASK MATERIAL.
3. ARTWORK BY SAF-HOLLAND AS SHOWN, WITH WHITE BACKGROUND AND BLACK LETTERS.
4. DECAL MUST PERMANENTLY ADHERE TO PAINTED SURFACE.
5. ORIGINAL ARTWORK ON FILE IN SAF-HOLLAND COMMUNICATIONS DEPT.

UNSPECIFIED TOLERANCES FOR DIMENSIONS
ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ]
X[X] = ±.125[3.18]
.X[X] = ±.060[1.52]
.XX[X.X] = ±.030[0.76]
.XXX[X.XX] = ±.010[0.25]
ANGLES ±1°
THIRD ANGLE PROJECTION

WEIGHT: 0.17# B3
SCALE: 3:2
TITLE: SWING ALIGN DECAL
MATL: SEE NOTES
MATL.#: -
PART NUMBER: XL-AR435
REV.: B

CHANGE RECORD					
LTR.	DESCRIPTION OF CHANGE	CAD	ENG	E.C.N.	DATE
A	CREATED	CJS		30870	21MAR06
F	PIVOT CONNECTION TORQUE 550-600 WAS 450-500.	TM		66811	23JAN14
G	G1- REMOVED 1-1/8" PIVOT BOLT TORQUE COLUMN; G2- ADDED SPEC CHART	SEB	CS	311228	2020-10-19



E2 NOTES:

1. DECAL MATERIAL PER SPEC. NS-65-91
2. ARTWORK BY SAF-HOLLAND AS SHOWN, WITH WHITE BACKGROUND AND BLACK LETTERS.
3. DECAL MUST PERMANENTLY ADHERE TO PAINTED SURFACE.
4. ORIGINAL ARTWORK ON FILE IN SAF-HOLLAND COMMUNICATIONS DEPT.

G2

NS-65-91	MATERIAL SPEC
SPECIFICATION	**DESCRIPTION**

UNSPECIFIED TOLERANCES FOR DIMENSIONS

ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ]

X[X] =±.125[3.18]

.X[X] =±.060[1.52]

.XX[X.X] =±.030[0.76]

.XXX[X.XX] =±.010[0.25]

ANGLES ±1°

THIRD ANGLE PROJECTION

EST. WEIGHT: 0.20# D3

SCALE: 1:1

SAF Holland

TITLE: TORQUE SPECIFICATION DECAL

MATL: SEE NOTES

MATL.#:

PART NUMBER: XL-AR436

REV. G

SAF CBX and CBXA Fixed Frame Series Air Ride Suspension and Axle System

US and Canada Commercial Warranty

SAF-HOLLAND Group

SAF-HOLLAND's Commitment

We warrant each SAF® CBXAN23, CBXAS23, CBX23u, CBX23y, CBXAS25, CBX25u, CBX25y, CBXAS30, CBX23, CBX25, CBX25/30, CBXSSA, CBX25/30u and CBX25/30y Air Ride Suspension and Axle System manufactured after June 1, 2016, when properly installed on your vehicle, and maintained and operated in accordance with our requirements.

SAF-HOLLAND® will, at its option repair, replace or reimburse due to defects in material or workmanship. Parts reimbursement is limited to the parts acquisition cost, not to exceed the suggested list price. The cost of labor covered by this warranty includes any reasonable labor expense. Labor reimbursement is based on a published flat rate schedule in conjunction with local labor rates.

Your Responsibilities

You are responsible for proper installation, operation, and maintenance as specified in our applicable publications on SAF CBX Systems and for using the product in recommended applications within rated capacities. Please reference the SAF Trailer Air Suspension Selection Guide (XL-MP20033SG-en-US) for additional details.

Claims

You are required to obtain prior authorization from an authorized SAF-HOLLAND customer service representative before replacing or returning any part. You are required to retain the product or part claimed to be covered by this warranty and return it to SAF-HOLLAND upon request. You must submit a valid Service Report to have your warranty request considered. The Service Report form is available under the Service section of our website at www.safholland.us or by calling 1.888.396.6501.

Coverage Periods

Coverage extends from date in service of trailer or the date of installation, for the time period limits listed on page 2.

Exclusions and Limitations

This warranty does not cover coatings and any SAF axle or component that is altered without written permission, or fails, malfunctions or is damaged as a result of accident, abuse, or improper installation, maintenance or use. Warranty excludes normal wear.

THIS WARRANTY IS OUR SOLE WARRANTY IN REGARDS TO THE COVERED SAF AIR RIDE SUSPENSION AND AXLE SYSTEM. WE MAKE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL WE BE RESPONSIBLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND INCLUDING, BUT NOT LIMITED TO TOWING, DOWNTIME, LOST PRODUCTIVITY, CARGO DAMAGE, TAXES, OR ANY OTHER LOSSES OR COST RESULTING FROM A DEFECTIVE COVERED COMPONENT.

Application Limitations

Standard Duty:

- Less than 95,000 lb. [43,000 kg] Gross Combination Weight (GCW)
- Less than 10% Off-Highway
- Single Trailer: Tandem Axle Max
  "A" Trains: Three Axles Only (Trailers + Dolly Converter)
  "B" Trains: Maximum Three Axles Only (Lead + Pup Trailers)
- Does not include repetitive short haul applications (e.g. city pick-up delivery or intercity fuel haul)

Moderate Duty:

- Less than 115,000 lb. [52,000 kg] Gross Combination Weight (GCW)
- Less than 10% Off-Highway
- Single Trailer: Tandem and Tri-Axle Only
  "A" Trains: Maximum Four Axles Only (Trailers + Dolly Converter)
  "B" Trains: Maximum Four Axles Only (Lead + Pup Trailers)

continued on back

Severe Duty On-Highway:

- More than 115,000 lb. [52,000 kg] Gross Combination Weight (GCW)
- Less than 10% Off-Highway
- Single Trailer: Any Number of Axles
  "A" Trains: No Maximum Number of Axles
  "B" Trains: No Maximum Number of Axles

Severe Duty Off-Highway:

- More than 115,000 lb. [52,000 kg] Gross Combination Weight (GCW)
- More than 10% Off-Highway
- Single Trailer: Any Number of Axles
  "A" Trains: No Maximum Number of Axles
  "B" Trains: No Maximum Number of Axles

Notes:

On-Highway is defined as maintained concrete, asphalt roads, or smoothly graded surfaces.

Off-Highway is defined as terrain that is unpaved and rough, or ungraded.Typically any terrain not considered to be part of the public road system will be considered off-road.

Should either the GCW or the number of axles be exceeded, or one or more of the other criteria be surpassed, the next level of duty classification must be used. **Under no circumstances should the axle capacities be exceeded.**

Coverage Periods

SUSPENSION COMPONENTS		On-Highway	Off-Highway Severe Duty
Frame Brackets and Frame Bracket Assemblies	Parts/Labor	5 Years/3 Years	3 Years/1 Year
Air Controls	Parts/Labor	Valve Manufacturers Warranty Applies	
Air Springs	Parts/Labor	2 Years/1 Year	1 Year/1 Year
Shock Absorbers	Parts/Labor	2 Years/2 Years	1 Year/1 Year
Bushings	Parts/Labor	7 Years/5 Years	3 Years/1 Year
SAF-HOLLAND Supplied Trailing Arm, Axle Beam, Welded Bracketry & Axle Connection	Parts/Labor	7 Years/5 Years	3 Years/1 Year
Tire Pilot™ Inflation Systems SAF-HOLLAND supplied (See Tire Pilot warranty for details)	Parts/Labor	5 Years/5 Years	1 Year/1 Year
3rd Party Tire Inflation Systems (only covers SAF-HOLLAND installation)[4]	Parts/Labor	1 Year/1 Year	1 Year/1 Year
Other Components	Parts/Labor	2 Years/1 Year	2 Years/1 Year
Self-Steer Axle Components (Damper, Kingpins, Tie-Rod Ends, Etc.)	Parts/Labor	2 Years/1 Year	2 Years/1 Year

[1] Excludes heat cracks and corrosion perforation of the rotor - PSP7 Only.
[1] Heat cracks and corrosion perforation of the rotor covered for 3 years - P89+ Only.
[2] Excludes wear items such as slide pins, bushings, and rubber boots. These items are warranted to be free from material and workmanship defects.
[3] Excludes normal wear. Pads are warranted to be free from material and workmanship defects.
[4] See 3rd party suppliers warranty for details regarding complete system.
[5] SAF-HOLLAND does not provide warranty coverage for other tire inflation systems and/or components not installed by SAF-HOLLAND and any consequential damages incurred due to these components. Tire Pilot Plus is the only complete tire management system offered by SAF-HOLLAND and is compatible with all SAF-HOLLAND wheel end packages.

BRAKED AXLE		On-Highway	Off-Highway Severe Duty
Brake Linings and Hardware	Parts/Labor	1 Year/1 Year	1 Year/1 Year
Camshafts	Parts/Labor	3 Years/1 Year	2 Years/1 Year
Cam Enclosures	Parts/Labor	3 Years/1 Year	3 Years/1 Year

DRUM BRAKE WHEEL END PACKAGE		On-Highway	Off-Highway Severe Duty
SC5	Parts/Labor	5 Years/5 Years	1 Year/1 Year
SC7	Parts/Labor	7 Years/7 Years	1 Year/1 Year

Included components: Brake Drums, Brake Actuators, Auto Slack Adjusters, Hub Assembly, Hub Caps and Gaskets, Oil Seals, Wheel Bearings, Axle Nuts and Others

DISC BRAKE WHEEL END PACKAGE		On-Highway	Off-Highway Severe Duty
P89	Parts/Labor	5 Years/5 Years	1 Year/1 Year
P89+	Parts/Labor	7 Years/7 Years	1 Year/1 Year
PSP7	Parts/Labor	7 Years/7 Years	1 Year/1 Year

Included components: Brake Chamber, Hub, Hub Caps, Wheel Seals, Bearings, Axle Nuts, Others, Caliper[3], Brake Pads[4], Rotor[1]

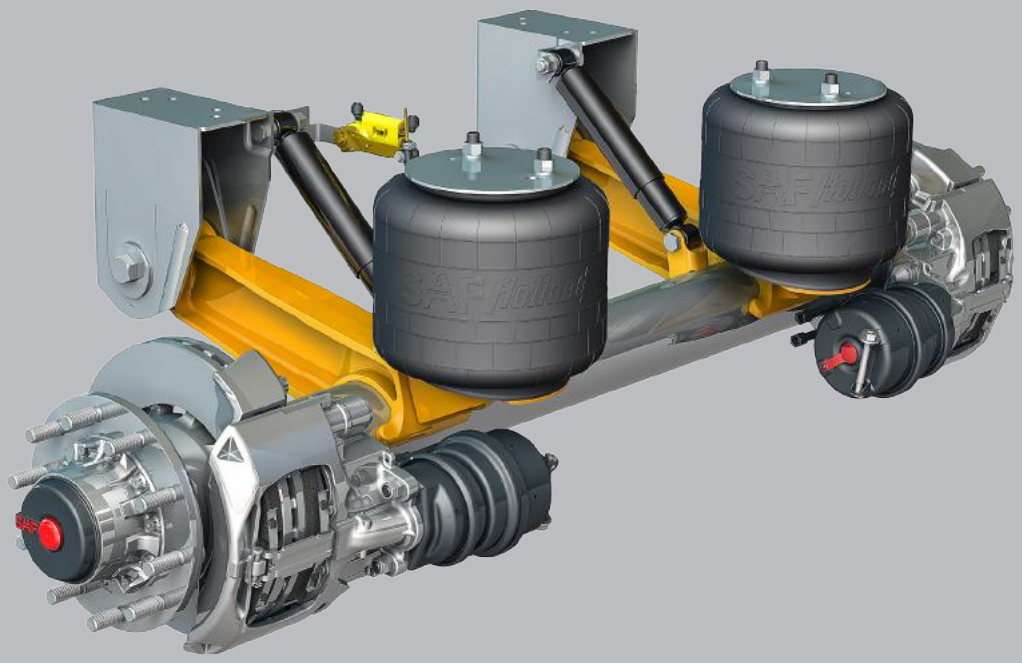
SAF-HOLLAND Group

Installation and Operation Manual

CBX/CB Series

Fixed Frame Top Mount Trailer Air Suspension

- For Disc and Drum Brake Applications



XL-AS11406OM-en-US Rev E

Introduction

This manual provides information necessary for the installation and operation of the SAF-HOLLAND® CBX/CB fixed frame top mount trailer air suspension. Although the images throughout this manual depict the CBX23 Fusion, there is no difference in fit or function between the models in the CBX/CB Series.

The CBX/CB suspensions include premium 5.75" diameter axles, the CB suspensions include 5" diameter axles. For axle end and/or brake servicing information or component replacements, refer to Drum Brake Manual XL-TA10006OM-en-US, Disc Brake Manual XL-SA10059OM-en-US or contact Customer Service at 888-396-6501.

This suspension uses air drawn from the tractor air system to pressurize the air springs. The height control valve (HCV) regulates the air pressure required for varying loads while maintaining the design ride height. This suspension can provide a cushioned ride throughout the load range, from empty to fully loaded.

The suspension also provides excellent side-to-side and axle-to-axle loading which helps equalize and control braking.

Read this manual before using or servicing this product and keep it in a safe location for future reference. Updates to this manual, which are published as necessary, are available on the internet at www.safholland.us.

When replacement parts are required, SAF-HOLLAND highly recommends the use of only SAF-HOLLAND Original Parts. A list of technical support locations that supply SAF-HOLLAND Original Parts and an Aftermarket Parts Catalog are available on the internet at 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 written warranty is included with the product or available on the internet at www.safholland.com.

Notes, Cautions, and Warnings

Before starting any work on the unit, read and understand all the safety procedures presented in this manual. This manual contains the terms "NOTE", "IMPORTANT", "CAUTION", and "WARNING" followed by important product information. These terms are defined 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.

1. Safety Instructions

General and Servicing Safety Instructions

- Read and observe all Warning and Caution hazard alert messages. The alerts provide information that can help prevent serious personal injury, damage to components, or both.

⚠WARNING Failure to follow the instructions and safety precautions in this manual could result in improper servicing or operation leading to component failure which, if not avoided, could result in death or serious injury.

- All maintenance should be performed by a properly trained technician using proper/special tools, and safe procedures.

NOTE: In the United States, workshop safety requirements are defined by federal and/or state Occupational Safety and Health Act (OSHA). 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.

- Properly support and secure the vehicle from unexpected movement when servicing the unit.

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

- If possible, unload the trailer before performing any service procedures.
- After re-positioning the brake chamber, slack adjuster and/or ABS system as instructed in this manual, always consult the manufacturer's manual for proper operation.
- Service both roadside and curbside of an axle. Worn parts should be replaced in sets. Key components on each axle's braking system, such as friction material, rotors and drums will normally wear over time.
- Follow all manufacturer's instructions on spring pressure and/or air pressure controls.

⚠WARNING Failure to follow manufacturer's instructions regarding spring pressure or air pressure control could allow unexpected release of energy which, if not avoided, could result in death or serious injury.

- DO NOT paint the wheel contact surfaces between the wheel and hub.

IMPORTANT: The wheel 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 wheel/hub separations which, if not avoided, could result in death or serious injury.

- Only the wheel and tire sizes approved by the trailer builder can be used.

Operational and Road Safety Instructions

- Before operating vehicle, ensure that the maximum permissible axle load is NOT exceeded and that the load is distributed equally and uniformly.
- Make sure that the brakes are NOT overheated from 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.

- The parking brake MUST NOT be immediately applied when the brakes are overheated.

CAUTION If the parking brake is immediately applied to the brakes when overheated, the brake drums or discs could be damaged by different stress fields during cooling.

- Observe the operating recommendation of the trailer manufacturer for off-road operation of the installed axles.

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

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

- Follow the recommended routine maintenance and inspections described in this manual. These procedures are designed so that optimum performance and operational safety are achieved.
- In the event of suspension air pressure loss, 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.
- Contact a qualified towing and/or service company to assist in repairing the vehicle or to move it to a qualified repair facility. DO NOT operate the vehicle in the absence of suspension air pressure; however in the event of an air system failure while in service, an internal rubber bumper built into the air spring will make it possible to temporarily operate the vehicle at reduced speed determined by road conditions.

⚠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.

2. Standard Decal Requirements

The following three (3) decals MUST be properly installed on the trailer prior to putting it in service:

- Tire Clearance Warning Decal: XL-AR356-01 ***(Figure 1)***.
- SwingAlign Axle Alignment Decal: XL-AR435 ***(Figure 2)***.
- Torque Decal: XL-AR436 ***(Figure 3)***.
- Shear Bolt Decal: XL-AS20085DC-en-US ***(Figure 4)***.

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

⚠WARNING

Minimum tire clearance MUST be maintained between tires and nearest point of contact on the suspension or vehicle. Premature tire wear, fire or loss of vehicle control could result from contact with the tires if clearances are not maintained.

SAF-Holland

 www.safholland.us XL-AR356-01

TIRE CLEARANCE REQUIREMENTS

- **1 INCH (25.4 mm) MINIMUM VERTICAL** tire clearance is required between the top of the tire and the nearest point of contact above the tire when the air pressure is completely exhausted from the air suspension or when the axle is fully lifted if equipped with a suspension lift feature.
- **2 INCH (50.8 mm) MINIMUM LATERAL** tire clearance is required between the sides of the tire and the nearest point of contact through total travel of the air suspension. This includes when the wheels are fully turned in either direction if equipped with an SAF Self Steer Axle.

Figure 2

SWING ALIGN® NON-WELDED AXLE ALIGNMENT PROCEDURES

ALIGNMENT BOLT IS ON THE FRONT OF THE ROADSIDE FRAME BRACKET:

STEP 1. To properly align the suspension, the trailer should be pulled in a straight line for a sufficient distance to insure there are no binds in the suspension.

STEP 2. Check to verify trailer is empty and emergency brakes are **NOT** engaged.

STEP 3. Rotate bolt **CLOCKWISE** to move axle forward (A arrows); **COUNTERCLOCKWISE** to move axle rearward (B arrows).

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 www.safholland.us XL-AR435

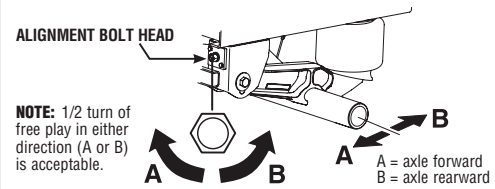

Figure 3

CBX / CB FIXED FRAME TRAILER AIR SUSPENSION TORQUE SPECIFICATIONS

Torques are with clean, lubricated threads. Always apply torque to nut, if possible.

REQUIRED RE-TORQUING SCHEDULE:

- All fasteners after first three (3) months or 5,000 miles.
- At every routine preventative maintenance.
- At every brake relining.

	Pivot Connection	Shock	Air Spring		SwingAlign
Fastener Size	1-1/8"	3/4"	1/2"	3/4"	1/2"
Torque ft.-lbs. (N•m)	550-600 (746-813)	140-175 (190-237)	30-40 (41-54)	40-45 (54-61)	50-60 (68-81)

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 www.safholland.us XL-AR436

Figure 4

SHEAR BOLT – FRONT PIVOT CONNECTION

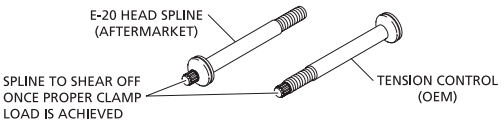
This suspension has been installed with a shear bolt front pivot connection design. This connection requires no torque check, but does REQUIRE VISUAL INSPECTION. Inspect that the spline has been sheared off and for any signs of movement:

- Prior to placing trailer in service.
- After three (3) monts or 5,000 miles.
- At every routine preventative maintenance.
- At every brake relining.

⚠CAUTION DO NOT apply anti-sieze compound or additional lubricant to pivot connection hardware. This can lead to unpredictable clamp loads and unreliable axle alignment.

XL-AS20085DC-en-US

SHEAR BOLT STYLES



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SAF-Holland

3. CBX Fusion Model Identification

The CBX Fusion suspension serial tag is located on the frame bracket ***(Figure 4)***.

NOTE: This manual applies to the suspension models listed on the front cover. However, determine the specific model number, write that information below and refer to it when obtaining information or replacement parts ***(Figure 5)***.

NOTE: If the suspension serial tag is NOT legible or is NOT available, it can identified by the appearance of the equalizing beam ***(Figure 6)***. The CBX Fusion model will have a cast beam with a lower air spring mounting plate welded to it mounted on a 5.75" round axle ***(Figure 6)***.

NOTE: The CBX Fusion models come in four (4) different beam lengths. Equalizing beam lengths are measured from the centerline of the pivot to the centerline of the air spring mounting plate ***(Figure 6).***

4. CBX Fusion Model Nomenclature

The sample tag illustrated will help interpret the information on the SAF-HOLLAND, Inc. serial number tag. The part number is on the first line. The model number along with the suspension capacity are on the second line. The third line contains the serial number ***(Figure 5)***.

CB X 23 - 14

- **CB** — Cast Beam Suspension
- **X** — 5.75" Diameter Premium Axle
- **23** — Axle Capacity
  Suspension Series
  20 – 20,000
  23 – 23,000
  25 – 25,000
  25/30 – 25,000/30,000*
  *30,000 at creep speed
- **14** — Ride Height
  14" (356 mm)
  15" (381 mm)
  16" (406 mm)
  17" (432 mm)

Figure 4

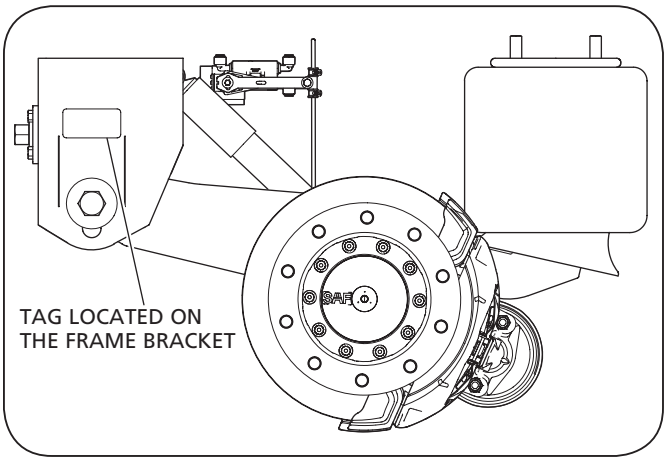


Figure 5

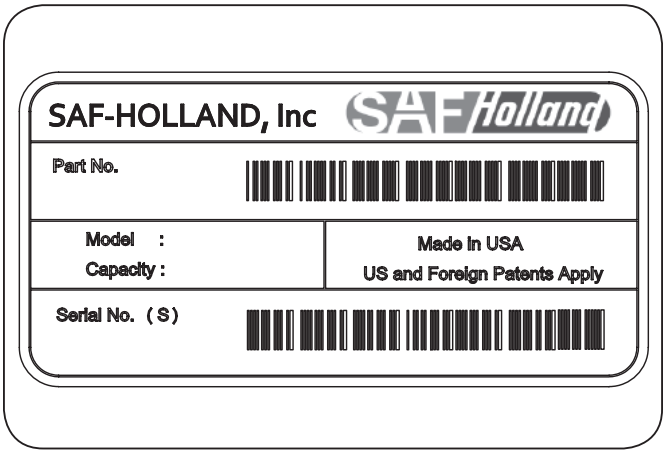
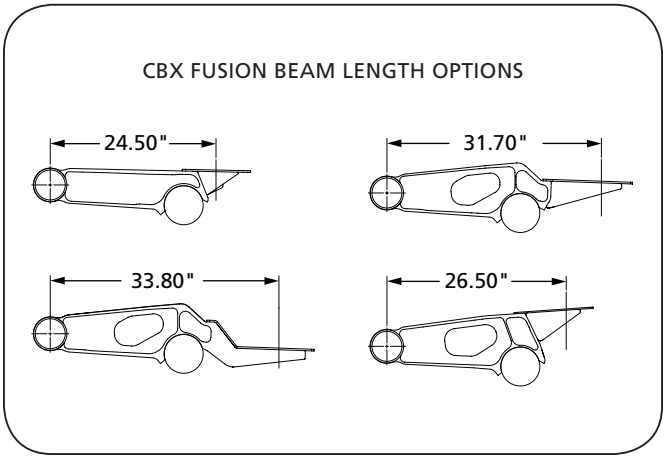


Figure 6



5. CBX Model Identification

The CBX suspension serial tag is located on the frame bracket ***(Figure 7)***.

NOTE: This manual applies to the suspension models listed on the front cover. However, we urge you to determine your specific model number, write that information below and refer to it when obtaining information or replacement parts ***(Figure 8)***.

NOTE: If the suspension serial tag is NOT legible or is NOT available, it can be identified by the appearance of the equalizing beam. The CBX model will have a full cast beam mounted to a 5.75" round axle ***(Figure 9)***.

NOTE: The CBX models come in three (3) different beam lengths. Equalizing beam lengths are measured from the centerline of the pivot to the centerline of the air spring mounting plate ***(Figure 9)***.

6. CBX Model Nomenclature

The sample tag illustrated will help interpret the information on the SAF-HOLLAND, Inc. serial number tag. The model number is on the first line along with the suspension capacity. The second line contains the part number and the serial number ***(Figure 8)***.

CB X 23 - 14

- **14** — Ride Height
  - 14" (356 mm)
  - 15" (381 mm)
  - 16" (406 mm)
  - 17" (432 mm)
- **23** — Axle Capacity Suspension Series
  - 20 – 20,000
  - 23 – 23,000
  - 25 – 25,000
  - 25/30 – 25,000/30,000*
  - *30,000 at creep speed
- **X** — 5.75" Diameter Premium Axle
- **CB** — Cast Beam Suspension

Figure 7

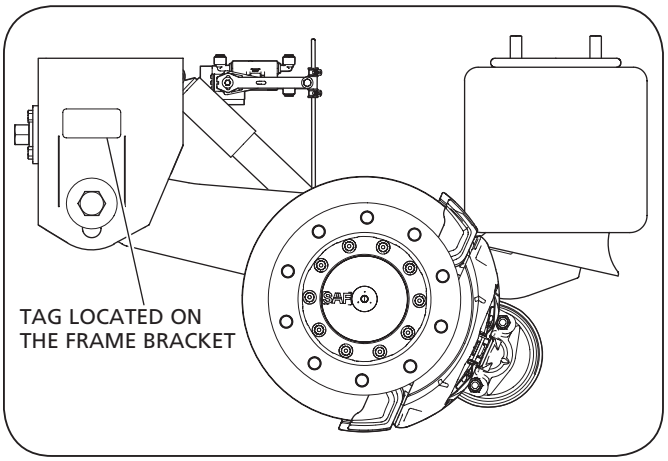


Figure 8

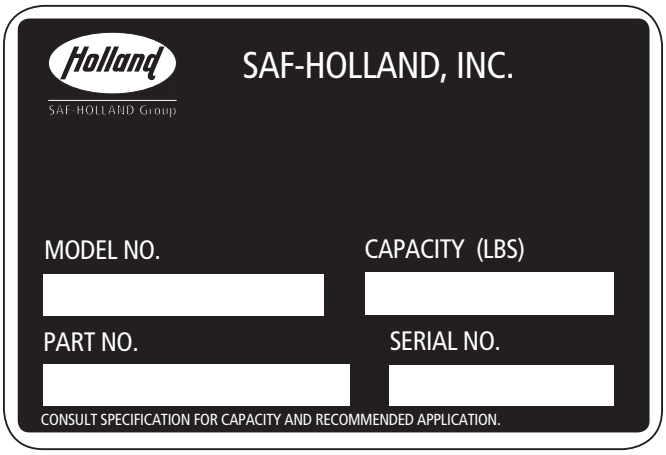
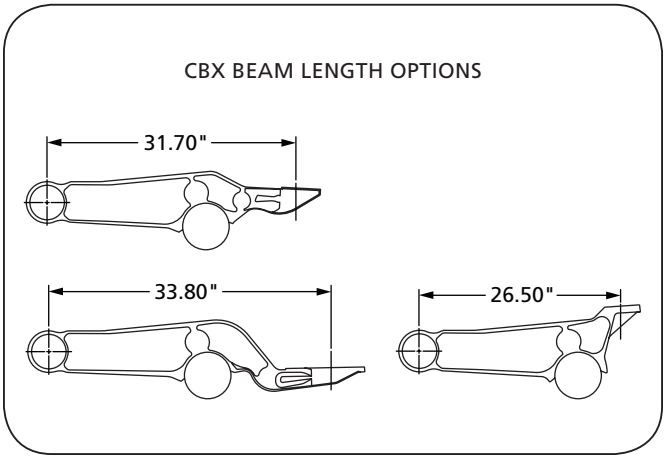


Figure 9



7. CB-2300 Model Identification

The CB-2300 suspension serial tag is located on the frame bracket ***(Figure 10)***.

NOTE: If the suspension serial tag is NOT legible or is NOT available, you can identify your suspension model by the appearance of the equalizing beam. The CB-2300 model will have a full cast beam with a 5" round axle ***(Figure 10)***.

NOTE: This manual applies to the suspension models listed on the front cover. However, determine the specific model number, write that information below and refer to it when obtaining information or replacement parts ***(Figure 11)***.

8. CB-2300 Model Nomenclature

The sample tag illustrated will help interpret the information on the SAF-HOLLAND, Inc. serial number tag. The model number is on the first line along with the suspension capacity. The second line contains the part number and the serial number ***(Figure 11)***.

CB 2300 - 14

- 14 — Ride Height
  - 14" (356mm)
  - 15" (381mm)
  - 16" (406mm)
  - 17" (432mm)
- 2300 — Axle Capacity Suspension Series 23,000 lbs.
- CB — Cast Beam Suspension

Figure 10

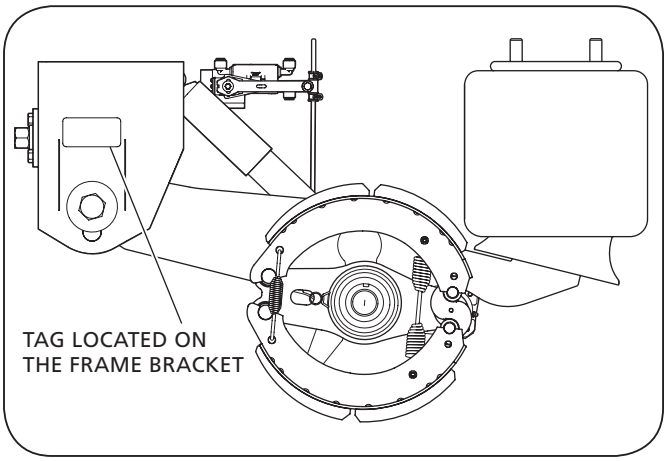
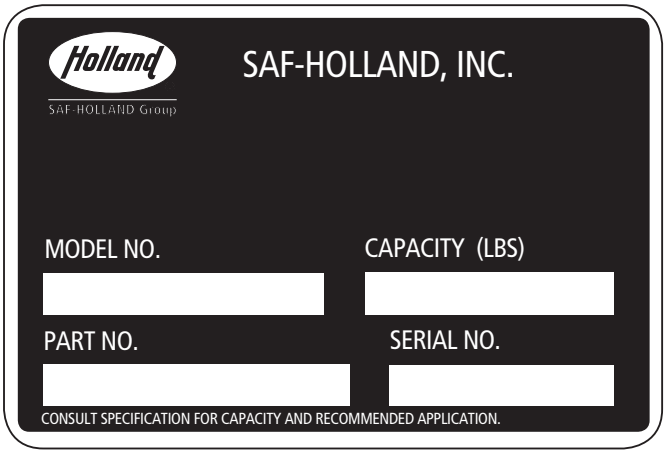


Figure 11



9. Welding Standards

9.1 Scope

When welding is required for the suspension repairs, observe the requirements below. 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.

9.2 Workmanship

All welding on SAF-HOLLAND products MUST be performed by a welder qualified according to the appropriate AWS standard for the weld being made or an equivalent standard. It is the responsibility of the customer to provide good workmanship when welding on SAF-HOLLAND products.

9.3 Material

Items to be welded that are 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)
Charpy V Notch - 20 ft.-lbs. (27 N•m) at 0° F (-17.7° 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 illustrated ***(Figure 12)***. Where the installation drawing specifies different than above, the drawing shall prevail.

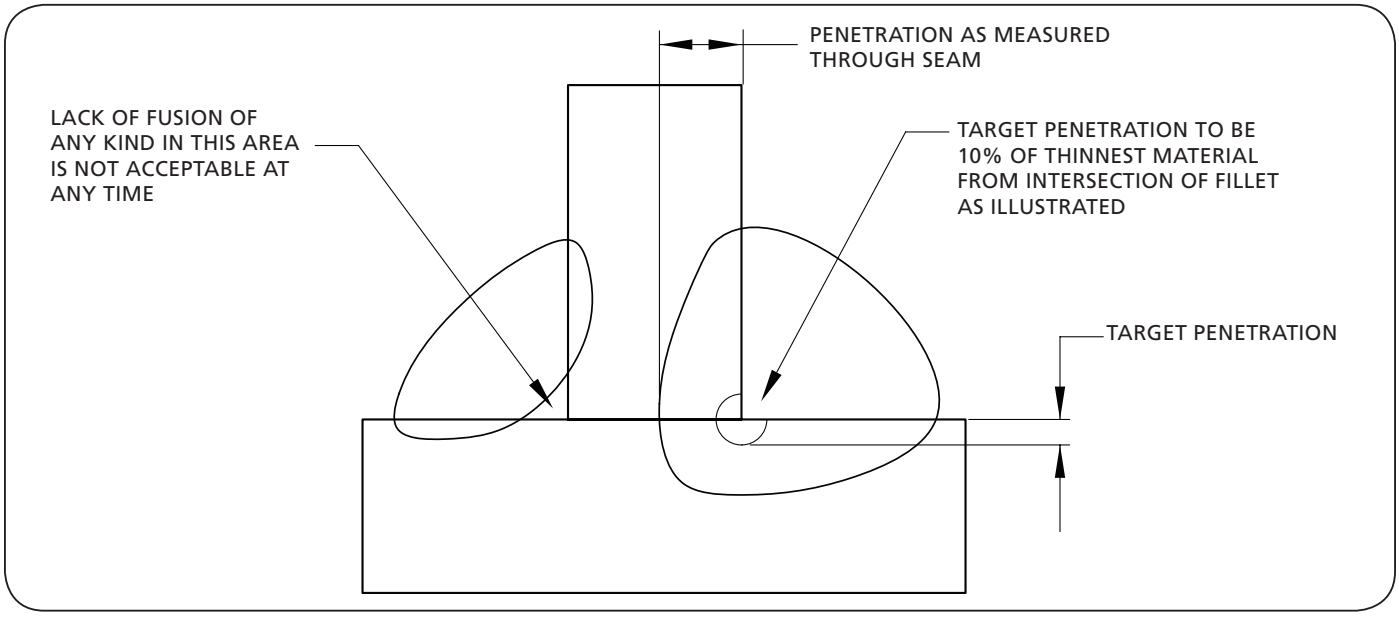
9.4 Procedures

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" (12.7 mm) or a sufficient amount to prevent craters at the end of the weld. Where weld is illustrated to go around corners, it is assumed the corner represents a stress concentration area. DO NOT start or stop weld within 1" (25.4 mm) of the corner. Particular care should be taken to prevent undercutting in this area.

9.5 Weld Size

If weld size is NOT specified, the effective throat of the weld MUST be no smaller than the thinnest material being welded ***(Figure 12)***.

Figure 12



10. Standard Air Control System Installation

The following is a typical air system installation and should be plumbed as illustrated ***(Figure 13)***. Optional air control systems are available. Contact SAF-HOLLAND applications department to discuss your particular needs.

The air control system of the CBX/CB suspensions use air drawn from the tractor air system to pressurize the suspension's air springs. The suspension, working with the air control system, provides optimum suspension performance only when all air control system components are installed and operating properly.

IMPORTANT: Make certain that all air lines and valves are free from obstruction through the full operational range of the suspension.

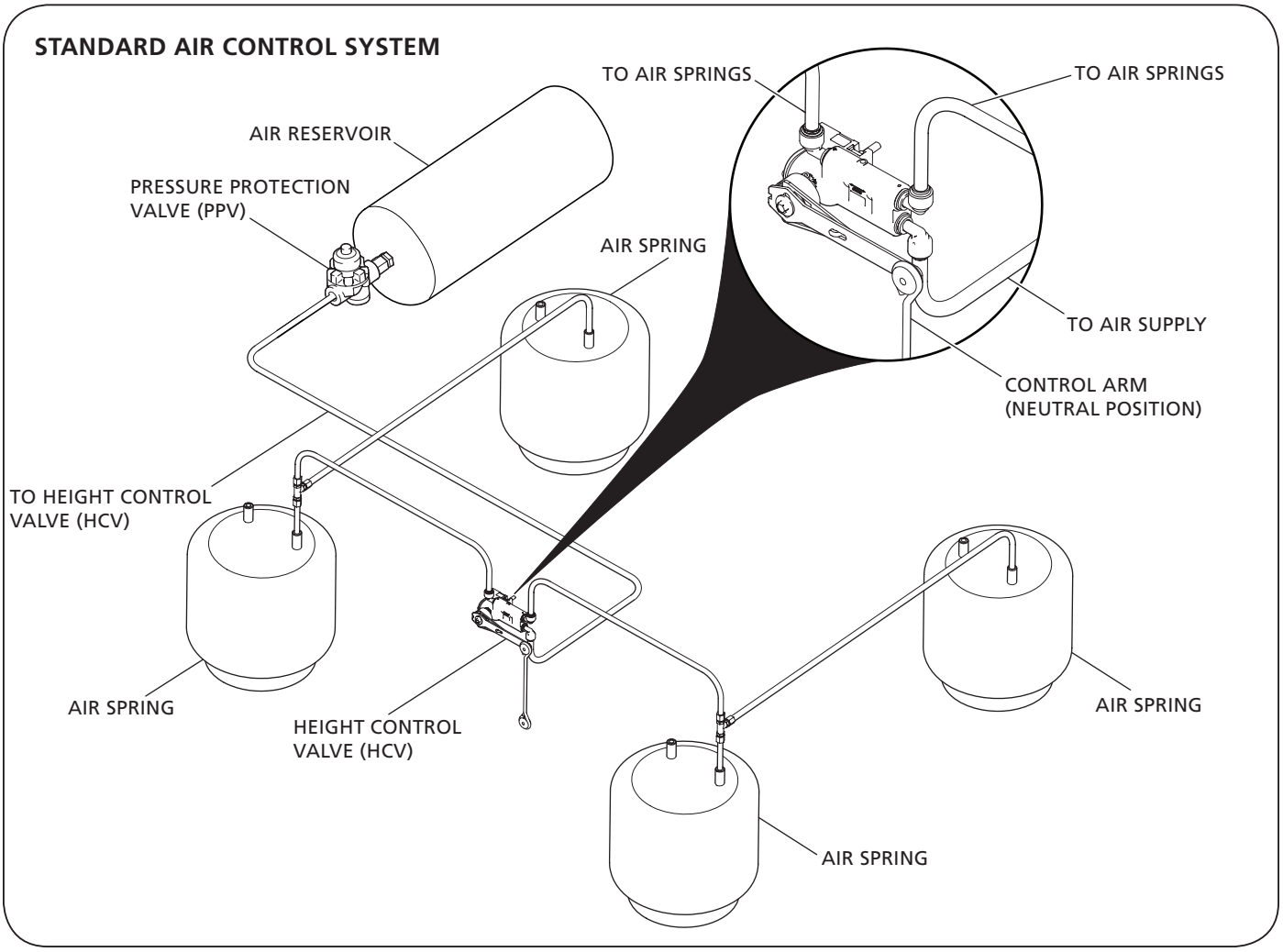
IMPORTANT: A pressure protection valve (PPV) MUST be attached to the air reservoir in order to maintain proper air pressure ***(Figure 13)***.

IMPORTANT: The air pressure protection valve maintains safe brake pressure. Approximately 85 psig (5.9 bars) opens the valve, and 65 psig (4.5 bars) closes the valve.

NOTE: When installing the pressure protection valve, use a drop of oil or Loctite® to lubricate threaded connections. DO NOT use a pipe compound or teflon tape as they may clog the valve.

A height control valve (HCV) is used to regulate the air pressure required for varying load capacities ***(Figure 13)***.

Figure 13



11. Suspension Assembly Installation

NOTE: Locate the suspension on the trailer frame. Refer to your model's specific installation drawing for the proper weld patterns and locations. To obtain a copy of your specific installation drawing, contact SAF-HOLLAND Customer Service at 888-396-6501.

1. Once the suspension is correctly positioned, weld the suspension in place as outlined in Section 9.
2. Ensure the linkage assembled to the height control valve (HCV) and suspension is installed properly ***(Figure 14)***.
3. Install the service and emergency lines to the suspension and allow the suspension to air up.
6. Measure the ride height of the suspension with a tape measure ***(Figure 15)***.
7. Compare the measured suspension ride height value to the appropriate value ***(Table 1)***. Ensure the measured ride height value is within ± 1/4" (6 mm).

IMPORTANT: If the measured ride height value is NOT within ± 1/4" (6 mm), follow the Ride Height Adjustment procedures described in Section 12.

4. Visually check all air control system fittings for air leaks by applying a soapy water solution and checking for bubbles at all air connections and fittings.

Figure 14

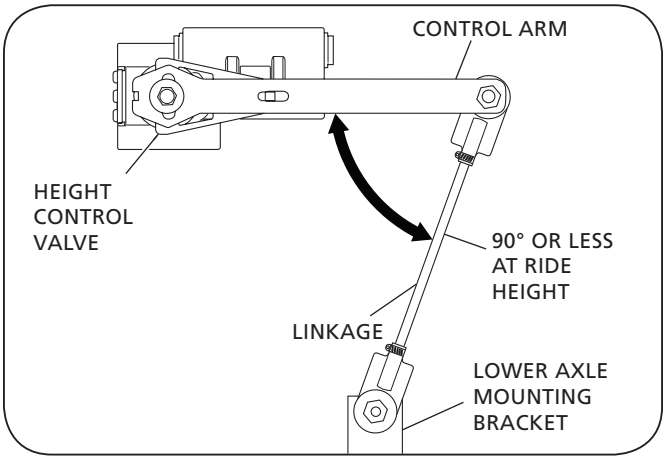
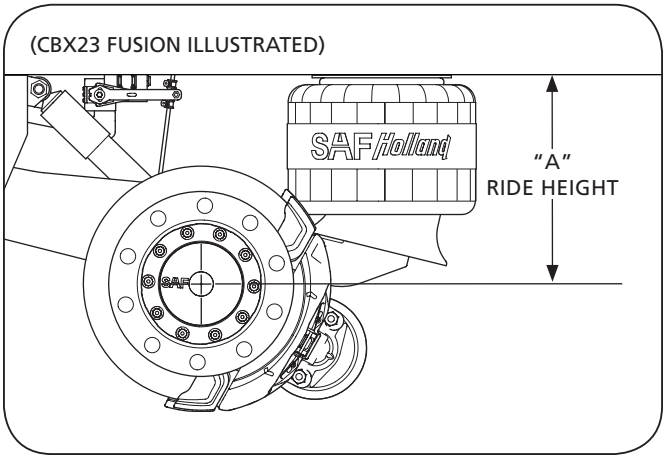


Table 1

MODEL	"A" RIDE HEIGHT
CBX/CB-14	14"
CBX/CB-15	15"
CBX/CB-16	16"
CBX/CB-17	17"

Figure 15



12. Ride Height Adjustment

IMPORTANT: Trailer MUST be unloaded before beginning any service procedures.

1. On a level surface, support the front of the trailer with either a kingpin stand, landing gear, or while coupled to a tractor ***(Figure 16)***.
2. Raise the trailer frame approximately 2" (51 mm) above the suspension's specified ride height ***(Figure 17)***.
3. Place multiple jack stands at the suspension's specified ride height ***(Table 2)*** under the vehicle frame at OEM specified locations, then lower the trailer onto the jack stands.

NOTE: It could be necessary to shim the jack stands to achieve specified ride height.

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

Table 2

MODEL	"A" RIDE HEIGHT
CBX/CB-14	14"
CBX/CB-15	15"
CBX/CB-16	16"
CBX/CB-17	17"

4. Exhaust all air from the suspension, set the parking brakes, and chock the wheels.

⚠WARNING Failure to exhaust the suspension air and chock the tires prior to beginning maintenance could allow vehicle movement which, if not avoided, could result in death or serious injury.

5. Disconnect the linkage from the control arm and lower the axle mounting bracket ***(Figure 18)***.
6. Pin the height control valve so that the valve arm is in the center or neutral position ***(Figure 18)***.

Figure 16

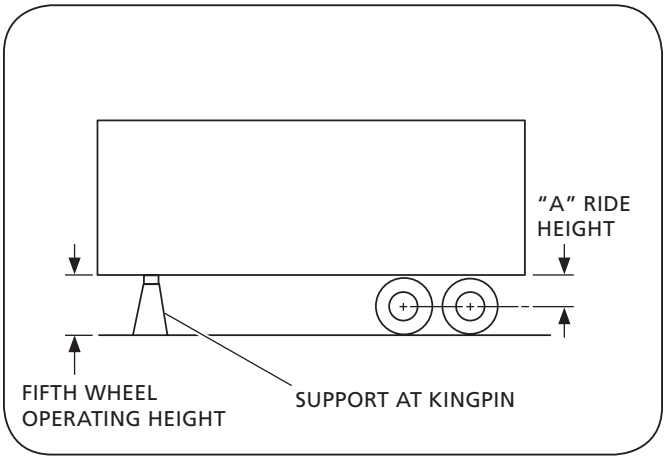


Figure 17

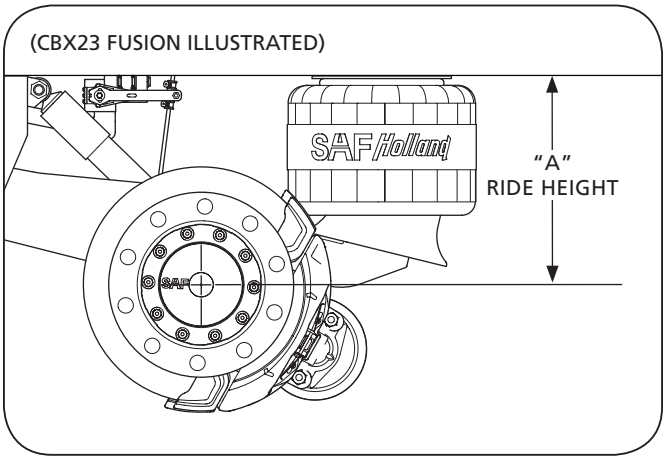
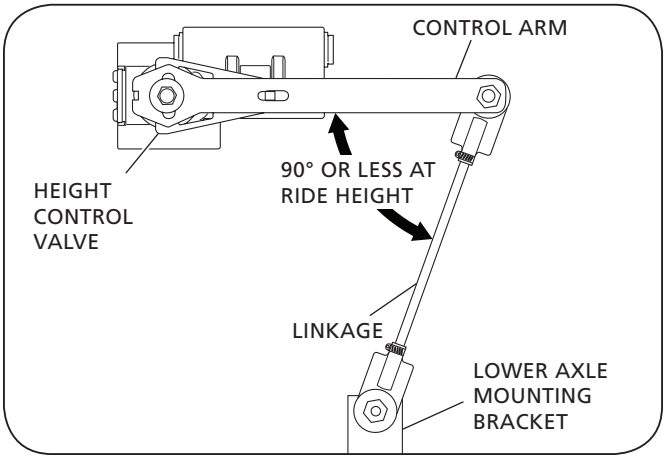


Figure 18



7. Measure distance "B" between the valve arm and mounting bracket holes to determine linkage length ***(Figure 19)***.
8. Adjust the linkage to required length and install the hardware into the upper and lower connections ***(Figure 19)***. Torque hardware to 30-40 in.-lbs. (3-5 N•m).

NOTE: It could be necessary to cut linkage rod to achieve proper length. Be sure to de-burr rod to prevent link end damage.

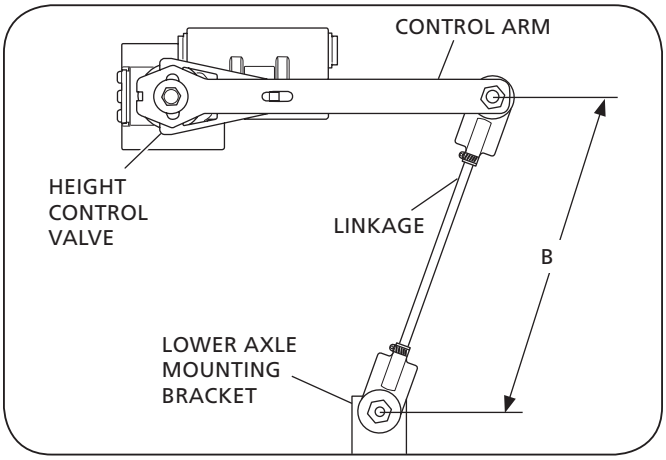
9. Raise the trailer approximately 2" (50 mm) above the ride height and remove the jack stands.
10. Slowly lower the trailer so that the trailer suspension is fully collapsed.
11. Pull the pin and apply air to the trailer allowing the suspension to return to ride height.
12. With the suspension at rest, measure the ride height. Ride height MUST be within 1/4" (6 mm) of the suspensions specified ride height.
13. Spray a soapy water mix on all air line connections to check for air leaks and verify fittings are tight.

IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for air leaks. If air leaks are detected, repair as required.

CAUTION Failure to eliminate air leaks could compromise the suspension performance which, if not avoided, could result in component or property damage.

14. Remove the wheel chocks.

Figure 19



13. SwingAlign Axle Alignment

13.1 Alignment Preparation

1. Pull the trailer in a straight line for a sufficient distance to ensure that there are no binds in the suspension.
2. Disengage the trailer parking brakes and make sure the trailer is empty.
3. 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 the spindle extensions be utilized.
   b. Dimensions A and B ***(Figure 20)*** 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 20)*** MUST be equal to within 1/16" (1 mm).

13.2 Alignment Instructions

1. Using the measurements per Section 13.1 Step 3, align each axle. Align by rotating the alignment bolt head using a 1-3/8" socket wrench on the front face of the road-side frame bracket clockwise to move axle forward ***(A arrows);*** counterclockwise to move axle rearward ***(B arrows) (Figure 21)***. Approximately 250 ft.-lbs. (339 N•m) will be required.

IMPORTANT: DO NOT loosen the pivot bolts.

IMPORTANT: Two (2) scribe lines on the side of the frame bracket indicate maximum adjustment for axle alignment. If the edge of the visible washer touches either scribe line, the SwingAlign axle alignment adjustment is "out of stroke." Inspect and repair trailer components as necessary and realign ***(Figure 22)***.

IMPORTANT: The SwingAlign design maintains proper alignment without welding or without loosening of the pivot connection. DO NOT weld alignment bolt or pivot bolts ***(Figure 22)***.

14. Brake Adjustment Instructions

Brakes should be adjusted per axle and brake manufacturer's specifications.

For CBX/CB Suspensions with Drum Brake Systems refer to SAF-HOLLAND Drum Brake Service Manual, XL-TA10006OM.

For CBX Suspension with Disc Brake Systems refer to SAF-HOLLAND Disc Brake Service Manual, XL-SA10059OM.

Figure 20

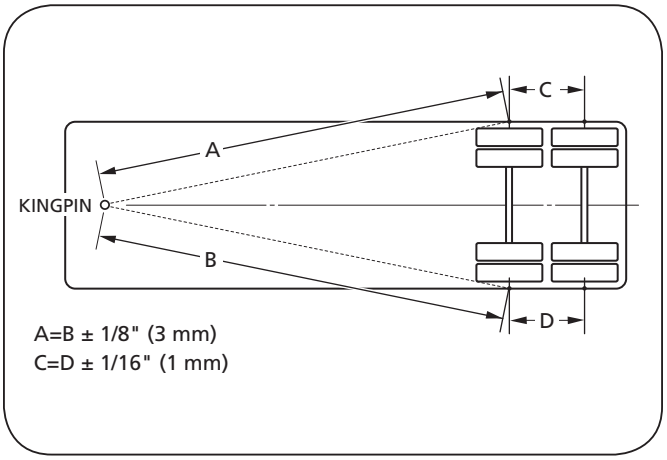


Figure 21

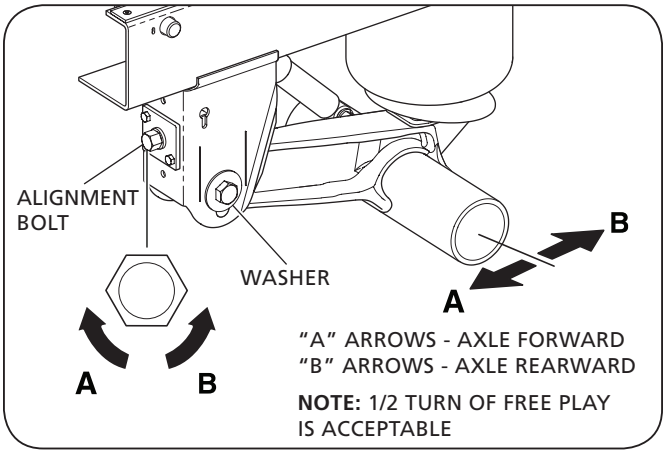
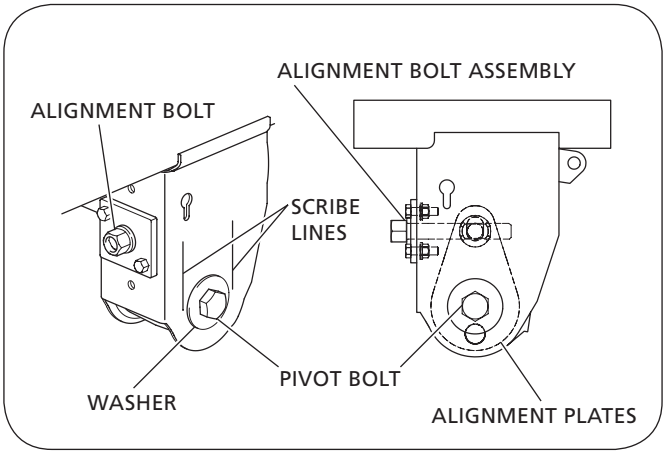


Figure 22



15. Pre-Operation

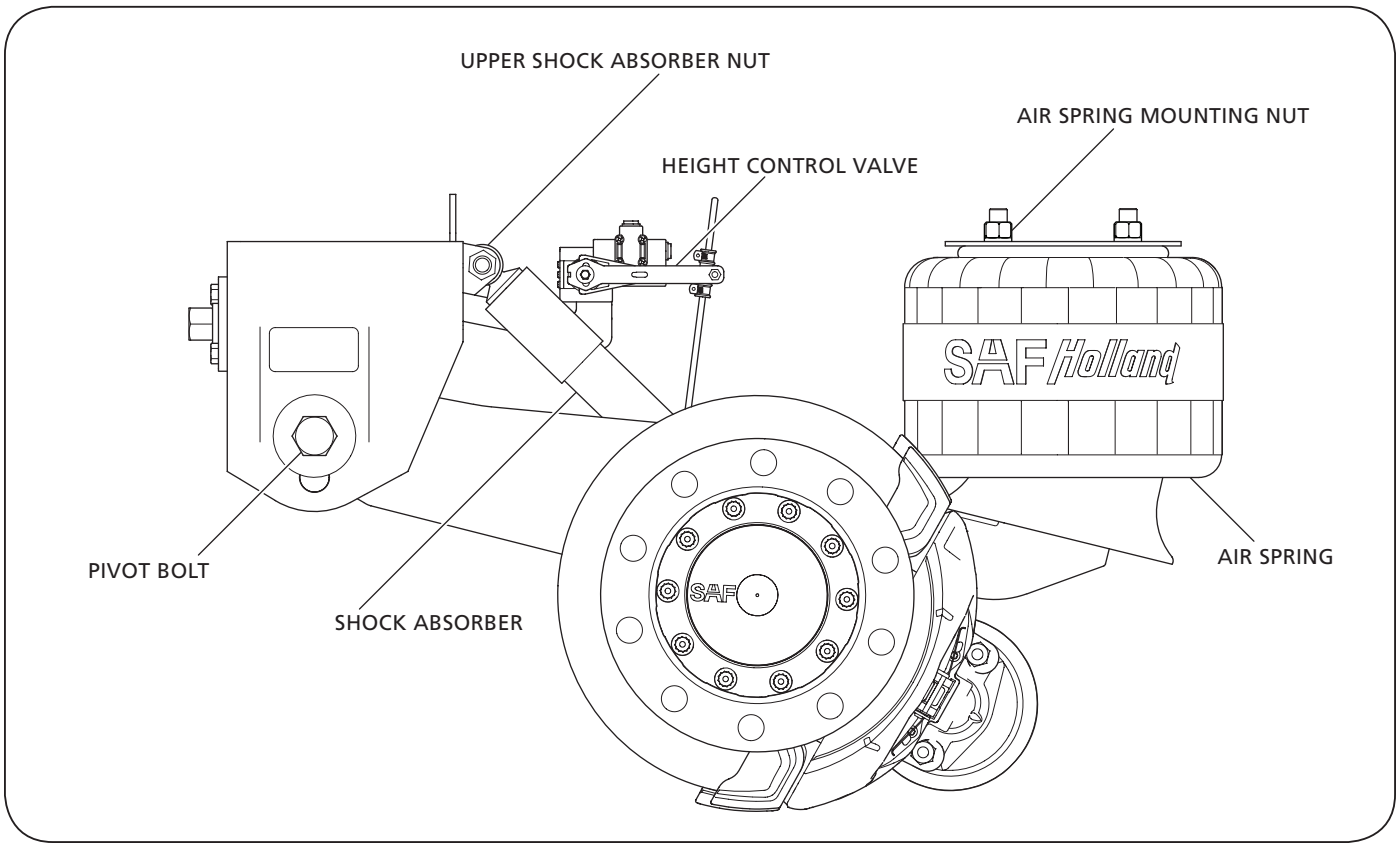
NOTE: In the United States, workshop safety requirements are defined by federal and/or state Occupational Safety and Health Act. Equivalent laws may exist in other countries. This manual is written based on the assumption that OSHA or other applicable employee safety regulations are followed by the location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

1. With the vehicle on a level surface, bring air system to operating pressure (above 85 psig/5.9 bars).
2. Shut off the vehicle and visually check all air control system fittings for air leaks by applying a soapy water solution and checking for bubbles at all air connections and fittings. Examine the air springs ***(Figure 23)*** for equal firmness.
3. Check the shock absorbers for proper installation and make sure that the upper and lower 3/4" shock absorber nuts are torqued to 140-175 ft.-lbs. (190-237 N•m) ***(Figure 23)***.
4. Verify that the 1/2" air spring mounting nuts are torqued to 30-40 ft.-lbs. (41-54 N•m), and the 3/4" air spring mounting nuts are torqued to 40-45 ft.-lbs. (54-61 N•m) ***(Figure 23)***.
5. With the suspension at full capacity, check that there is a 1" (25 mm) minimum clearance around the air springs.
6. The suspension's ride height should be within ±1/4" (6 mm) of the recommended design height. For proper ride height, refer to Section 12.
7. Determine which pivot bolt style is installed ***(Figure 23)***.
   - If 1-1/8" hex head bolt, verify torque on the nut is 550-600 ft.-lbs. (746-813 N•m).
   - If 7/8" pan head shear bolt, verify spline has been sheared off.

IMPORTANT: The SwingAlign design maintains proper alignment under correct torque without welding; DO NOT weld.

NOTE: SwingAlign pivot connections are on roadside and fixed alignment pivot connections are on curbside. For SwingAlign Connection Axle Alignment procedure, refer to Section 13.

Figure 23



16. Routine Maintenance and Daily Inspection

1. Daily or before each trip, check the suspension to ensure it is fully operational.
2. Inspect all decals to ensure they are clearly legible and intact. Clean with a terry cloth towel, soap and water.
3. Visually inspect air springs for sufficient inflation and that the suspension is at proper ride height. For ride height details and measurements, refer to Section 12 of this manual.

16.1 Initial Three (3) Months or 5,000 Mile (8,000 km) Service Inspection

1. Suspension ride height (underside of frame to centerline of axle) MUST be within ± 1/4" (6 mm) of recommended design height. For instructions on measuring ride height, refer to Section 11.

CAUTION An improperly set ride height could result in suspension component damage and/or poor vehicle ride performance.

2. After first three (3) months or 5,000 miles (8,000 km) of service, whichever comes first, inspect bolts and nuts at the pivot connections to ensure there are no signs of movement. Check all other nuts and bolts for proper torque, refer to the specifications listed in Section 17. Re-torque as necessary thereafter.
3. With the vehicle on a level surface and air pressure above 85 psig (5.9 bars), verify that all the air springs are of sufficient and equal firmness.

NOTE: Check all air control system fittings for air leaks, by applying a soapy water solution and checking for bubbles at all air connections and fittings.

16.2 Routine Physical Inspections

Every 100,000 Miles (160,000 km) or one (1) year, whichever comes first.

Check all other suspension components for any sign of damage, looseness, torque loss, wear or cracks. Repair, tighten or replace damaged part(s) to prevent equipment breakdown.

16.3 Visual Inspection Procedure

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.

Visually check for:

- Loose, broken 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.

- Air springs – clearances, wear damage, and proper inflation.
- Shock absorbers – leaking or damaged.
- Cracked parts or welds.

17. Torque Specifications

Table 3

COMPONENT	TORQUE VALUE	FASTENER SIZE
Shock Absorber	140-175 ft.-lbs. 190-237 N•m	3/4"
Pivot Connection, Hex Head Bolt	550-600 ft.-lbs. 746-813 N•m	1-1/8"
*Pivot Connection, Pan Head Shear Bolt	Visual Inspection	7/8"
Lower Air Spring Nut	30-40 ft.-lbs. 40-54 N•m	1/2"
Upper Air Spring Nut	40-45 ft.-lbs. 54-61 N•m	3/4"
SwingAlign Mounting Fasteners Only - NOT Pivot Bolt	50-60 ft.-lbs. 68-81 N•m	1/2"
Height Control Valve Lower Linkage	30-40 In.-lbs. 3-5 N•m	1/4"

All torque specifications are ± 5%.
Torques specified are for clean, lubricated threads.
Always Apply torque to nut if possible.
Required re-torquing at every brake re-lining.
* If equipped with 7/8" pan head shear bolt, ensure that the spline is sheared off and that there are no signs of movement.

NOTE: Torque specifications listed above are with clean lubricated / coated threads (***Table 3)***. All new SAF-HOLLAND fasteners come precoated from the factory. For bolt and lock nut grade markings refer to ***Figure 24***.

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

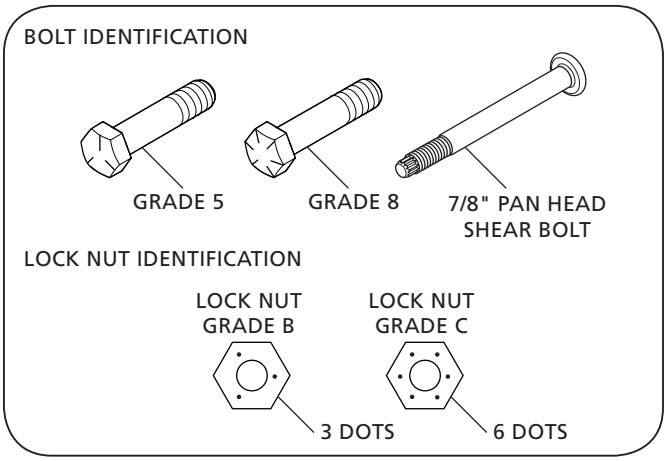
General Information

1. The torque specifications are applied to the nut and NOT the bolt.

⚠WARNING Failure to use the proper fasteners when servicing the suspension could cause component failure which, if not avoided, could result in death or serious injury.

⚠WARNING Failure to properly torque all fasteners could result in component failure which, if not avoided, could result in death or serious injury.

Figure 24



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-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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www.safholland.us

SAF-HOLLAND CANADA • 519.537.3494 • Fax 800.565.7753
WESTERN CANADA • 604.574.7491 • Fax 604.574.0244
www.safholland.ca

SAF-HOLLAND MEXICO • 52.55.5362.8743 • Fax 52.55.5362.8743
www.safholland.com.mx

info@safholland.com

SAF-HOLLAND INC.
1950 Industrial Blvd., Muskegon, MI 49442
www.safholland.com

SAF-HOLLAND Engineering Your Road to Success

CHANGE RECORD				
LTR.	DESCRIPTION OF CHANGE	BY	E.C.N.	DATE
A	CREATED	SEB	61793	01AUG11

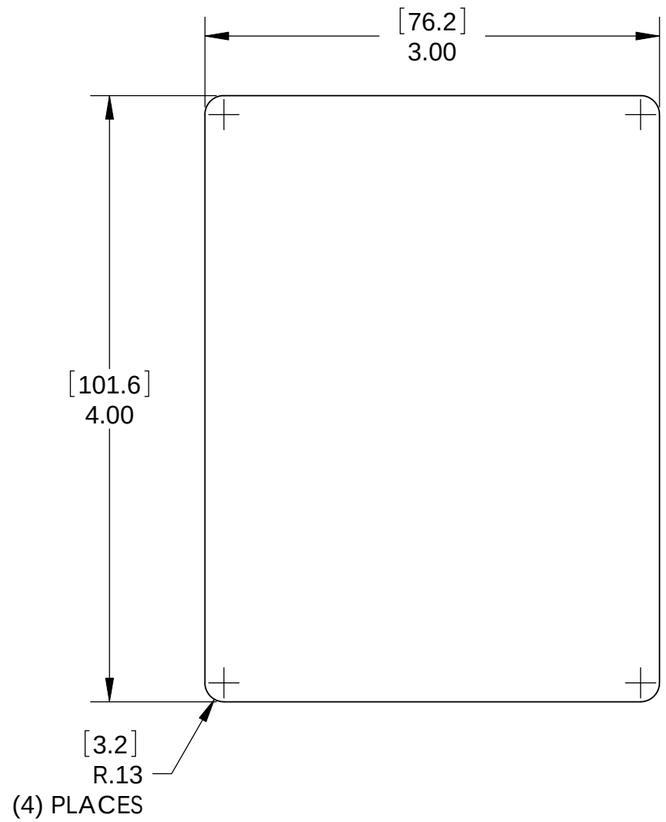
CBX25/30 PSI SPECIFICATIONS

Suspension Capacity: 25,000 lbs. (Capacitè 11,339 kgs)

Load Per Axle (lbs. / kgs) Charge par essieu (lbs. / kgs)	33.80" **Beam Length Required psi / kpa*** Longeur de bras de suspension Pression psi / kpa	24.50" **Beam Length Required psi / kpa*** Longeur de bras de suspension Pression psi / kpa
3000 / 1360	**4** / 27	**4** / 27
6000 / 2721	**15** / 103	**16** / 110
9000 / 4082	**26** / 179	**27** / 186
12000 / 5443	**37** / 255	**38** / 262
15000 / 6803	**48** / 331	**49** / 338
18000 / 8164	**59** / 407	**60** / 414
19000 / 8618	**63** / 434	**64** / 441
22500 / 10205	**76** / 524	**76** / 524
25000 / 11339	**85** / 586	**86** / 593
30000 / 13607**	**103** / 709	**104** / 717

* These are guidelines only. Actual values may vary depending on axle and wheel end configuration.
* Ce sont des directives. Les valeurs réelles peuvent varier selon la configuration d'essieu et de roue.
** At creep speed – 5 mph or less. / À la vitesse minimale – 8 kph ou moins.

SAF-HOLLAND XL-AS11425DC-m3-US Rev A



NOTES:

1. DECAL MATERIAL PER SPEC. NS-65-91
2. ARTWORK BY SAF-HOLLAND AS SHOWN, WITH WHITE BACKGROUND AND BLACK LETTERS.
3. DECAL MUST PERMANENTLY ADHERE TO PAINTED SURFACE.
4. ORIGINAL ARTWORK ON FILE IN SAF-HOLLAND MARKETING SERVICES DEPT.

UNSPECIFIED TOLERANCES FOR DIMENSIONS

ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ]

X[X] = ±.125[3.18]

.X[X] = ±.060[1.52]

.XX[X.X] = ±.030[0.76]

.XXX[X.XX] = ±.010[0.25]

ANGLES ±1°

THIRD ANGLE PROJECTION

WEIGHT: -

SCALE: 1:1

SAF-HOLLAND

TITLE: DECAL, LOAD VS PSI - CBX25/30

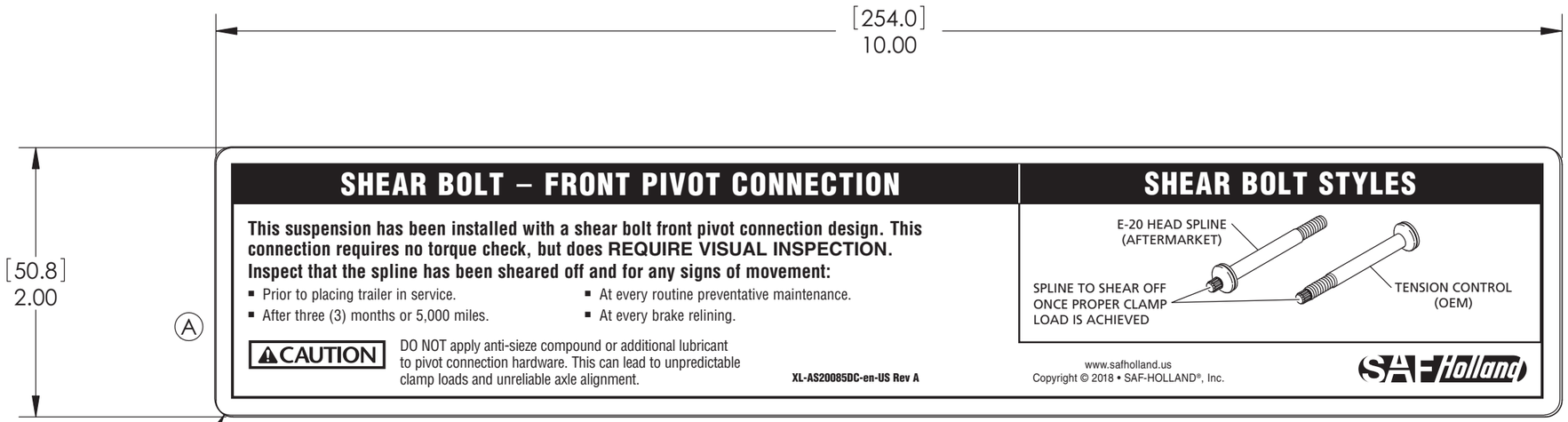
MATL: SEE DETAILS

MATL.#: -

PART NUMBER: XL-AS11425DC-m3-US

REV. A

CHANGE RECORD				
LTR.	DESCRIPTION OF CHANGE	BY	E.C.N.	DATE
-	CREATED	AC	307837	2018-03-02
A	UPDATED DECAL TO CORRECT TYPO	RC	308085	2018-04-06



NOTES:

1. DECAL MATERIAL PER SPEC. NS-65-91
2. ARTWORK BY SAF-HOLLAND AS SHOWN, WITH WHITE BACKGROUND AND BLACK LETTERS.
3. DECAL MUST PERMANENTLY ADHERE TO PAINTED SURFACE.
4. ORIGINAL ARTWORK ON FILE IN SAF-HOLLAND COMMUNICATIONS DEPT.

UNSPECIFIED TOLERANCES FOR DIMENSIONS

ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ]

X[X] =±.125[3.18]

.X[X] =±.060[1.52]

.XX[X.X] =±.030[0.76]

.XXX[X.XX] =±.010[0.25]

ANGLES ±1°

THIRD ANGLE PROJECTION

EST. WEIGHT: 0.20#

SCALE: 1:1

SAF-Holland

TITLE: TORQUE SPECIFICATION DECAL

MATL: SEE NOTES

MATL.#:

PART NUMBER: XL-AS20085DC-en-US

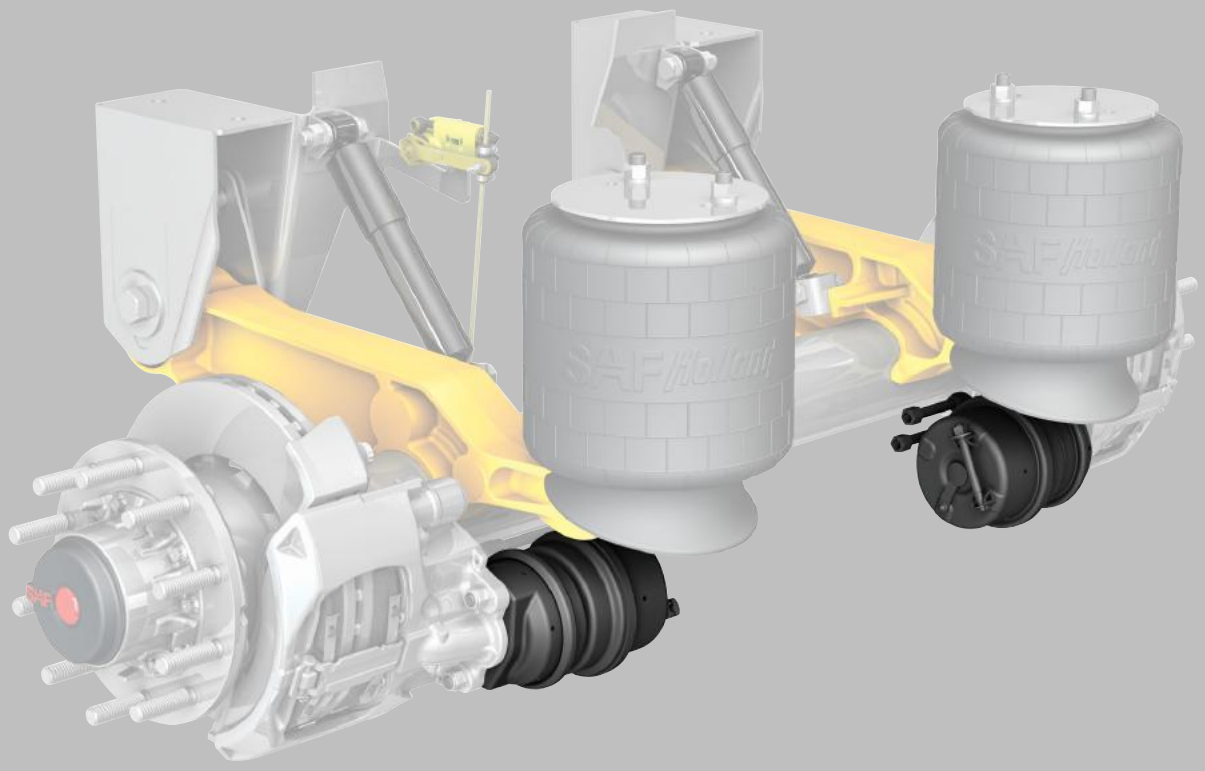
REV. A

SAF-HOLLAND Group

Installation and Service Guide

Brake Chambers

For INTEGRAL ™ Disc Brakes



XL-SA10062IM-en-US Rev B

Introduction

This manual provides you with information necessary for the installation, inspection, maintenance, and safe operation of the SAF brake chambers. SAF brake chambers are designed and engineered to provide trouble-free service.

NOTE: For axle end/brake components replacement contact SAF-HOLLAND Customer Service 1-888-396-6501.

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 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.

⚠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 may result in property damage.

⚠CAUTION Indicates a potentially hazardous situation which, if not avoided may 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 serious injury or death.

NOTE: Several maintenance procedures in this manual require re-positioning of the slack adjuster and/or ABS system. Consult the manufacturer's manual for procedures on the proper operation of slack adjuster 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 driver and curb side of an axle.

⚠WARNING Failure to follow manufacturer's instructions regarding spring pressure or air pressure control may allow uncontrolled release of energy which, if not avoided, could result in serious injury or death.

Please observe the following safety instructions in order to maintain the operational and road safety of your SAF-HOLLAND suspension:

1. The brake chamber internal components are under a spring preload of approximately 2,200 lbs. (1,000 kg). The brake chamber should never be opened or mishandled.

⚠WARNING Opening or mishandling the brake chamber may result in the release of internal spring pressure which, if not avoided could result in death or serious injury

2. Should the brake chambers show signs of material damage, significant corrosion, or other damage, the brake chambers must be immediately replaced.

3. If, during installation of the double diaphragm brake chamber, the parking brake section is not released using the release tool bolt, the plunger of the brake chamber may not fully engage in the lever arm of the disc brake. This can result in a limited function of the brake and/or damage to the internal components of the brake chamber.

⚠WARNING Failure to release the parking brake section of a double diaphragm brake chamber could result in limited brake function which, if not avoided could result in serious injury or death.

Note: The release tool bolt must always be removed and stored in the bracket provided on the brake chamber housing. The release tool bolt serves only for the manual caging of the parking brake with the trailer in the pressure-free state.

4. The wheel contact surfaces between the wheel and hub must not be additionally painted. 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 wheel/hub separations which, if not avoided could result in serious injury or death.

5. Only the wheel and tire sizes approved by the trailer builder may be used.

⚠CAUTION 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 may result in minor to moderate injury.

6. Before operating vehicle, ensure that the maximum permissible axle load is not exceeded and that the load is distributed equally and uniformly.

7. 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 serious injury or death.

8. 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.

9. Observe the operating recommendation of the trailer manufacturer for off-road operation of the installed axles.

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 you can contact SAF-HOLLAND Customer Service at 1-888-396-6501

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

2. Brake Chamber Installation

SAF Brake chambers are supplied ready for installation. Double diaphragm chambers with parking brake section are supplied with a release tool bolt for manual caging.

2.A. Single Diaphragm Brake Chamber

1. Check that all drain vent holes ***(1)*** are open (***Figure 1***). If necessary, completely remove the dust plug.

CAUTION Failure to keep bottom moisture drain vents open could result in damage to the brake chamber which, if not avoided may result in component or property damage.

Note: SAF accepts no liability for damage caused by the bottom moisture drain vents being closed.

2. The sealing surface on the brake caliper **(2)** must be free from dirt and corrosion ***(Figure 2)***.
3. Prior to installation, grease the spherical cap **(3)** in the brake lever ***(Figure 2)***.
4. Inspect the flange surface on the brake caliper **(4)** for flatness and cleanliness. Clean or replace if necessary ***(Figure 2)***.
5. Inspect the plungers, seals, and flange surface of the brake chamber for debris or damage. Clean or replace if necessary.
6. Move the brake chamber into the same orientation as the original chamber, ensuring that the plunger of the brake chamber engages in the spherical cap of the brake lever.
7. If the plunger is not in the correct position, it can be corrected as follows:

   Pressurize the service brake section of the brake chamber with compressed air five times and then relieve the pressure again. If the connecting rod has not moved into the desired position or if no compressed air is available, carefully maneuver the connecting rod into place manually.

Figure 1

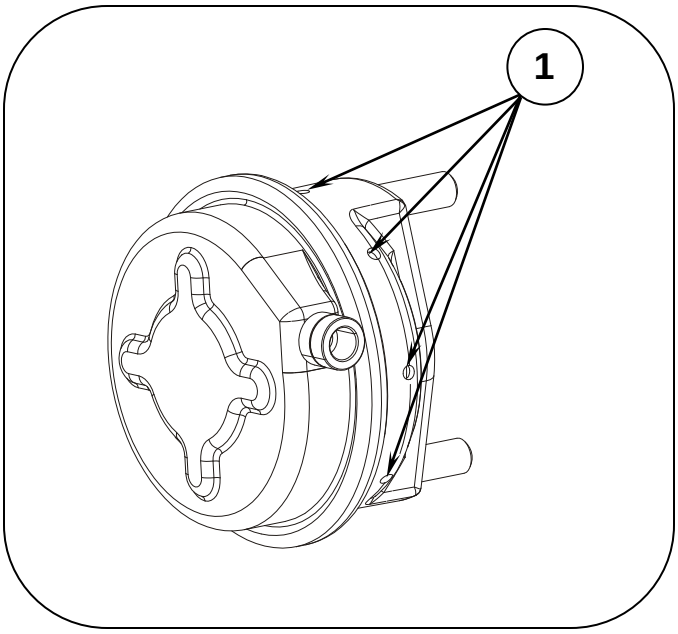
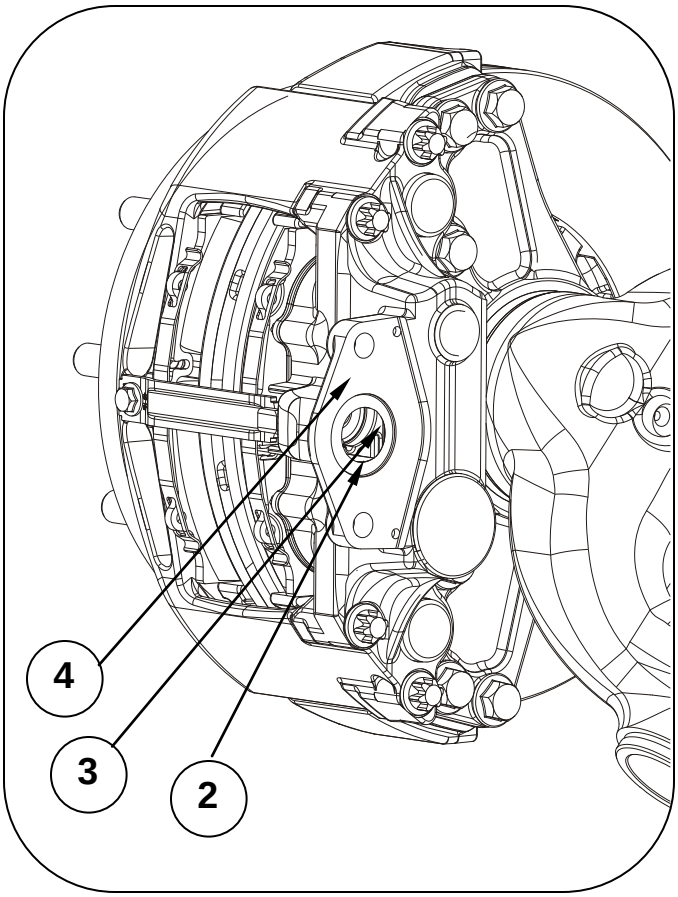


Figure 2



8. Install brake chamber nuts **(5)** until the brake chamber is in full contact with the mounting bracket ***(Figure 3)***. Pre-torque both nuts to 60-75 ft. lbs (80-100 Nm) and then torque to 130-155 ft. lbs (180-210 Nm).
9. Install air lines to the brake chamber (**6**) ***(Figure 3)***. Be sure to follow the installation instructions from trailer manufacture.
10. Spray a soapy water mix on all air line connections and test for air leaks, verify fittings are tight.

IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for any air leaks. If air leaks are detected, repair as required.

CAUTION Failure to eliminate air leaks could compromise the brake system performance which, if not avoided may result in component or property damage.

11. After installation, be sure to check the brake system for proper function.

2.B. Double Diaphragm Brake Chamber

1. Check that all drain vent holes ***(1)*** are open (***Figure 4***). If necessary, completely remove the dust plug.

CAUTION Failure to keep bottom moisture drain vents open could result in damage to the brake chamber which, if not avoided may result in component or property damage.

Note: SAF accepts no liability for damage caused by the bottom moisture drain vents being closed.

2. The sealing surface on the brake caliper **(2)** must be free from dirt and corrosion ***(Figure 5)***.
3. Prior to installation, grease the spherical cap **(3)** in the brake lever ***(Figure 5)***.
4. Inspect the flange surface on the brake caliper **(4)** for flatness and cleanliness. Clean or replace if necessary ***(Figure 5)***.
5. Inspect the plungers, seals, and flange surface of the brake chamber for debris or damage. Clean or replace if necessary.
6. Confirm that the parking brake is released and the release bolt is installed. If the parking brake is not released, refer to Section 3 for manual caging instructions.

Figure 3

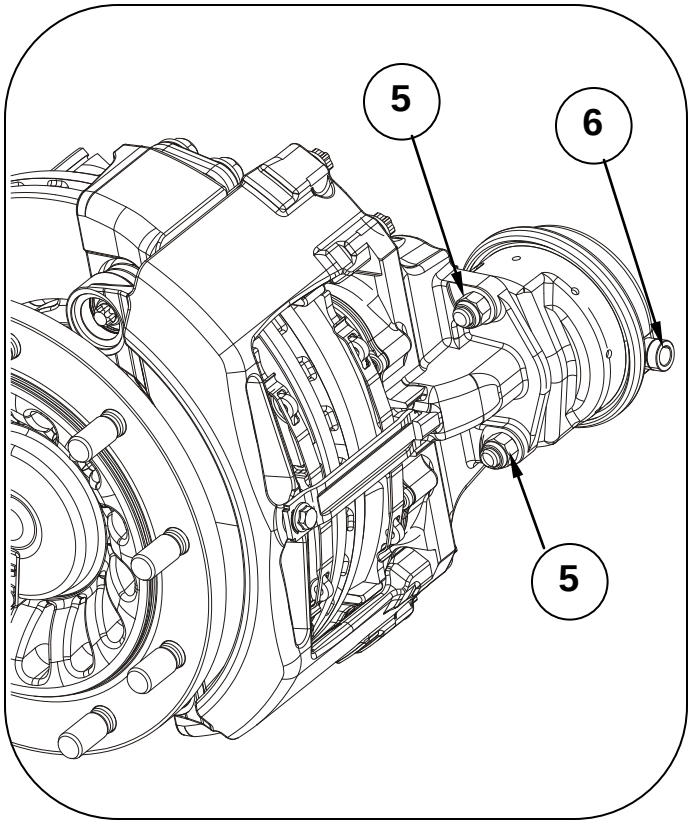
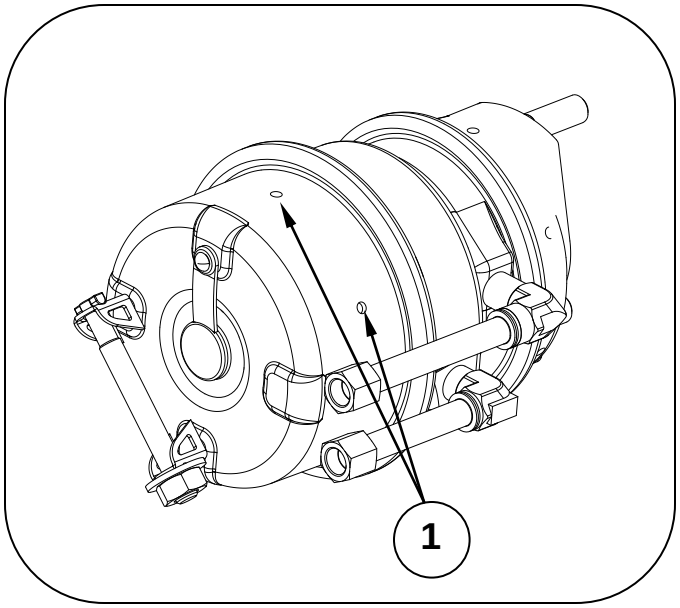


Figure 4



7. Move the brake chamber into the same orientation as the original chamber, ensuring that the plunger of the brake chamber engages in the spherical cap of the brake lever.

8. If the plunger is not in the correct position, it can be corrected as follows:

   Pressurize the service brake section of the brake chamber with compressed air five times and then relieve the pressure again. If the connecting rod has not moved into the desired position or if no compressed air is available, carefully maneuver the connecting rod into place manually.

10. Install brake chamber nuts **(5)** until the brake chamber is in full contact with the mounting bracket ***(Figure 6)***. Pre-torque both nuts to 60-75 ft. lbs (80-100 Nm) and then torque to 130-155 ft. lbs (180-210 Nm).

11. Install air lines to the brake chamber (**6 - 7**) ***(Figure (6)***. Be sure to follow the installation instructions from the trailer manufacture.

    Air line connections:
    Emergency brake port **(6)**
    Service brake port **(7)**

10. Spray a soapy water mix on all air line connections and test for air leaks, verify fittings are tight.

IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for any air leaks. If air leaks are detected, repair as required.

CAUTION Failure to eliminate air leaks could compromise brake system performance which, if not avoided may result in component or property damage.

13. After installation, be sure to check the brake system for proper function.

Figure 5

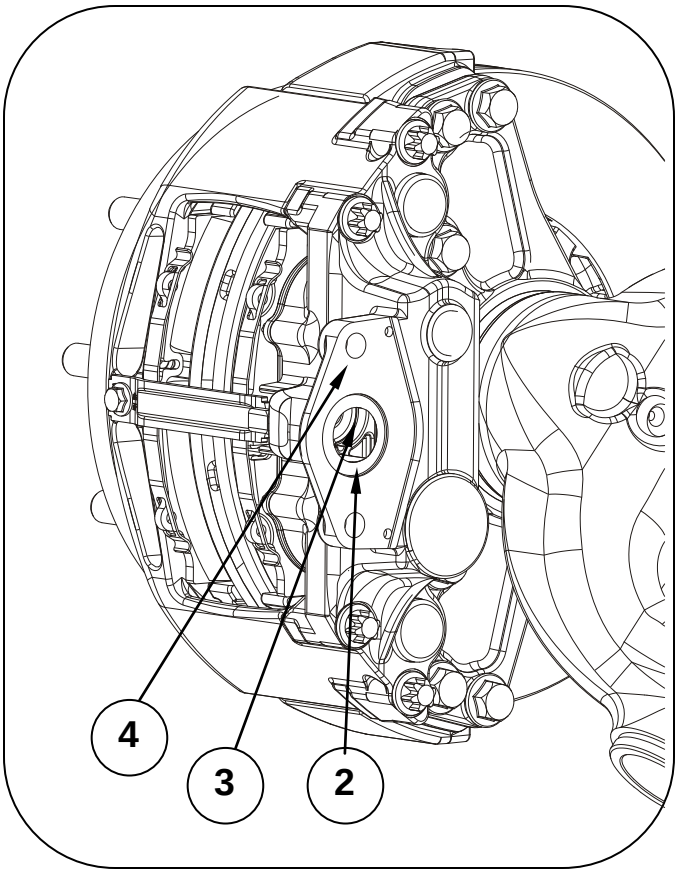
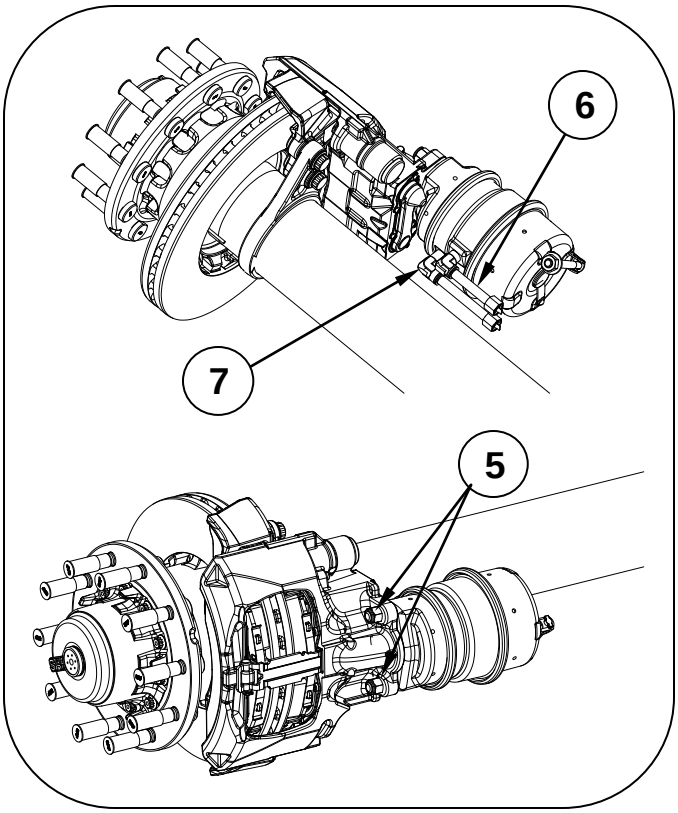


Figure 6



3. Manually Caging Brake Chambers

SAF brake chambers should preferably be caged using compressed air. If no compressed air is available, the parking brake can be caged using the release tool bolt supplied with the brake chamber.

3.A. Caging the Parking Brake using Release Tool Bolt and Compressed Air

1. Remove the dust plug **(8)** from the release bolt access hole in the middle of the brake chamber housing ***(Figure 7)***.
2. Remove the release bolt **(9)**, washer **(10)**, and nut **(11)** from the mounting bracket **(12)** on the back of the brake chamber ***(Figure 7)***.
3. Apply air to the trailer and release the parking brake. Apply and release the brakes three times.
4. Insert the release tool bolt **(9)** through the access hole provided until it engages with the pressure plate inside the brake chamber ***(Figure 8)***.
5. Ensure that the release tool bolt is correctly engaged with the pressure plate by turning the bolt clockwise and pulling the bolt outward at the same time. If the bolt is correctly engaged in the pressure plate it cannot be turned more than 1/4 turn and cannot be pulled out by more than 0.75" (19mm).
6. Install the washer **(10)** and nut **(11)** onto the release bolt and finger tighten ***(Figure 8)***.

IMPORTANT: Do not torque the nut to more than 35 ft. lbs [47 Nm]. Over-tightening the bolt can cause damage to the pressure plate, washer, and brake chamber housing.

⚠WARNING Over-tightening the release bolt could cause the main spring to suddenly release which, if not avoided could result in death or serious injury.

7. The parking brake is now caged and the air pressure can be removed.

Figure 7

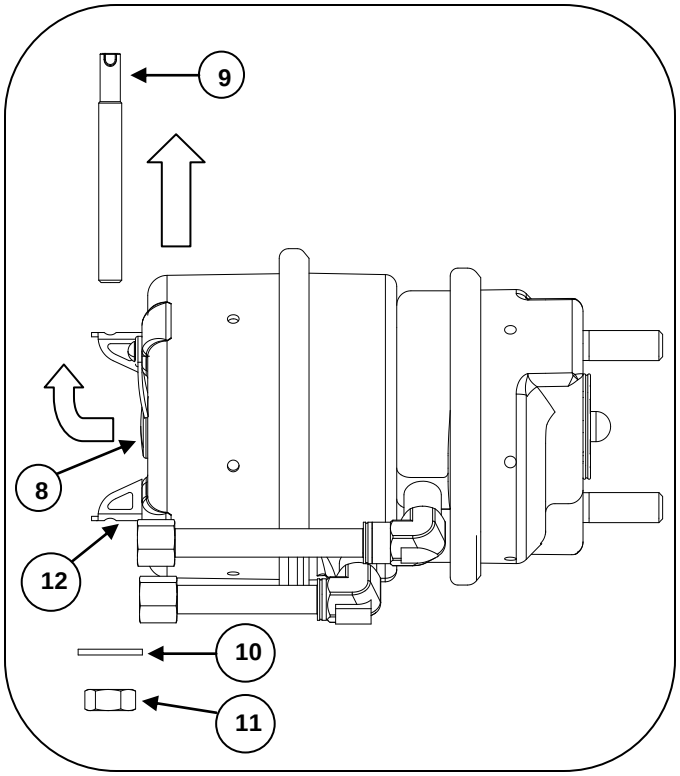
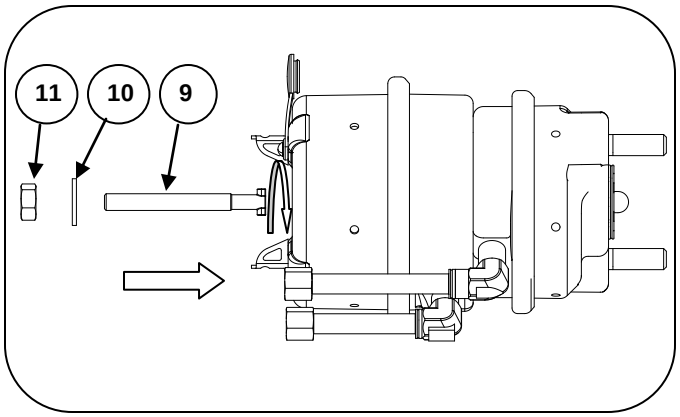


Figure 8



3.B. Caging the Parking Brake using Release Tool Bolt without Compressed Air

This method should only be used if not compressed air is available. The preferred method of caging is by using compressed air. Use this method only if the brake chambers are not pressurized.

1. Remove the dust plug **(8)** from the release bolt access hole in the middle of the brake chamber housing ***(Figure 9)***.
2. Remove the release bolt **(9)**, washer **(10)**, and nut **(11)** from the mounting bracket **(12)** on the back of the brake chamber ***(Figure 9)***.
3. Ensure that the pressure plate is between 2-1/2" - 3" [63-76mm] from the housing.
4. Insert the release tool bolt **(9)** through the access hole provided until it engages with the pressure plate inside the brake chamber ***(Figure 10)***.
5. Ensure that the release tool bolt is correctly engaged with the pressure plate by turning the bolt clockwise and pulling the bolt outward at the same time. If the bolt is correctly engaged in the pressure plate it cannot be turned more than 1/4 turn and cannot be pulled out by more than 0.75" (19mm).
6. Install the washer **(10)** and nut **(11)** onto the release bolt and tighten ***(Figure 10)***. While tighten the nut, the actuating plunger of the brake chamber must be pulled back into the housing. Stop tightening the nut when the plunger can no longer be pulled back into the housing. Do not exceed 35 ft. lbs [47 Nm].

IMPORTANT: Do not torque the nut to more than 35 ft. lbs [47 Nm]. Over-tightening the bolt can cause damage to the pressure plate, washer, and brake chamber housing.

⚠WARNING Over-tightening the release bolt could cause the main spring to suddenly release which, if not avoided could result in death or serious injury.

7. The parking brake is now caged and the air pressure can be removed.

Figure 9

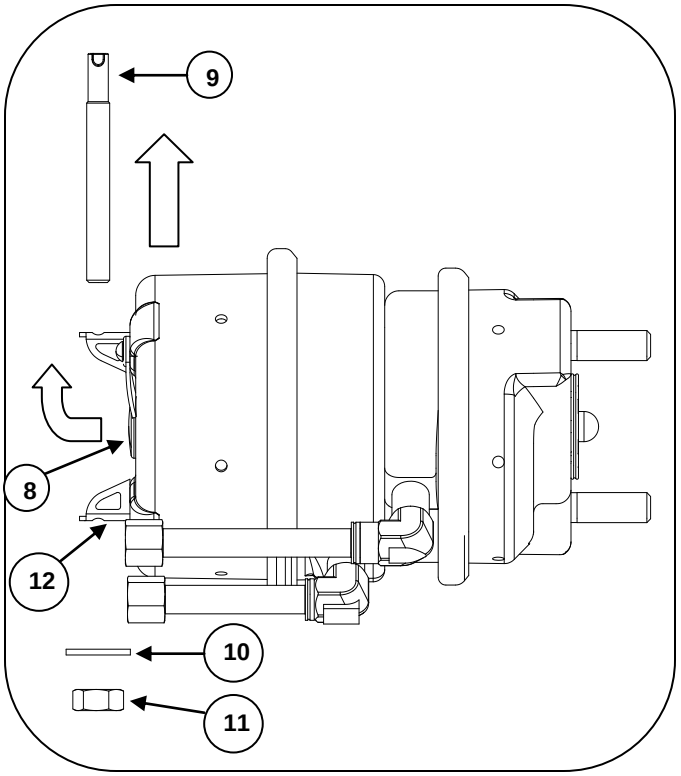
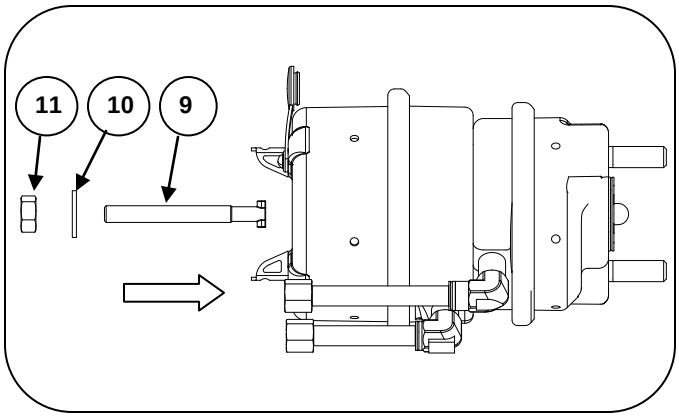


Figure 10



4. Uncaging Brake Chamber

1. Apply air to the trailer and set the parking brake.
2. Remove the nut (**11**) and washer (**10**) from the release bolt (**9**) and remove the release bolt from the brake chamber (***Figure 11***).
3. Insert the release tool bolt, washer, and nut into the mounting bracket on the back of the brake chamber (***Figure 12***). Torque the nut to 60 - 130 in. lbs (7-15 Nm).
4. Reinstall the dust plug (**8**) (***Figure 12***).
5. After uncaging the brake chamber, be sure to check the brake system for proper function.

Figure 11

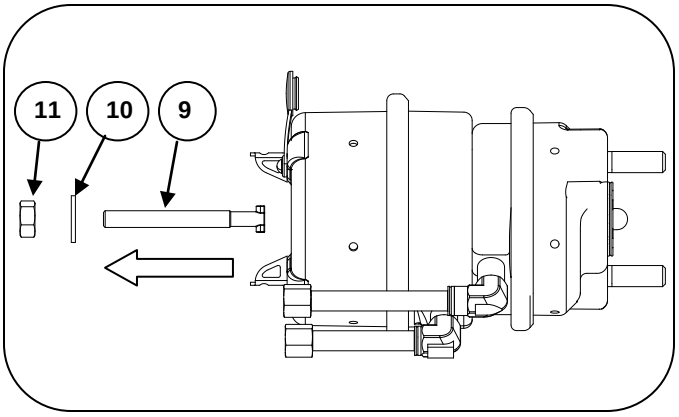
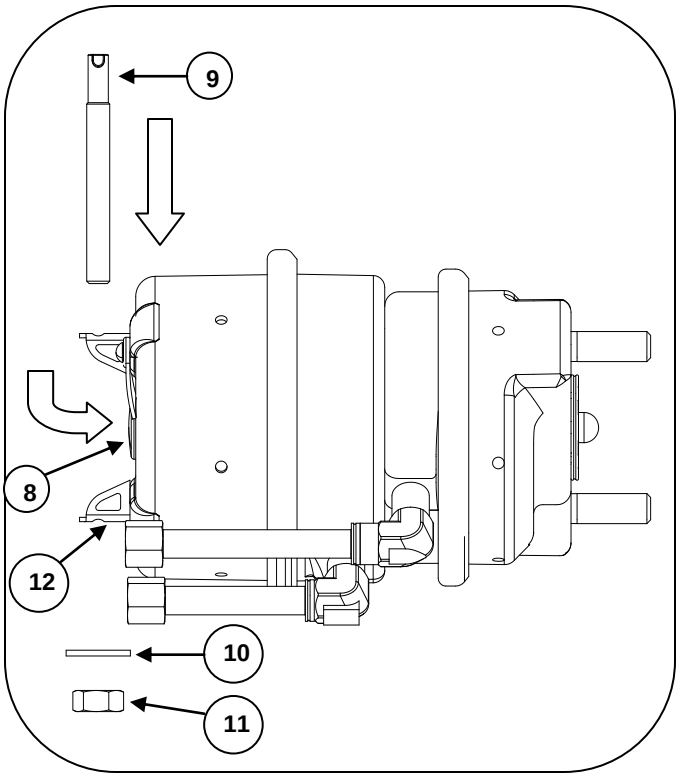


Figure 12



5. Routine Service Procedure

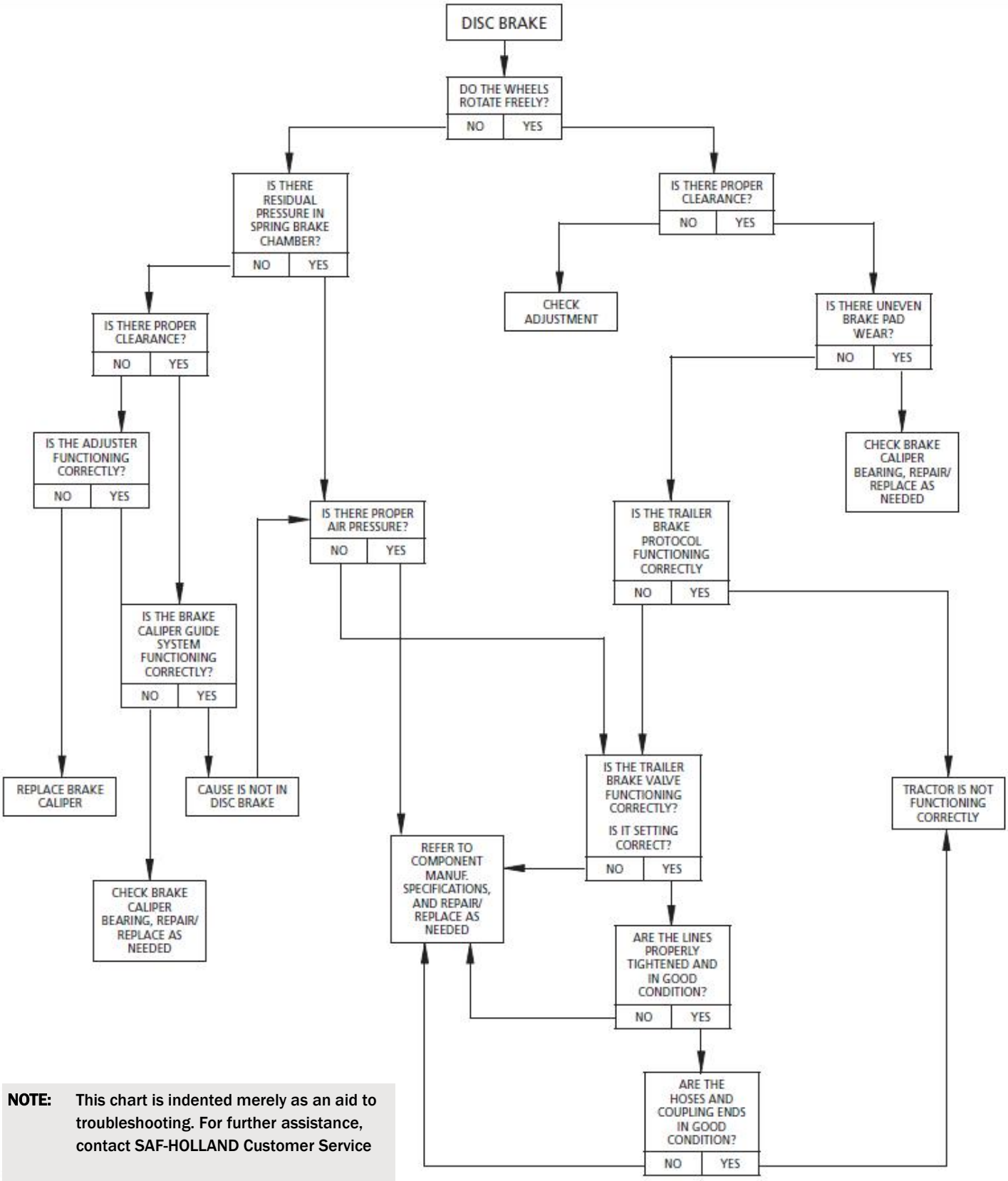
WHICHEVER OCCURS FIRST			PERIODIC CHECKS		
	MILEAGE INTERVALS	After First 3,000 Miles	Every 20,000 Miles	Every 50,000 Miles	Every 100,000 Miles
	TIME INTERVALS	After First Month	Every 3 Months	Every 6 Months	Every 12 Months
VISUAL & SAFETY INSPECTION					
Hub Unit Maintenance Free Check for grease leaks					●
Inspect the brake calliper guide system Check for free movement and sliding action					●
Check rubber dust covers for cracks and damage Check adjuster cap for correct seating					●
Inspect brake pad thickness regularly			●		
Inspect brake rotors for cracks					●
Perform general annual inspection (axle, brakes and suspension components, etc.)					●
Perform general annual safety check		●			●
Perform wheel rock and wheel noise tests					●
MECHANICAL CHECK					
Attention: Torque check wheel nuts after the first 30 miles (50 km) and 100 miles (150 km) (repeat also after every wheel removal).		●			

SPECIAL SERVICE CONDITIONS	
Vehicles with long standing periods	Service at specified time intervals. e.g. Trailer operating in continuous multi-shifts or in off-road construction sites.
Vehicles used under severe duty and extreme conditions	Service at suitably reduced intervals. e.g. Trailer operating in continuous multi-shifts or in off-road construction sites.

Warranty claims will only be accepted as long as the operation and maintenance instructions have been complied with and if SAF-HOLLAND approved spare parts have been fitted.

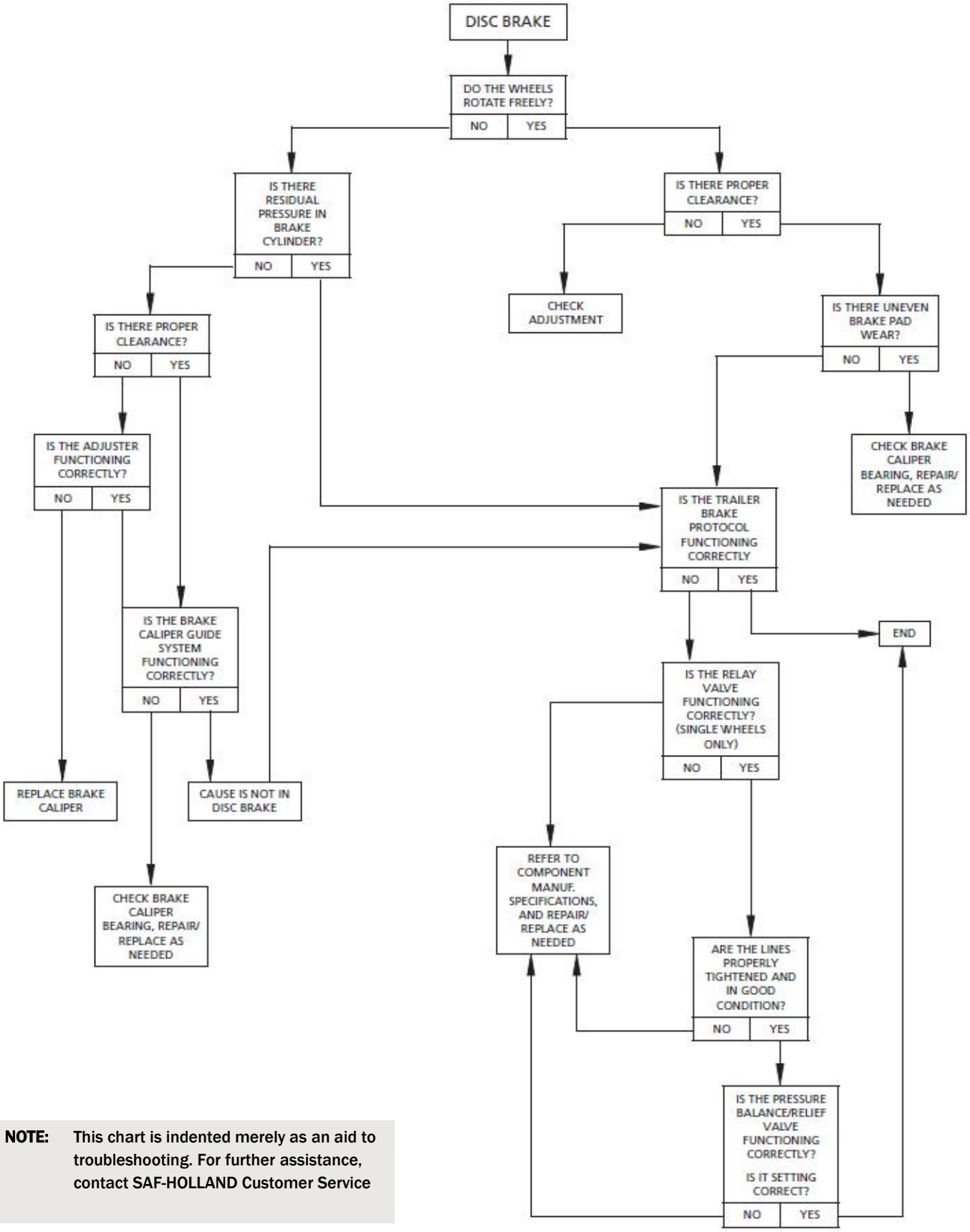
NOTE: If the seal mark on the hub nut is broken before the end of the stated warranty period this will invalidate all warranty coverage unless the repair works have been carried out in an SAF-HOLLAND authorized workshop.

6. Troubleshooting Chart for ALL WHEELS



NOTE: This chart is indented merely as an aid to troubleshooting. For further assistance, contact SAF-HOLLAND Customer Service

6. Troubleshooting Chart for INDIVIDUAL WHEELS



NOTE: This chart is indented merely as an aid to troubleshooting. For further assistance, contact SAF-HOLLAND Customer Service

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-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.

SAF-HOLLAND USA • 888.396.6501 • Fax 800.356.3929
www.safholland.us

SAF-HOLLAND CANADA • 519.537.3494 • Fax 800.565.7753
WESTERN CANADA • 604.574.7491 • Fax 604.574.0244
www.safholland.ca

SAF-HOLLAND MEXICO • 52.1.55.545668641 • Fax 52.55.58162230
www.safholland.com.mx

info@safholland.com

XL-SA10062IM-en-US Rev B 2010-11-18 Amendments and Errors Reserved.

SAF-HOLLAND USA, INC.
1950 Industrial Blvd, Muskegon, MI 49443
www.safholland.com

SAF-HOLLAND
Engineering Your Road to Success

Important Info – January 2019

SAF-HOLLAND Group

SAF® Trailer Suspension Axle Systems Equipped with Disc Brakes

Approved Wheel Part Numbers for use with SAF CBX and ULX Trailer Suspension Axle Systems Equipped with SAF Disc Brakes

Please Note:

When specifying wheels to be used with SAF CBX and ULX trailer suspension axle systems equipped with SAF Disc Brakes, please pay special attention to the approved list of wheel profiles listed on the provided table. Specification or installation of non-approved wheel profiles may lead to wheel and caliper interference.

Important:

- Dual steel wheels are not approved for SAF Disc Brake suspension systems produced prior to June 2012 with Version 1 head units. See XL-SA10071WI-en-US for identification of Version 1 head units.
- 2" offsets are NOT allowed in combination with the C88 bearing package.

Approved Wheel Profile Numbers for use with Knorr SK7 & SAF SBS 2220 K0 Calipers configured with C88 & P89 Bearing Packages

Wheel Manufacturer	Wheel Profile No.	C88	P89	Approved Valve Stem	Wheel Material	Wheel Size	Wheel Offset (+) Outset (-) Inset	Wheel Configuration
Accuride	41644	■	■	TR545D	Aluminum	22.5" x 8.25"	Dual	
	50487	■	■	TR572-E22	Steel			
	50408	■	■					
	28409	■	■	TR573	Steel	24.5" x 8.25"		
	28641	■	■					
	28827	■	■					
	41362	■	■	TR545D	Aluminum			
	50172	■	■	TR543E	Steel	22.5" x 14"	0.00	Wide Base Single
	29627	N/A	■	TR573			+2.00	
	41016	■	■	TR543E	Aluminum		+0.50	
	41140	■	■					
	41660	N/A	■				+2.00	
	42142	N/A	■					
Arconic	88367x	■	■	TR554D	Aluminum	22.5" x 8.25"	Dual	
	88567x	■	■					
	98367x	■	■	TR555D		24.5" x 8.25"		
	82262x	■	■	TR553E		22.5" x 12.25"	+.056	Wide Base Single
	84062x	N/A	■			22.5" x 14"	+2.00	
	84060x	■	■				0.00	
	84060x	N/A	■	TR555E			+1.00	
Maxion	90262	■	■	TR572-E22	Steel	22.5" x 8.25"	Dual	
	90541	■	■					
	90542	■	■	TR573		24.5" x 8.25"		
	90263	■	■					
	90261	■	■					
	10031	■	■	TR575		22.5" x 14"	0.00	Wide Base Single
	10084	N/A	■	TR500			+2.00	
KIC	WH22501	■	■	TR572-E27	Steel	22.5" x 8.25"	Dual	
TCC	2269E	■	■	TR572-F19	Steel	22.5" x 8.25"	Dual	
	2271E	■	■					

Note: For specification of wheels not listed in the table, please contact SAF-HOLLAND trailer suspension application engineering.

SAF-HOLLAND, INC.
1950 Industrial Blvd, Muskegon, MI 49442
www.safholland.com

SAF Holland

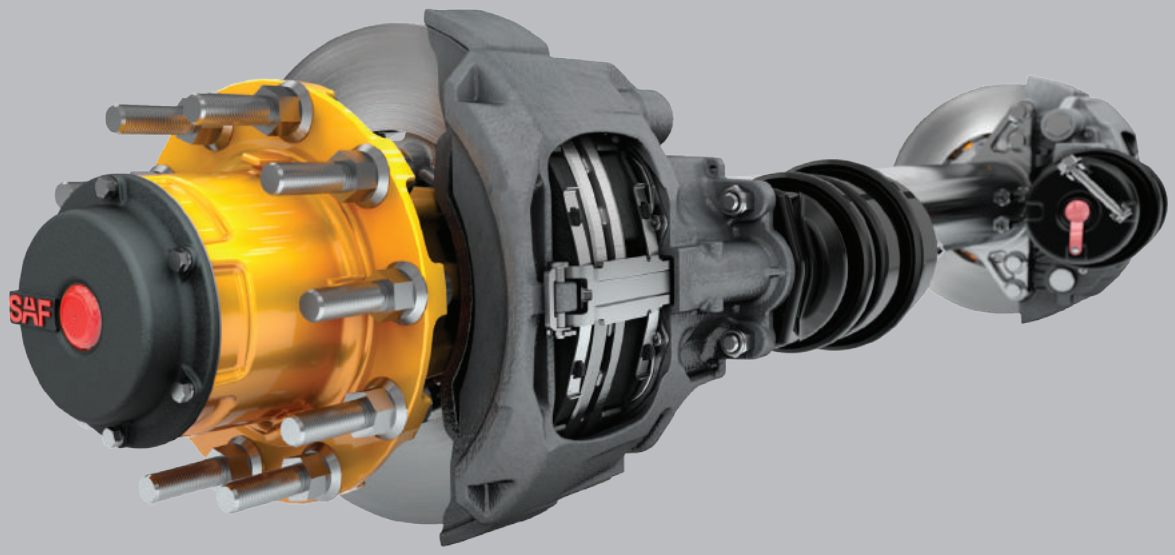
SAF-HOLLAND Group

Service Manual

INTEGRAL® Disc Brake Axles

P89 Parallel Spindle with Precision Bearings

P89 PLUS™



XL-SA20024UM-en-US Rev G

SAF Holland Group

Introduction

This manual provides the necessary information for the maintenance, inspection and safe operation of the SAF® P89 Plus Disc Brake system. Refer to XL-SA20018UM-en-US for P89 Disc Brake System.

For axle end/brake replacement components contact SAF-HOLLAND® Customer Service at 888-396-6501.

Read this manual before using or servicing this product and keep it in a safe location for future reference. Updates to this manual, which are published as necessary, are available on the internet at www.safholland.us.

Use only SAF-HOLLAND Original Parts to service your SAF-HOLLAND INTEGRAL Disc Brake axle. A list of technical support locations that supply SAF-HOLLAND Original Parts and an Aftermarket Parts Catalog are available on the internet at 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 written warranty is included with the product or available on the internet at www.safholland.us.

Notes, Cautions, and Warnings

Before starting any work on the unit, read and understand all the safety procedures presented in this manual. This manual contains the terms "NOTE", "IMPORTANT", "CAUTION", and "WARNING" followed by important product information. These terms are defined 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.

1. General Safety Instructions

General and Servicing Safety Instructions

- Read and observe all Warning and Caution hazard alert messages. The alerts provide information that can help prevent serious personal injury, damage to components, or both.

⚠WARNING Failure to follow the instructions and safety precautions in this manual could result in improper servicing or operation leading to component failure which, if not avoided, could result in death or serious injury.

- All maintenance should be performed by a properly trained technician using proper/special tools, and safe procedures.

NOTE: In the United States, workshop safety requirements are defined by federal and/or state Occupational Safety and Health Act (OSHA). 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.

- Properly support and secure the vehicle from unexpected movement when servicing the unit.

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

- 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.
- Service both roadside and curbside of an axle. Worn parts should be replaced in sets. Key components on each axle's braking system, such as friction material and rotors will normally wear over time.

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

⚠WARNING Failure to follow manufacturer's instructions regarding spring pressure or air pressure control could allow uncontrolled release of energy which, if not avoided, could result in death or serious injury.

- The wheel contact surfaces between the wheel and hub MUST NOT receive additional paint.

IMPORTANT: The wheel 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 wheel/hub separations which, if not avoided, could result in death or serious injury.

- Only the wheel and tire sizes approved by the trailer builder can be used.

Operational and Road Safety Instructions

- Before operating vehicle, ensure that the maximum permissible axle load is not exceeded and that the load is distributed equally and uniformly.
- Make sure that the brakes are not overheated from 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.

- The parking brake MUST NOT be immediately applied when the brakes are overheated. Refer to the rotor wear inspection information in Section 6.3.

CAUTION If the parking brake is immediately applied to the brakes when overheated, the brake discs could be damaged by different stress fields during cooling.

- Observe the operating recommendation of the trailer manufacturer for off-road operation of the installed axles.

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

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

- SAF® axles require routine service, inspection and maintenance in order to maintain optimum performance, and operational safety as well as an opportunity to recognize natural wear and defects before they become serious. Refer to the Routine Service Schedule in Section 13.

⚠WARNING Failure to inspect and maintain the SAF-HOLLAND INTEGRAL disc brake axle as outlined in Section 13 can result in brake or wheel bearing failure which, if not avoided, could result in death or serious injury.

IMPORTANT: Use only SAF-HOLLAND Original Parts to service the SAF-HOLLAND INTEGRAL disc brake axle.

⚠WARNING Failure to maintain the SAF-HOLLAND INTEGRAL disc brake with SAF-HOLLAND Original Parts can result in brake or wheel bearing failure which, if not avoided, could result in death or serious injury.

2. General Service/Maintenance

1. Conduct regular visual checks of the brakes, tires and all chassis components. Refer to Section 13 for more information:
   a. Inspect for secure mounting, wear, leaks, corrosion and damage.
   b. Check for loose, broken or cracked air hoses, air system leaks, and damaged components.
   c. Check that brake hoses and cables are properly secured.
   d. For proper brake pad wear, check that there is enough clearance to allow the caliper full movement during normal operation.
2. Check the brake pads at regular service intervals to ensure that the brake pad hold down springs are in the correct position, and that brake pads are NOT worn beyond the minimum wear limits described in this manual.
3. When replacing brake pads, inspect the rotors for signs of wear, cracks, grooves, scoring or hot spots.
4. Visually check the brake caliper at regular service intervals as defined by the brake caliper manufacturer's basic inspection program. Refer to Section 6.1 of this manual for further information.
5. Check the spring brake chambers to make sure the parking springs are NOT caged in the released position. Be sure the dust plugs are properly installed.
6. Make sure that the vent holes in the air brake chamber are NOT covered with snow, ice, mud, etc.
7. Inspect the wheel bearing unit for grease leaks at every brake pad change.
8. Visually check the brake assembly (e.g. pads, rotor, etc.) for oil or grease contamination.
9. Check that all dust caps and boots are present and in good condition.
10. Regularly conduct general safety checks in accordance with any applicable laws.
11. After every wheel change, the wheel nuts MUST be re-tightened to the specified torque level after the initial 100 miles of operation, and then at every regular service interval.

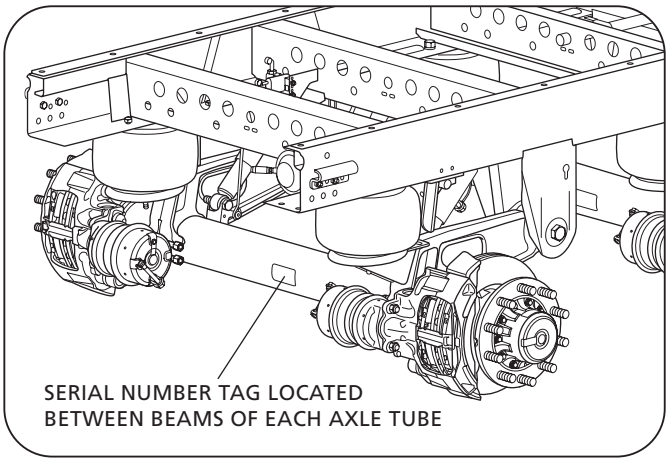
CAUTION Failure to re-tighten wheel nuts at specified intervals could result in component failure which, if not avoided, could result in damage to property.

Use only SAF-HOLLAND Original Parts to service your SAF-HOLLAND INTEGRAL Disc Brake Axle.

3. Model Identification

The disc brake axle serial tag is located near the center of the axle tube ***(Figure 1).***

Figure 1



4. Identification Tag

The sample tag shown will help you interpret the information on the SAF-HOLLAND Inc. serial number tag. The model number, axle body part number and serial number are listed on the tag ***(Figure 2).***

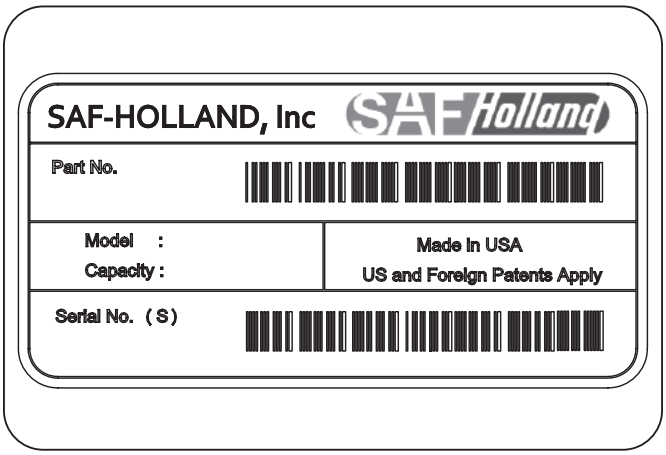
Record your tag numbers below for future quick reference.

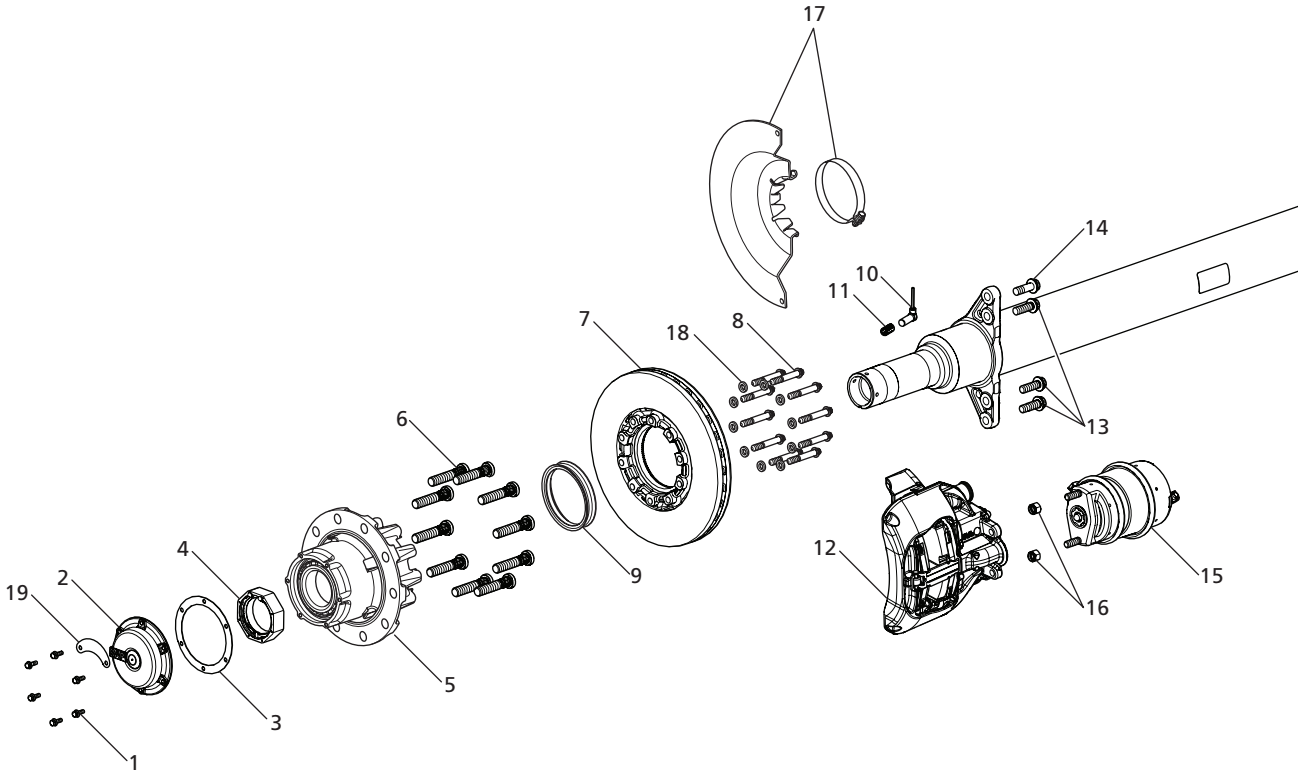
Axle Body Part Number: _____

Model Number: _____

Serial Number: _____

Figure 2





ITEM	DESCRIPTION	QTY. / AXLE
1	Bolt, Hub Cap	12
2	Hub Cap	2
3	Gasket, Hub Cap	2
4	Nut, One Piece Axle	2
5	Hub with Bearings	2
6	Wheel Studs	20
7	Rotor with ABS Tone Ring	2
8	Rotor Attachment Bolts	20
9	Seal, Hub	2
10	ABS Sensor (WABCO)	2

ITEM	DESCRIPTION	QTY. / AXLE
11	Clamping Bush	2
12	Brake Caliper Left-Hand Brake Caliper Right-Hand	1
13	M18 x 1.5" Bolt, Standard	6
14	M18 x 1.5" Bolt, Shoulder	2
15	Brake Chamber	2
16	Brake Chamber nut	4
17	Dust Shield with Clamp (optional)	2
18	Washers	20
19	P89 Identification Tag	1

5. Caliper Identification and Inspection

SAF P89 axles are equipped with one of three disc brake calipers, SAF-HOLLAND SBS 2220 K0 Calipers, Knorr-Bremse® SK7 calipers, or SAF-HOLLAND SBS 2220 H20 calipers.

5.1 SAF-HOLLAND SBS 2220 K0 Caliper

The SAF-HOLLAND SBS 2220 K0 has a smooth forward face of the caliper and SAF logo on the rear side ***(Figure 3)***.

The inner and outer brake pads for the SBS 2220 K0 are different in shape. The inner brake pad has two "circle X's" on the back side, while the outer brake pad has a relatively smooth back. There is also a notch on the pads to keep them from being installed in the wrong position ***(Figure 4)***.

For instructions on SBS 2220 KO brake caliper inspection and repair, refer to XL-AS20032RM-en-US which can be found at www.safholland.com.

5.2 Knorr-Bremse SK7 Caliper

The Knorr-Bremse SK7 Caliper has a large indentation on the forward face and no SAF logo on the rear of the caliper ***(Figure 5)***.

The brake pads in the SK7 caliper are the same for the inner and outer side of the caliper. The back of the brake pad has the Knorr-Bremse logo and six (6) slots on the back of the brake pad ***(Figure 6)***.

For instructions on SK7 brake caliper inspection and repair, refer to Knorr-Bremse Pneumatic Disc Brake SN6-SN7-SK7 Service Manual Y006471 which can be found at www.knorr-bremsecvs.com/en/.

Figure 3

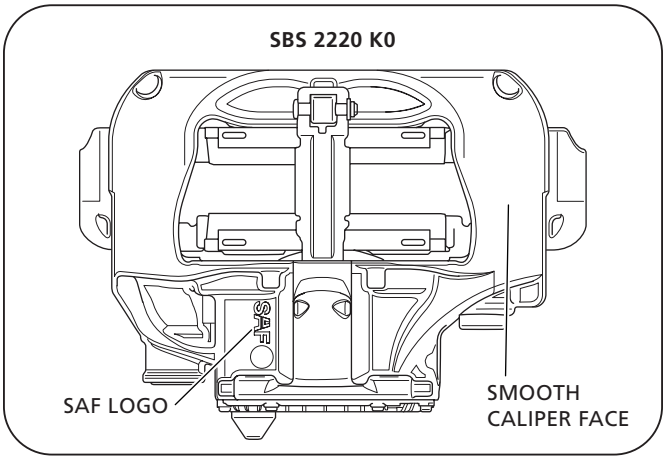


Figure 4

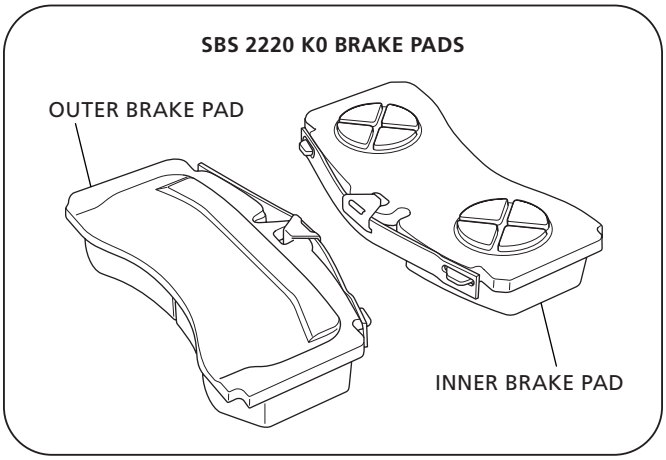


Figure 5

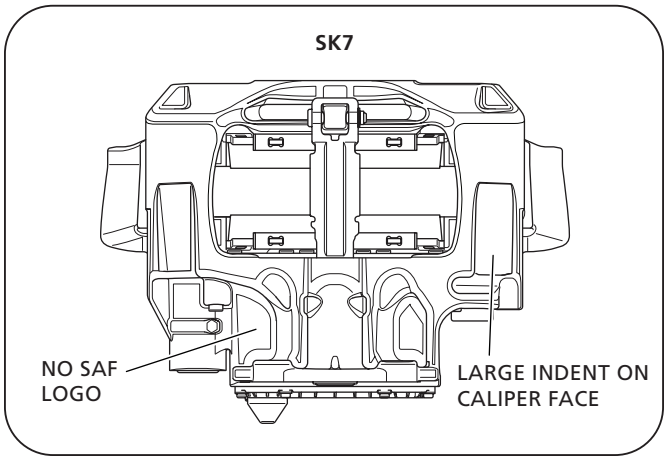
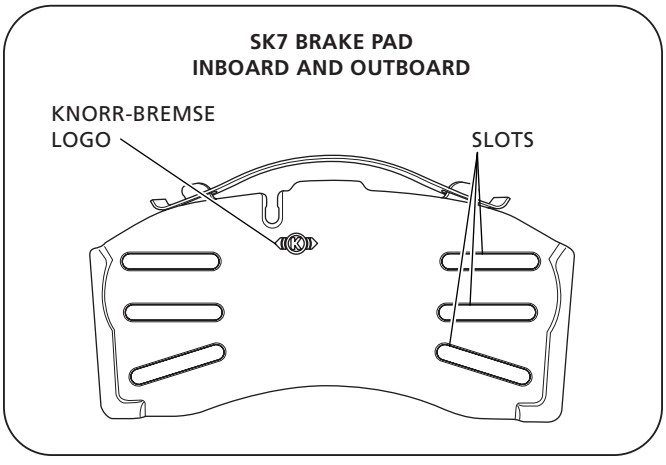


Figure 6



5.3 SAF-HOLLAND SBS 2220 H20 Caliper

The SAF-HOLLAND SBS 2220 H20 caliper has an SAF logo on the rear side ***(Figure 7)***. The calipers brake pad retainer bar is held in place by a spring clip similar to the brake pads (it has no pins or bolts).

The brake pads in the SBS 2220 H20 caliper are the same for the inner and outer side of the caliper. The back of the brake pad has the SAF logo and two (2) indentations on the back of the pad that align with the caliper piston locators ***(Figure 8)***.

For instructions on SBS 2220 H20 brake caliper inspection and repair, refer to XL-SA20057RM-en-US which can be found at www.safholland.com.

Figure 7

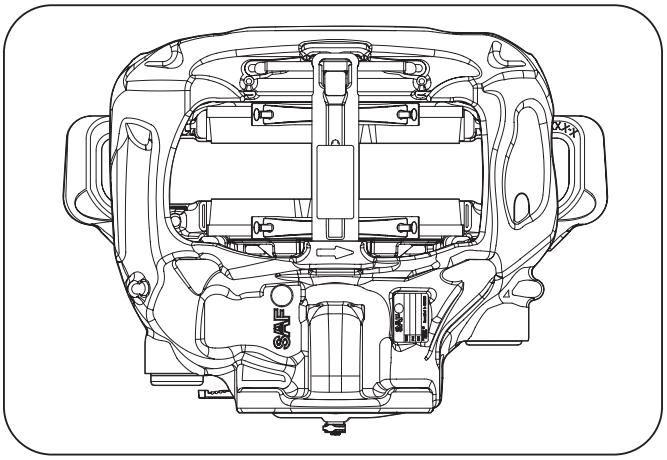


Figure 8

6. Disc Brake Inspection

IMPORTANT: During removal inspect components for wear and replace worn components.

⚠WARNING Failure to properly support axle during maintenance could allow axle to fall which, if not avoided, could result in death or serious injury.

NOTE: For further disc brake inspection information, refer to the latest version of the TMC recommended practice RP 652–Service and Inspection of Air Disc Brakes.

6.1 Brake Caliper Inspection

The SAF-HOLLAND P89 Plus disc brake is equipped with an SAF-HOLLAND SBS 2220 KO caliper. For instructions on SBS 2220 KO caliper inspection and repair, refer to XL-AS20032RM-en-US which can be found at www.safholland.com.

The inner and outer brake pads for the SBS 2220 KO are different in shape. The inner brake pad has two "circle X's" on the back side, while the outer brake pad has a relatively smooth back. There is also a notch on the pads to keep them from being installed in the wrong position ***(Figure 9)***.

6.2 Pad Wear Inspection

Check the brake pads for proper thickness at regular service intervals based on vehicle usage. Brake pad inspections should be carried out at least every three (3) months and in accordance with any legal requirements. Refer to "Routine Service Schedule" in Section 13.

NOTE: Regular service intervals could be required more frequently for severe duty applications. Refer to Section 13.

A quick visual inspection of the condition of the brake pads can be performed without removing the wheel:

1. Compare the position of the caliper marking to the carrier marking located on the underside of the caliper unit ***(Figure 10)***.
   a. ***Figure 10*** - "View A" shows the positions of the two (2) markings when the brake pads are in good condition.
   b. ***Figure 10*** - "View B" shows the positions of the two (2) markings when the wheel MUST be removed for further inspection of wear to the brake pads and brake rotor.

Figure 9

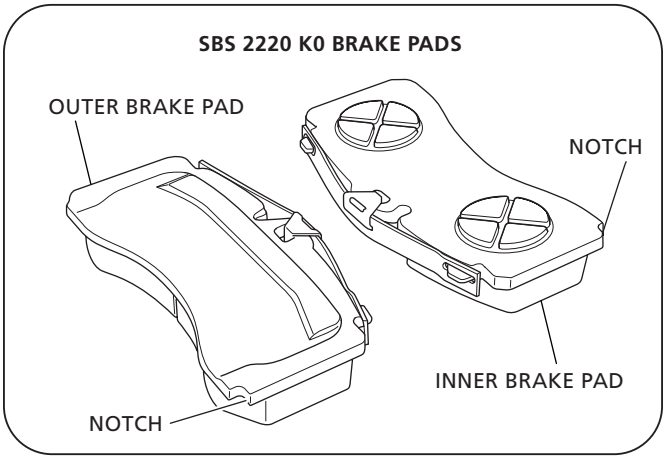
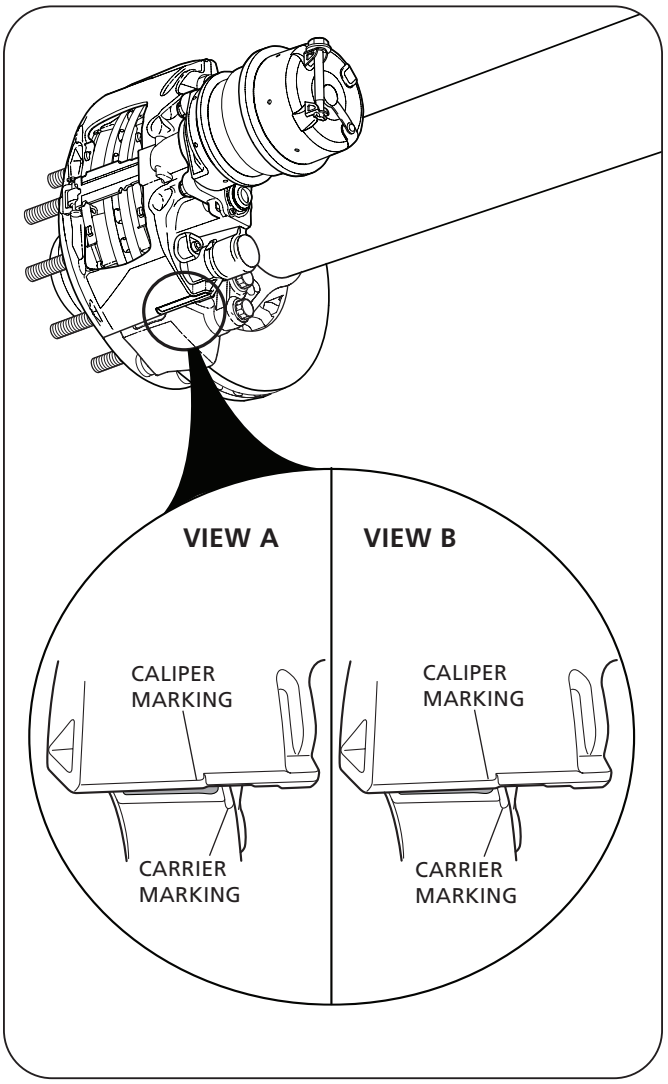


Figure 10



For further inspection of the brake pads, the wheel and brake pads MUST be removed. Refer to XL-AS20032RM-en-US, which can be found at www.safholland.com.

IMPORTANT: After inspecting the brake pads, check that the brake system is functioning properly.

IMPORTANT: When replacing worn brake pads, ALL pads on the axle MUST be replaced.

If the friction material of the brake pad is less than 0.080" (2 mm) at its thinnest area, the brake pad MUST be replaced ***(Figure 11)***.

NOTE: Minor breakouts at the edges are permitted; major breakouts on the surface of the brake pad are NOT permitted ***(Figure 12)***.

6.3 Rotor Wear Inspection

1. Carefully inspect both sides of the brake rotor friction surface ***(Figure 13).***
   a. Spider web cracking is acceptable ***(Area A)***.
   b. Radial cracks less than 0.06" (1.5 mm) deep or wide and their length is less than 75% of the width of the rotor friction surface are acceptable***(Area B)***.
   c. Grooves in the rotor surface are acceptable only if they are less than 0.06" (1.5 mm) deep ***(Area C)***.
   d. Cracks that run completely to either edge of the hub are NOT acceptable, regardless of depth ***(Area D)***.
2. Measure the brake rotor thickness and re-surface, if necessary. For proper brake function, the minimum thickness for re-surfacing the brake rotor is defined as 1.54-1.57" (39-40 mm).

⚠WARNING Re-surfacing the brake rotor beyond the minimum thickness could cause component failure which, if not avoided, could result in death or serious injury.

IMPORTANT: DO NOT use high-pressure cleaners or liquid cleaners on the brake rotor.

If the overall wear limits for the brake rotor and brake pads are exceeded ***(Figure 11)***, the rotor and pads MUST be replaced. Refer to brake pad and rotor replacement instructions as detailed in Sections 8.1 and 8.4 respectively.

For both the inner and outer pads, the maximum brake pad wear difference is 0.2" (5.0 mm).

⚠WARNING Failure to replace brake rotor and pads when minimum wear limits are reached could cause component failure which, if not avoided, could result in death or serious injury.

Figure 11

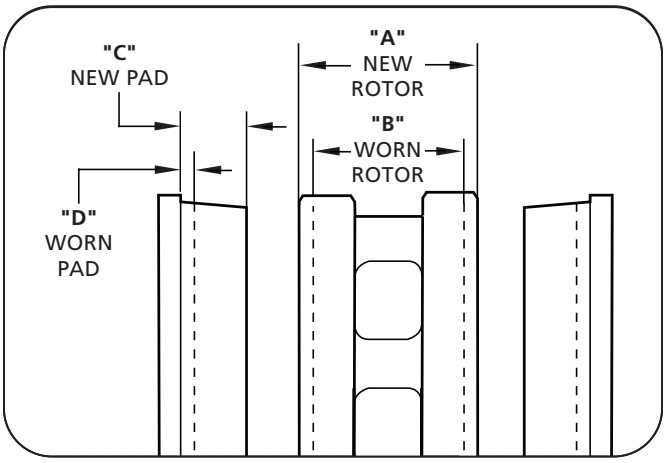
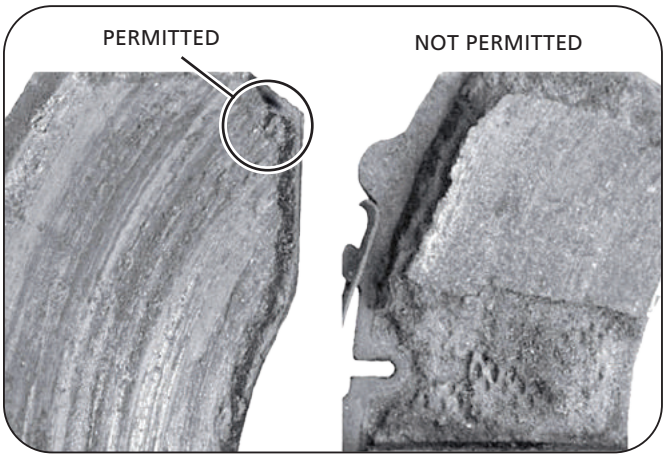


Figure 12



BRAKE ROTOR			BRAKE PAD	
DIAMETER	"A" NEW	"B" WEAR LIMIT	"C" NEW	"D" WEAR LIMIT
430 mm	45 mm	37 mm	23 mm	2 mm
16.93"	1.77"	1.46"	0.9"	0.080"

NOTE: When replacing the brake pads or brake rotor, use only Original SAF-HOLLAND rotors and approved brake pads.

IMPORTANT: When replacing worn brake pads, all pads on the axle MUST be replaced.

7 Hub Unit Inspection

The SAF-HOLLAND P89 Plus disc brake hub unit with a precision bearing system is designed to be maintenance-free. If there is a malfunction with the hub unit, the hub unit including a precision bearing system MUST be replaced. The precision bearing system is sealed and requires no additional grease or oil application to the bearing.

IMPORTANT: DO NOT remove the precision bearing system. If there is a malfunction, the bearing system and hub unit MUST be replaced.

1. When changing brake pads and rotors or in the event of damage (e.g. brake overheating), inspect the bearing for signs of wear and grease leakage. Perform the wheel end play and wheel bearing noise test as described in Sections 7.1 and 7.2.

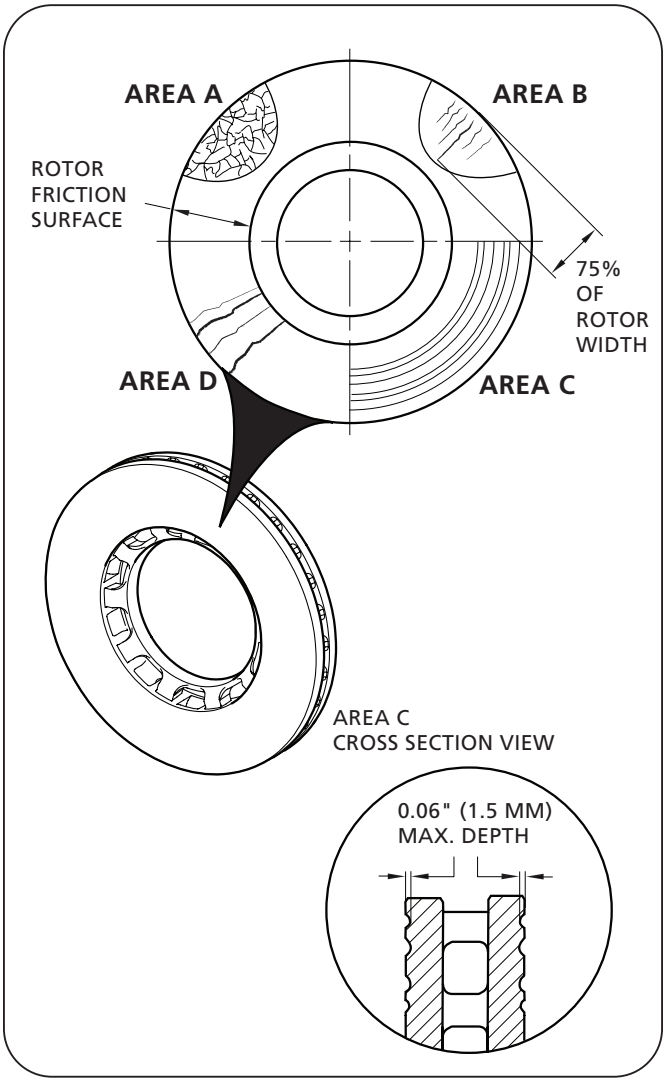
⚠WARNING Failure to replace bearing system and hub unit when required could cause component failure which, if not avoided, could result in death or serious injury.

2. Visually check the seal system to ensure that it is functioning properly and that there is minimal grease leakage.

NOTE: Adjustment of the precision bearing system is NOT necessary.

IMPORTANT: DO NOT use high-pressure cleaners or liquid cleaners on the hub unit.

Figure 13



7.1 Wheel End Play Check

1. For sufficient clearance to perform the test, raise the wheel off the ground. DO NOT remove the wheel.
2. With a 1/2" socket, remove the six (6) hub cap bolts and the hub cap ***(Figure 14)***.
3. Utilizing a screwdriver, carefully pry the orange keeper arm from the undercut groove on each side of the one piece axle nut until the keeper is released from it ***(Figure 15)***.
4. Using a standard 4-13/16" P-Spindle wheel nut socket, check the torque of the axle nut to ensure that it is torqued to 500 ft-lbs (680 N•m) by rotating the nut in a clockwise direction ***(Figure 15)***.
5. Re-install the orange keeper arm.

NOTE: All axle nuts on SAF-HOLLAND INTEGRAL P89 Disc Brake Axles are right-hand threaded.

6. Clean the face of the spindle. Attach the magnetic foot of the dial gauge to the surface of the nut and spindle. Place the pointer on the rim surface as illustrated ***(Figure 16)***.
7. Grasp the wheel assembly at the three o'clock and nine o'clock positions. Oscillate the hub a maximum of five degrees several times while pushing inward on the hub. Zero the dial indicator. Oscillate the hub a maximum of five degrees several times while pulling outward on the hub, record the end play shown on the dial gauge ***(Figure 16)***.

NOTE: Rotate the wheel several times before each measurement.

NOTE: If a recorded wheel end play of more than .005" (0.127 mm) while alternating ± 50 lbs (220 N) forces is measured, the hub unit MUST be replaced.

Figure 14

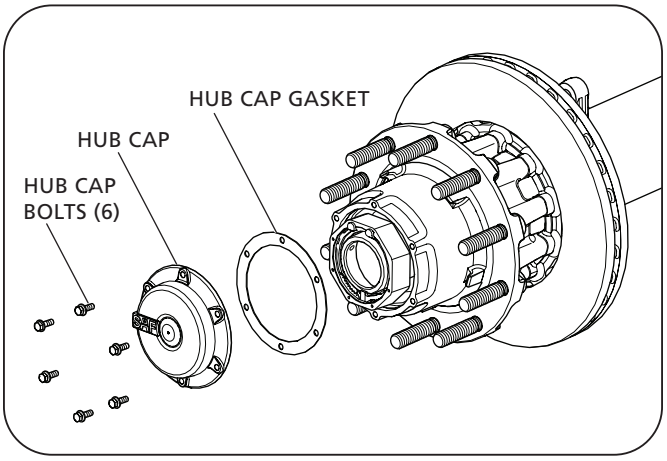


Figure 15

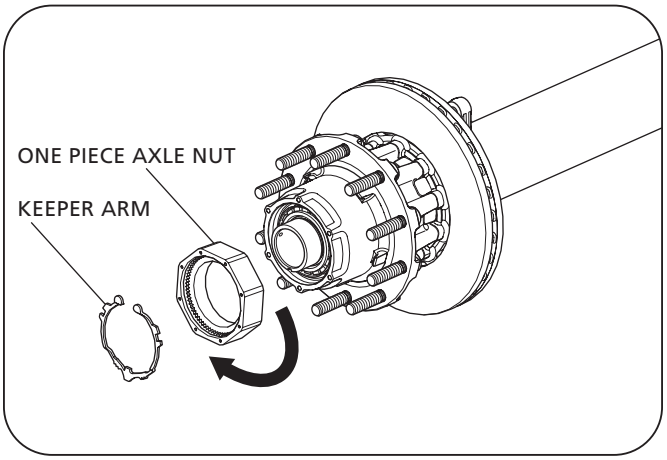
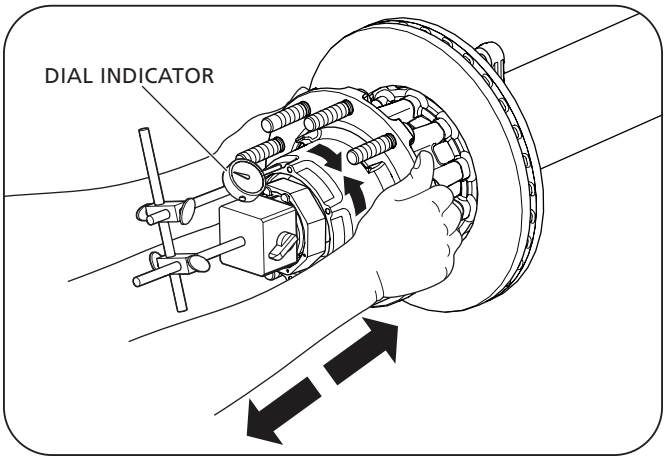


Figure 16



7.2 Wheel Bearing Noise Test

1. For sufficient clearance to perform the test, raise the wheel off the ground. DO NOT remove the wheel.
2. With a 1/2" socket, remove the six (6) hub cap bolts and the hub cap ***(Figure 17)***.
3. Utilizing a screwdriver, carefully pry the orange keeper arm from the undercut groove on each side of the one piece axle nut until the keeper is released from it ***(Figure 18)***.
4. Using a standard 4-13/16" P-Spindle wheel nut socket, check the torque of the axle nut to ensure that it is torqued to 500 ft-lbs (680 N•m) by rotating the nut in a clockwise direction. Re-install the orange keeper arm ***(Figure 18)***.

NOTE: All axle nuts on SAF-HOLLAND INTEGRAL P89 Disc Brake Axles are right-hand threaded.

5. Rotate the wheel in both forward and rearward directions, using varying speeds ***(Figure 19)***.
6. If the bearing feels rough and/or a "grinding" noise is heard, the hub MUST be replaced.

NOTE: Noises can also be caused by the brakes. Before removing the hub unit, remove the brake pads and repeat the bearing noise test.

Figure 17

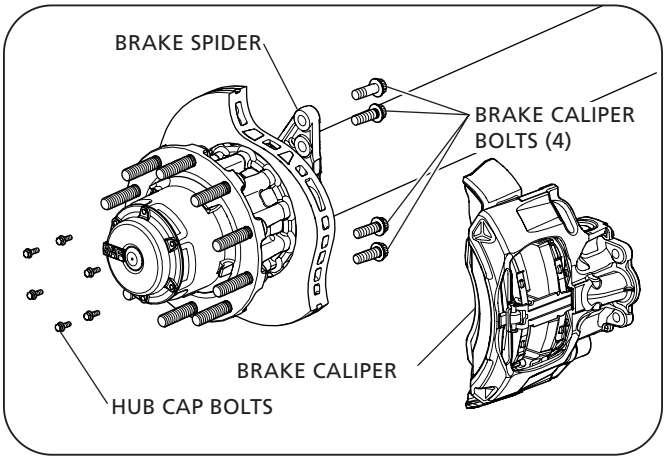


Figure 18

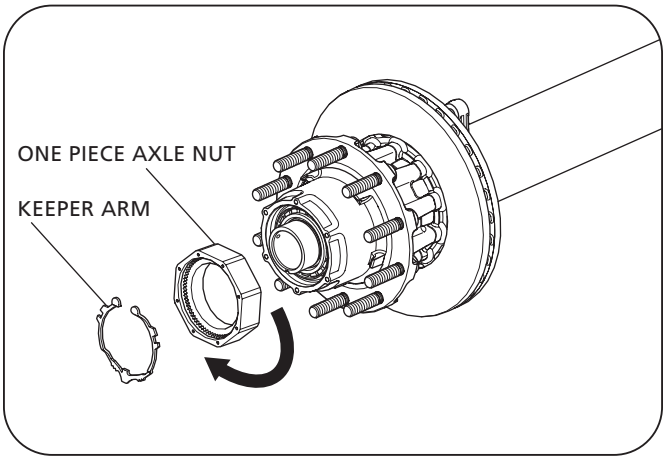
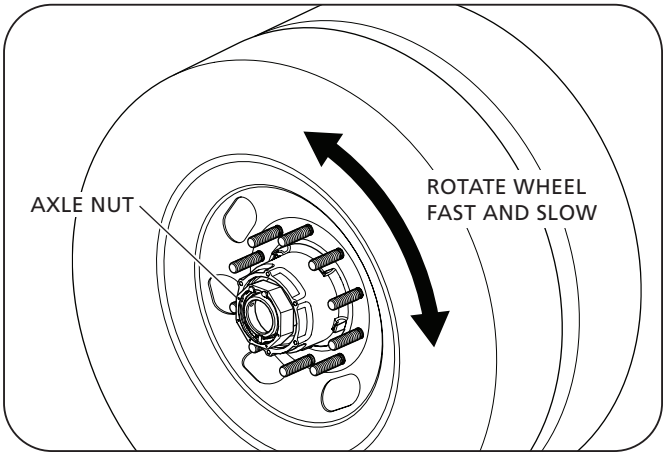


Figure 19



7.3 Hub Unit Grease Seepage

1. The P89 Plus bearing package is designed to allow for some seepage/leakage of grease from the sealed cartridge bearing. This is a result of the hydraulic action of the bearing working the grease. The following figures ***(Figures 20 through 25)*** will describe typical seepage you may see.
2. The grease on the face of the bearing will appear black in color. This is normal and a result of the grease getting properly worked in the bearing.
3. During the initial break in period a small amount of clear/opaque grease may be visible. This is normal and does not indicate a leak.
4. If you have questions about this criteria you may contact your local Field Service Rep or SAF-HOLLAND Warranty at 800-396-6501.

Examples of Bearing Seepage

Figure 20

Figure 21

Figure 22

Figure 23

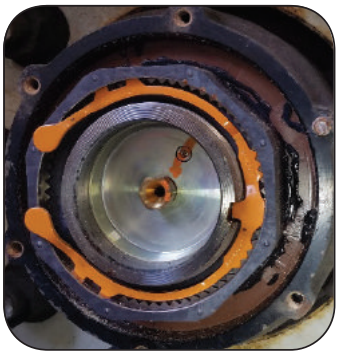
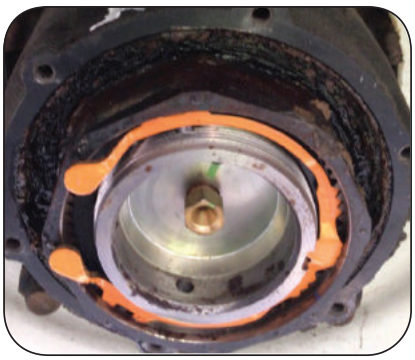


Figure 24

Figure 25



8. Disc Brake/Hub Unit Service

Contact SAF-HOLLAND Customer Service at 888-396-6501 before performing any work on the SAF-HOLLAND INTEGRAL disc brake hub unit.

IMPORTANT: Only qualified mechanics should perform the procedures detailed in this manual.

IMPORTANT: During removal inspect components for wear and replace worn components.

⚠WARNING Failure to properly support axle during maintenance could allow axle to fall which, if not avoided, could result in death or serious injury.

⚠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.

NOTE: For certain service and repair work, some bolts MUST be replaced. DO NOT oil or grease bolts for installation. Tighten bolts with a torque wrench following the specified procedure and torque value. Refer to Torque Chart in Section 12.

8.1 Brake Pad Replacement

For instructions on brake replacement, refer to SAF-HOLLAND manual XL-AS20032RM-en-US, which can be found at www.safholland.com.

IMPORTANT: After inspecting the brake pads, check that the brake system is functioning properly.

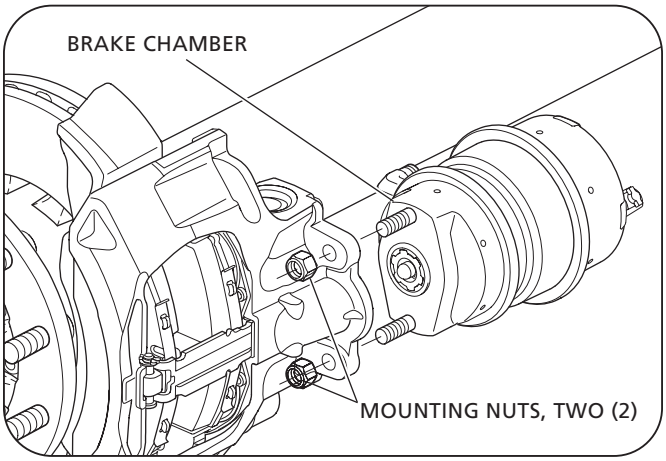
IMPORTANT: When replacing worn brake pads, all pads on the axle MUST be replaced.

8.2 Head Unit Removal

⚠WARNING Failure to observe these instructions could cause component failure which, if not avoided, could result in death or serious injury.

1. Cage the spring brake.
2. Remove the ABS sensor by following the instructions detailed in Section 11.1.
3. Remove the brake chamber from the brake caliper by loosening and removing the two (2) mounting nuts ***(Figure 26)***.

Figure 26



4. Remove the brake caliper from the brake spider by using a size 24 mm socket to loosen and discard all four (4) brake caliper bolts ***(Figure 27)***.
5. With a 1/2" socket, remove the six (6) hub cap bolts and the hub cap ***(Figure 27)***.
6. Utilizing a screwdriver, carefully pry the orange keeper arm from the undercut groove on each side of the one piece axle nut until the keeper is released from it ***(Figure 28)***.
7. Using a standard 4-13/16" P-Spindle wheel nut socket, remove the spindle nut by rotating it in a counter-clockwise direction ***(Figure 28)***.
8. Remove the head unit by gently sliding it off the spindle. ***(Figure 29).***
9. Remove the bearing spindle seal from the spindle and discard ***(Figure 30).***

NOTE: The spindle seal may be stuck to the bearing system or on the axle spindle.

8.3 Wheel Bolt Replacement

The SAF-HOLLAND disc brake hub unit with precision bearing system is designed to be maintenance-free. If there is a malfunction with the hub unit, the hub unit including the precision bearing system MUST be replaced. The integrated precision bearing system is lifetime sealed and requires no grease or oil application to the bearing.

IMPORTANT: DO NOT remove the integrated precision bearing system. If there is a malfunction, the bearing system and hub unit MUST be replaced.

When replacing the wheel bolts, refer to the head unit removal instructions described in Section 8.2

NOTE: Not all bolts may need to be replaced. Only replace bolts that are damaged or in need of replacement.

Figure 27

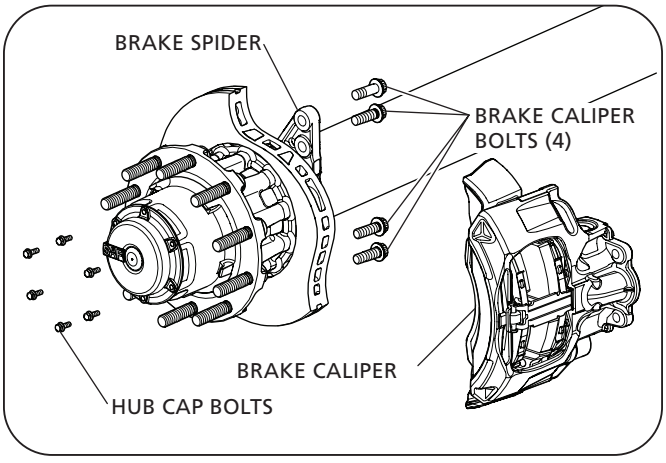


Figure 28

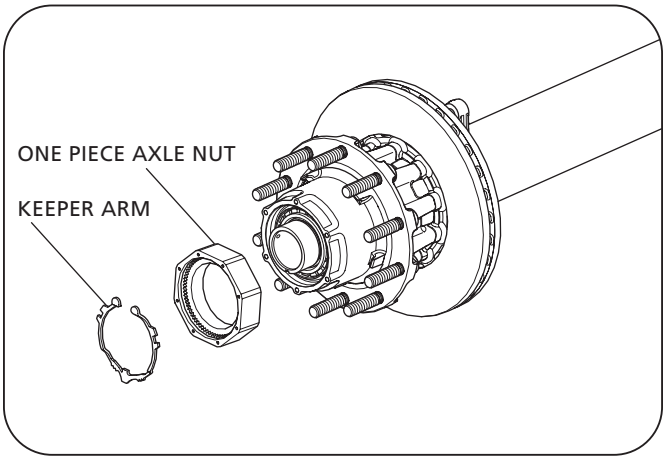


Figure 29

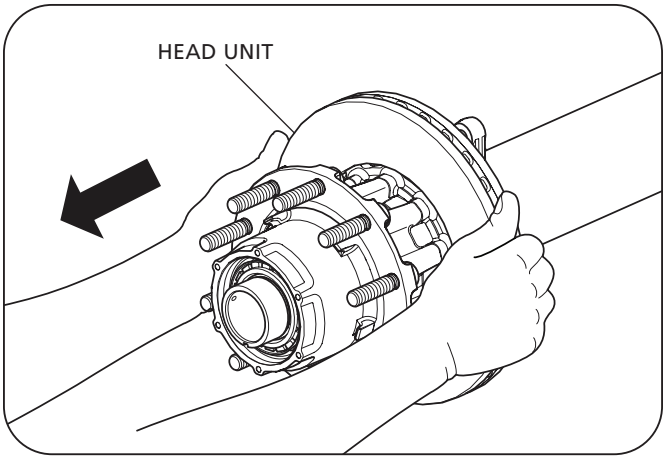
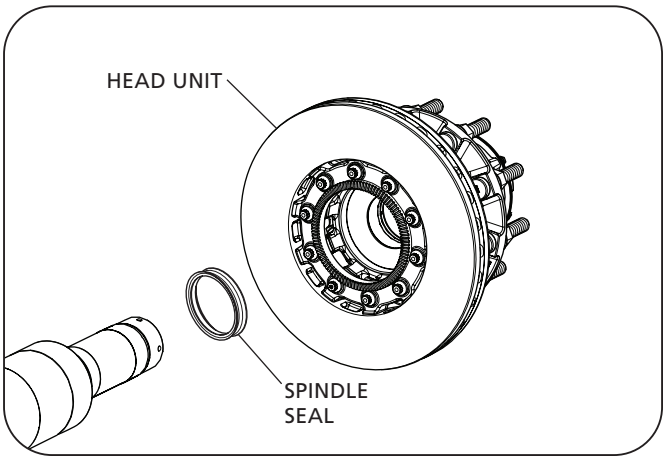


Figure 30



1. Remove the wheel bolts by pressing them out of the hub unit and discard ***(Figure 31).***
2. Install new wheel bolts by pressing them into the hub unit. To ensure correct alignment of the bolts during installation, position the flat side of each wheel bolt head so that it is facing the center of the hub ***(Figure 32)***.

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.

8.4 Rotor Replacement

1. Remove the hub unit from the rotor by using a size 15 mm socket to loosen and discard all ten (10) connection bolts ***(Figure 33).***
2. Clean the rotor contact surface on the hub. Using compressed air, clean the tapped holes in the hub. Check to make sure the threads are undamaged.
3. Attach the new rotor to the hub using ten (10) new SAF specific INTEGRAL bolts and washers ***(Figure 33)***. Using a torque wrench, pre-torque the bolts to 40 ft.-lbs. (54 N•m). For final torque, tighten the bolts to 140 ft.-lbs. (190 N•m) using a crisscross pattern. Refer to the Torque Chart in Section 12 for more information.

IMPORTANT: When attaching a new rotor to the head unit, use only new SAF specified connection bolts. Bolts MUST be clean and free from oil and grease.

⚠WARNING Failure to use only SAF specified connection bolts could cause component failure which, if not avoided, could result in death or serious injury.

CAUTION When installing new washers, the attachment bolts can interfere with the ABS sensor block. Ensure that there is clearance provided for ABS Sensor Block ***(Figure 38)***. Failure to provide clearance can cause damage to property. Refer to service bulletin XL-SA20031SB-en-US.

Figure 31

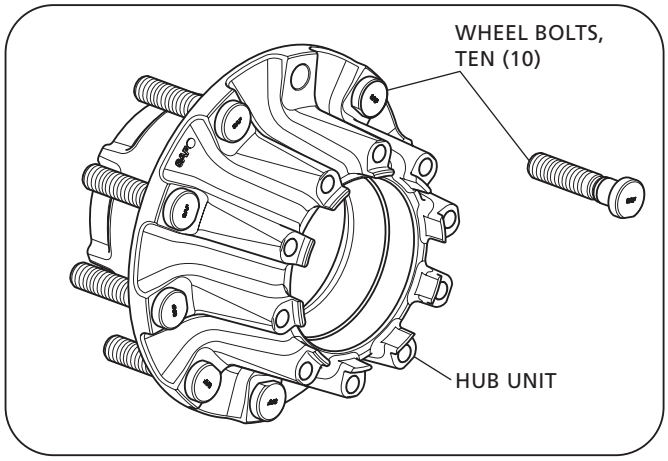


Figure 32

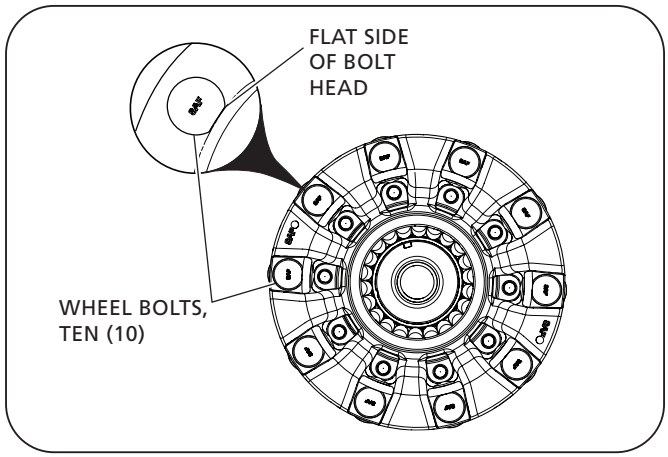
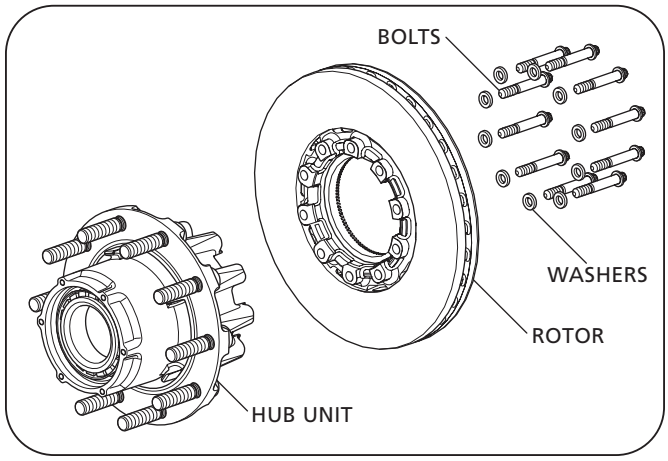


Figure 33



8.5 Head Unit Installation

1. Clean any grease residues from the axle spindle end and re-coat the bearing journal with SAF-HOLLAND fitting paste 05387004203. DO NOT grease or oil the spindle threads.

NOTE: SAF-HOLLAND fitting paste 05387004203 is available in 5 g packets through SAF-HOLLAND Original Parts online at www.safholland.us or by contacting Customer Service at 888-396-6501.

IMPORTANT: DO NOT use high-pressure cleaners or liquid cleaners on the spindle.

2. Coat a new spindle seal with SAF-HOLLAND fitting paste 05387004203 and slide it onto the spindle ***(Figure 34 and 35)***.
3. Re-install the head unit by gently sliding it on the spindle ***(Figure 34)***. Take care to orient the seal correctly ***(Figure 35)***.
4. Using a screwdriver, carefully pry the orange keeper arm from the undercut groove on the side until the keeper is released from the one piece wheel nut ***(Figure 36)***.
5. Install the wheel nut onto the spindle threads ***(Figure 36)***.
6. Using a standard 4-13/16" P-Spindle wheel nut socket, torque the spindle nut to 500 ft-lbs (680 N•m) while rotating the hub. DO NOT back off the spindle nut ***(Figure 36)***.
7. With the bent legs (orange side) of the keeper facing outward, insert the keeper tab into the undercut groove of the nut and engage the keyway tang in the axle keyway.
8. Engage the mating teeth ***(Figure 37)***.
9. Compress and insert the keeper arms, one at a time, into the undercut groove with a screwdriver.
10. If the keeper teeth do not line up with the teeth in the nut, tighten the nut slightly until they engage. DO NOT loosen the nut to align the teeth.

CAUTION Failure to follow the instruction could cause the wheel to come off and cause bodily injury. Make sure that the keeper tab and keeper arms are fully seated into the undercut groove. Inspect keyway tang to insure it does not contact the bottom of the keyway. If contact exists, immediately notify your once piece axle nut representative.

11. Using a dial indicator, verify that end play reading is no greater than .001" (0.03 mm), refer to Steps 6 and 7 of Section 7.1.

Figure 34

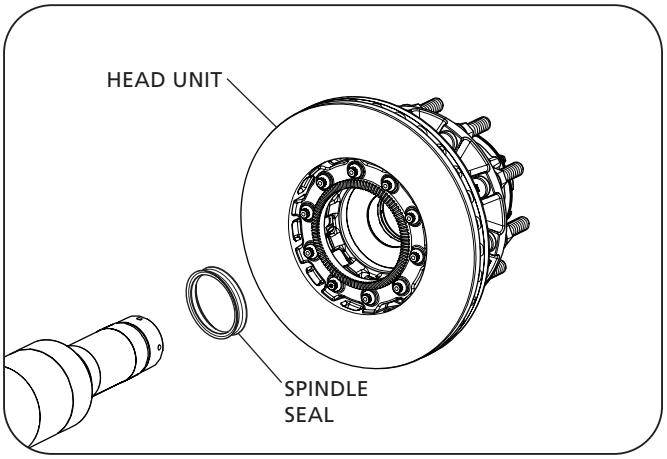


Figure 35

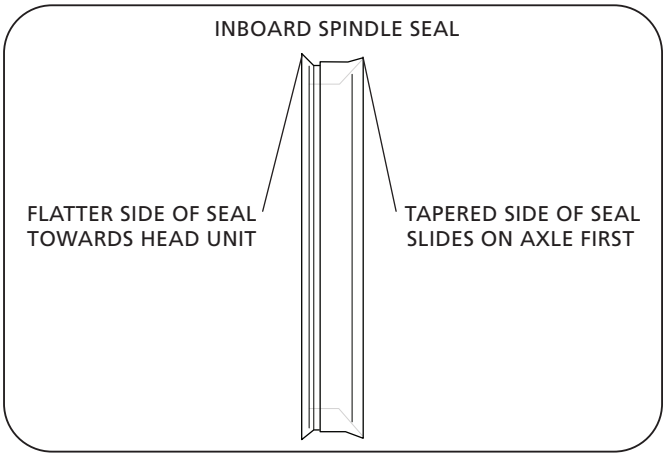
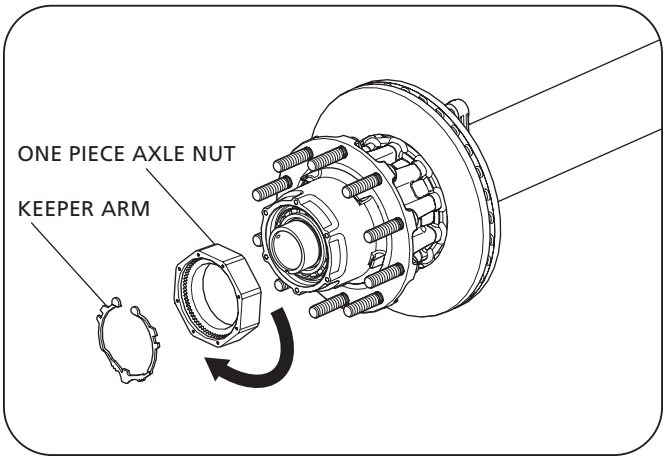


Figure 36



12. Make sure that the keeper tab and keeper arms are fully seated into the undercut groove. Inspect the keyway tang to ensure it does not contact the bottom of the keyway ***(Figure 37)***. If contact exists, immediately notify your SAF-HOLLAND Service Representative.

⚠WARNING Failure to ensure that the keeper is properly installed could cause wheel separation which, if not avoided, could result in death or serious injury.

13. ABS sensor block must clear rotor attachment bolts.

CAUTION When installing new washers, the attachment bolts can interfere with the ABS sensor block. Ensure that there is clearance provided for ABS Sensor Block ***(Figure 38)***. Failure to provide clearance can cause damage to property. Refer to service bulletin XL-SA20031SB-en-US for ABS Sensor Block Modification Procedure.

14. Install the hub cap and P89 Plus identification tag, making sure the hub cap gasket is in place ***(Figure 39)***.

IMPORTANT: When installing hub cap, make sure the hub cap gasket is not bent or damaged.

IMPORTANT: DO NOT over torque. This can crush the hub cap gasket.

CAUTION Failure to avoid damaging the hub cap gasket could allow lubricant to leak which, if not avoided, could result in bearing failure.

15. Install the six (6) bolts to secure the hub cap assembly ***(Figure 39)***. Tighten bolts to 12-16 ft-lbs (16 N•m).

Figure 37

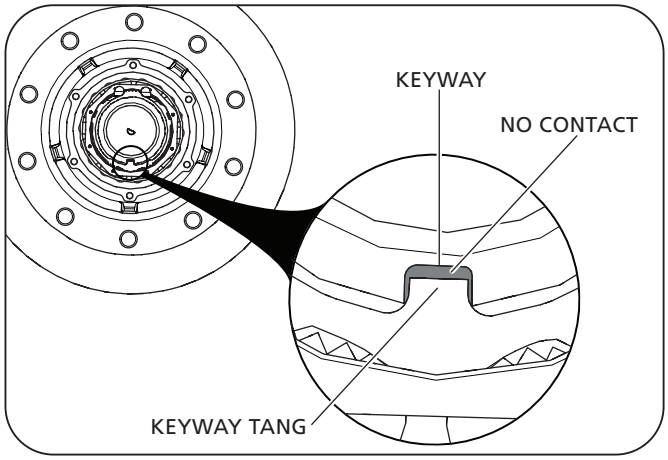


Figure 38

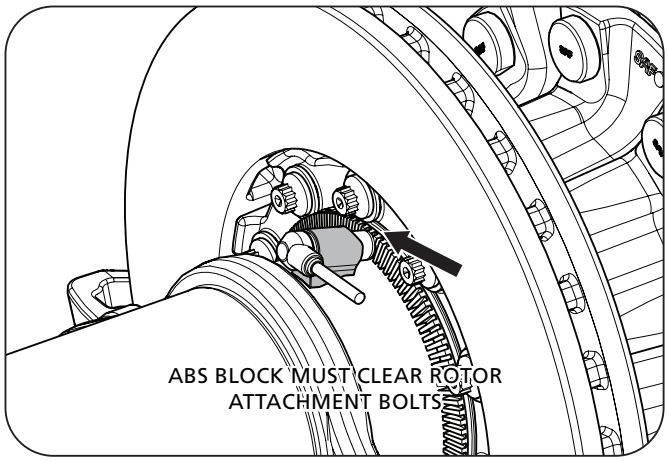
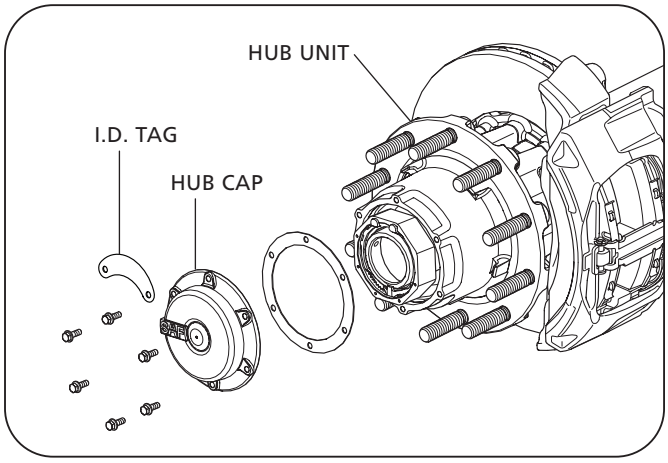


Figure 39



8.6 Caliper Installation

1. Re-install the caliper onto the brake spider using four (4) new SAF specific brake caliper bolts ***(Figure 40):***
   a. Pre-torque the bolts to 88 ft.-lbs. (120 N•m) starting with the shoulder bolt and work across the spider using a size 24 mm socket.
   b. Verify the pre-torque of the bolts a second time, and if necessary re-tighten all bolts to 88 ft.-lbs. (120 N•m).
   c. Final torque to 331 ± 22 ft.-lbs. (450 ± 30 N•m), starting with the shoulder bolt and work across the spider.

NOTE: The caliper is connected to the disc brake spider using four (4) SAF specific bolts: three (3) standard bolts and one (1) shoulder bolt ***(Figure 40).*** The shoulder bolt is located at the outer mounting hole where the brake rotor rotates OUT of the caliper when turning in driving direction.

IMPORTANT: Make sure that the brake caliper is mounted on the correct side of the axle. The correct position can be identified by the lengths of the guide pins on the caliper unit. The longer guide pins should be positioned on the bottom of the caliper unit when installed rearward of the axle and on top when forward of the axle ***(Figures 41 and 42).***

CAUTION Failure to install the shoulder bolt in the proper location could result in component damage.

2. Re-install the SAF brake chamber by following the instructions in SAF Brake Chambers Installation and Service Guide XL-SA10062IM-en-US available on the internet at www.safholland.us.
3. Re-install the ABS sensor by following the instructions detailed in Section 11.1.
4. To enable the ABS sensor to function properly press the ABS sensor against the ABS toner ring at the hub unit to eliminate any clearance between these parts.

IMPORTANT: After replacing the caliper, verify that the brake system is functioning properly.

9. Brake Caliper Servicing

For instructions on brake caliper and repair/replacement, refer to the SAF-HOLLAND XL-AS20032RM-en-US, which can be found at www.safholland.com.

Figure 40

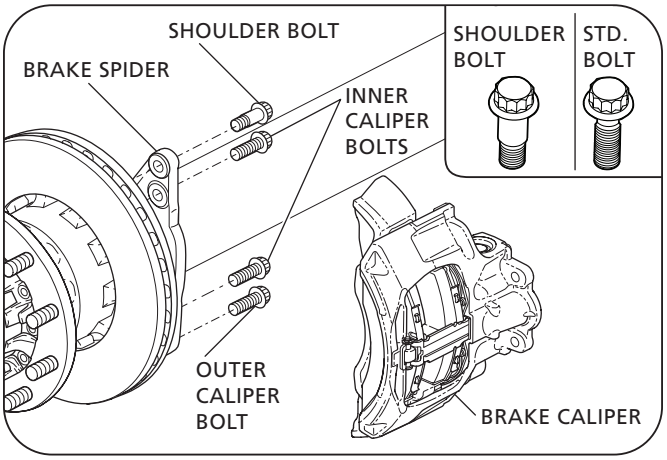


Figure 41

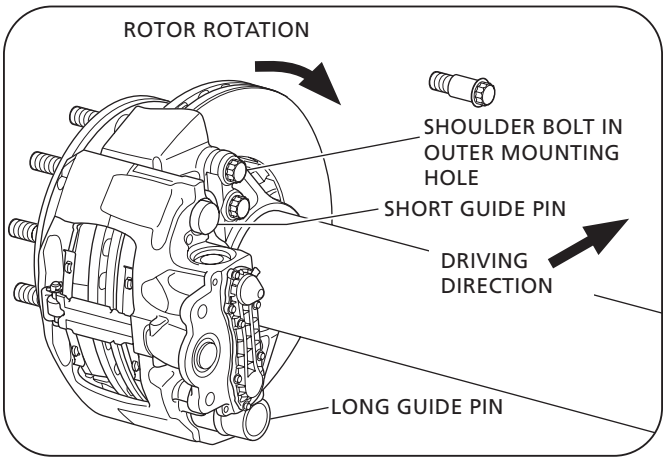
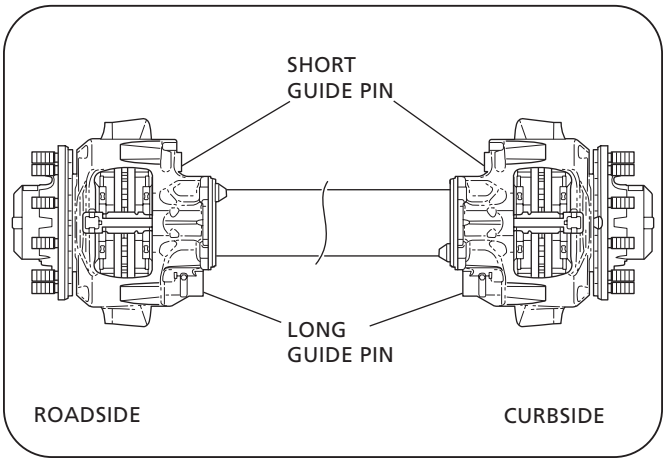


Figure 42



10. Wheel Installation Procedure

The following information is intended to provide basic wheel installation instructions. Refer to TMC RP222C for complete installation details.

1. Clean all mating surfaces on hub, wheels and nuts.
2. Rotate the hub so a pilot boss is at the top (12 o'clock) position ***(Figure 43)***.
3. Mount wheel(s) on hub. One or more of the wheel nuts can be started in order to hold wheel in position.
4. Tighten the top wheel nut first. Apply 50 ft-lbs (68 N•m) of torque to draw the wheel up fully against the hub.
5. Install remaining wheel nuts. Using sequence shown in ***(Figure 43)***, tighten all wheel nuts to 50 ft-lbs (68 N•m) of torque.
6. Repeating sequence shown in ***(Figure 43)***, retighten all wheel nuts to 475 ± 25 ft. lbs. (644 ± 34 N•m) of torque.
7. Check seating of wheel at the pilot bosses. Rotate wheel and check for any rotational irregularity.

⚠WARNING Re-torque all wheel nuts after 5 to 100 miles of service on the initial "in-service" following any installation of wheel to hub assembly.

11. Optional Equipment

11.1 ABS Sensor Replacement

1. Disconnect the ABS sensor.
2. Remove the ABS sensor from the sensor holder by pulling it straight out from the holder and discard ***(Figure 44).***
3. If necessary, remove the sensor retaining spring clip from the sensor holder and replace with new clip. ***(Figure 44).***
4. Install a new ABS sensor by pushing it directly into the sensor holder/spring clip until it contacts the tooth wheel in the hub unit ***(Figure 44).***

NOTE: Some models will have a dual ABS sensor Block ***(Figure 45)***. Be sure to use the angled hole for ABS sensor.

5. Re-connect the ABS sensor.

11.2 Hubodometer

The SAF-HOLLAND INTEGRAL Disc Brake can be factory equipped or retrofitted with any industry standard hubodometer designed for a parallel spindle axle.

Figure 43

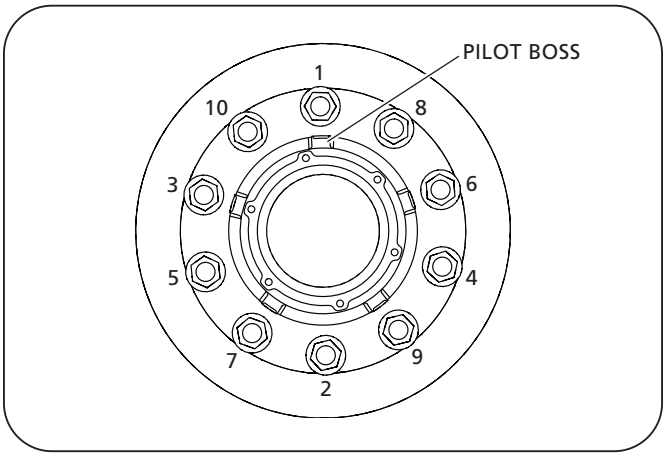


Figure 44

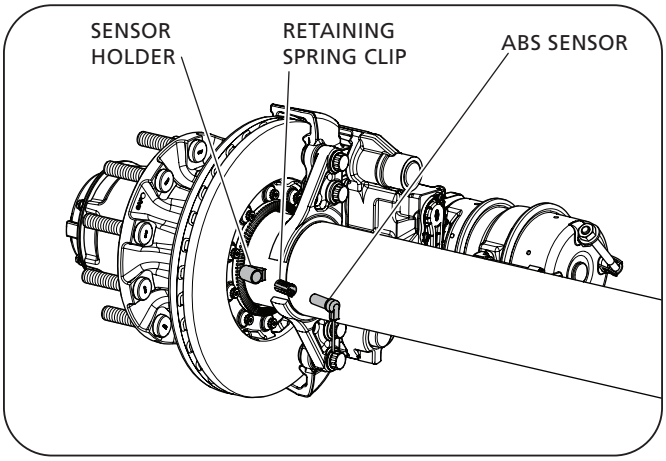
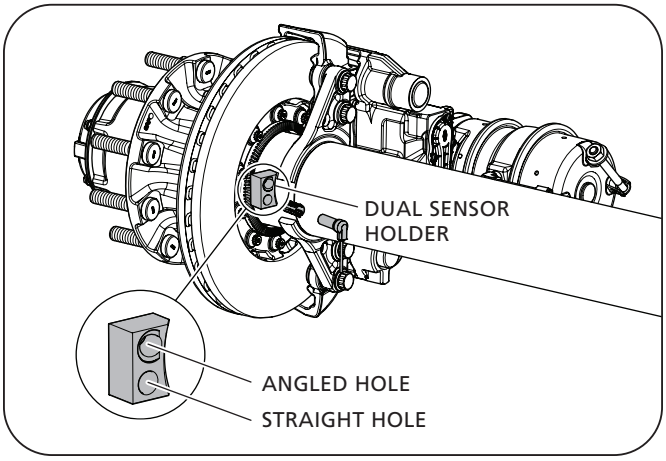


Figure 45



11.3 Tire Inflation System

If your system is prepped for a Tire Inflation System, contact SAF-HOLLAND Customer Service for further information and installation instructions.

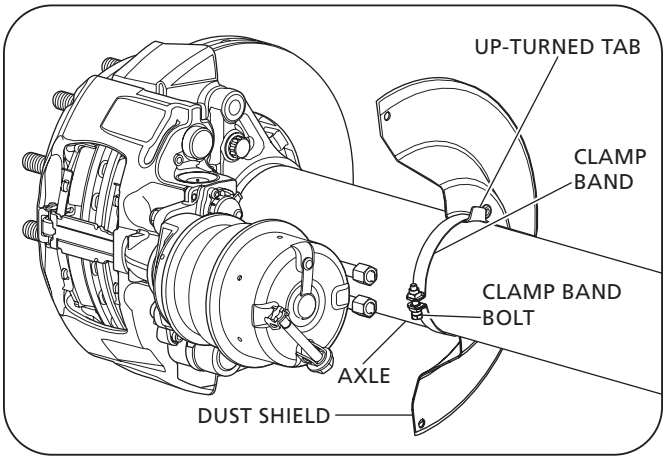
11.4 Dust Shield

The SAF-HOLLAND INTEGRAL Disc Brake can be factory equipped or retrofitted with a dust shield.

Refer to ***Figure 46*** for the following instructions:

1. Using a 13 mm socket, loosen and remove the dust shield clamp band bolt.
2. Route any ABS sensor wires through one of the two rubber grommets on the dust shield and position the dust shield on the axle.
3. Wrap the clamp band around the axle and dust shield and loosely install the clamp band bolt.
4. Slide the dust shield and clamp band together toward the disc brake until the clamp band is about 12 mm (0.5") from the brake rotor, pulling the ABS sensor wire through the rubber grommet as necessary.
5. Torque the clamp band bolt to 20-25 ft-lbs (27-34 N•m).
6. Use a pry bar and/or rubber mallet to ensure that there is clearance between the dust shield and the rotor.
7. Plug the ABS sensor into the abs system wire.

Figure 46



12. Torque Chart

PART	APPLICATION	TORQUE SPECIFICATIONS
One Piece Axle Nut	Precision Bearing System	1. Using a standard 4-13/16" P-Spindle wheel nut socket, torque the spindle nut to 500 ft-lbs (680 N•m) while rotating the hub. DO NOT back off the spindle nut. 2. With the bent legs (orange side) of the keeper facing outward, insert the keeper tab into the undercut groove of the nut and engage the keyway tang in the axle keyway. 3. Engage the mating teeth. 4. Compress and insert the keeper arms, one at a time, into the undercut groove with a screwdriver. 5. If the keeper teeth do not line up with the teeth in the nut, tighten the nut slightly until they engage. DO NOT loosen the nut to align the teeth.
SAF Specific INTEGRAL Bolt M14 x 1.5	Rotor - Hub	Torque all ten (10) bolts in a criss-cross pattern. 1. Pre-torque to 40 ft-lbs (54 N•m). 2. Final torque tighten 140 ft-lbs (190 N•m).
SAF Specific Caliper Bolt M18 x 1.5	Caliper - Spider	Torque bolts from inner bolts to outer bolts. 1. Pre-torque to 88 ft-lbs (120 N•m). 2. Verify the pre-torque of the bolts a second time, and, if necessary re-tighten all bolts to 88 ft-lbs (120 N•m). 3. Final torque from inner bolts to outer bolts to 331 +/- 22 ft-lbs (450 +/- 30 N•m).
SAF Specific Brake Chamber Nut 5/8"-11 UNC Nylock or M16 x 1.5"	Brake Chamber	1. Pre-torque both chamber nuts to 60-75 ft-lbs (80-100 N•m). 2. For final torque tighten both chamber nuts to 130-155 ft-lbs (180-210 N•m)
Wheel Nuts	Wheel Mounting	1. Torque to 475 ± 25 ft-lbs. (644 ± 34 N•m). Refer to Section 10 Page 21
5/16-18 Bolt	Hub Cap	1. Torque to 12-16 ft.-lbs. (16-22 N•m)
M8 x 1.25 Bolt	Dust Shield Clamp	1. Torque to 20-25 ft.-lbs. (27-34 N•m)

13. Routine Service Schedule

⚠WARNING Failure to inspect and maintain your SAF-HOLLAND INTEGRAL disc brake axle as outlined in Section 12 can result in brake or wheel bearing failure which, if not avoided, could result in death or serious injury.

⚠WARNING Failure to maintain your SAF-HOLLAND INTEGRAL disc brake with SAF-HOLLAND Original Parts can result in brake or wheel bearing failure which, if not avoided, could result in death or serious injury.

IMPORTANT: Use only SAF-HOLLAND Original Parts to service your SAF-HOLLAND INTEGRAL disc brake axle.

WHICHEVER OCCURS FIRST			PERIODIC CHECKS		
	MILEAGE INTERVALS	After First 3,000 Miles	Daily	Every 20,000 Miles	Every 50,000 Miles
	TIME INTERVALS	After First Month		Every 3 Months	Every 6 Months
VISUAL AND SAFETY INSPECTION					
Inspect for missing, or loose hubcap.			■		
Inspect for grease leakage around hubcap.			■		
Hub unit maintenance-free. Check for grease leaks. Refer to Section 7.				■	
Inspect the brake caliper guide system. Check for free movement and sliding action. Refer to Section 9.					■
Check rubber dust covers for cracks and damage. Check adjuster cap for correct seating. Refer to Section 9.					■
Inspect brake pad thickness regularly. Refer to Section 6.2.				■	
Inspect brake rotors for cracks. Refer to Section 6.3.					■
Perform general service / maintenance inspection. Refer to Section 2.		■			
Perform disc brake / hub unit inspection. Refer to Section 7.		■			■
Perform wheel end play and wheel noise tests. Refer to Section 7.1 and 7.2.		■			■

MECHANICAL CHECK
Attention: Check torque of wheel nuts after the first 5-100 miles (8-160 km) from date vehicle was placed into service and after every wheel removal. Continually check wheel torque every 10,000 miles (16,000 km), or at the intervals indicated in your vehicle owner's manual, whichever occurs first.

SPECIAL SERVICE CONDITIONS	
Vehicles with long standing periods.	Service at specified time intervals, e.g. trailer used for storage or frequently left standing for several days at a time.
Vehicles used under severe duty and extreme conditions.	Service at suitably reduced intervals, e.g. trailer operating in continuous multi-shifts or in off-road construction sites.

14. Troubleshooting Chart (SAF-HOLLAND suspensions equipped with disc brake axles)

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Brakes will NOT release	Disc brake caliper bound up	Lubricate or replace brake caliper
	Brake hoses restricted	Replace hoses
	Brake control valve restricted/inoperable	Repair/replace control valve
	Brake out of adjustment	Adjust brake/repair or replace automatic adjustment device as necessary
	Damaged brake chamber	Replace brake chamber
	Damaged brake assembly	Replace or repair brake assembly
	Supply air interrupted	Open glad hand cut-out cock or push brake control valve in
	Supply line improperly coupled	Properly couple supply air line
	Brake pads frozen to rotor in cold weather	Warm brakes
No brakes or insufficient brake performance	Service air interrupted	Open glad hand cut-out cock
	Service air line improperly coupled	Properly couple service air line
	Brake hoses restricted	Relieve restriction or obstruction or replace hoses
	Brake control valve restricted/inoperable	Repair/replace control valve
	Brake out of adjustment	Adjust brake/repair or replace automatic adjustment device as necessary
	Damaged brake chamber	Replace brake chamber
	Damaged brake assembly	Replace or repair brake assembly
Dragging Brakes/Slow brake application or release timing	Brake hoses restricted	Relieve restriction or obstruction or replace hoses
	Brake control valve restricted/inoperable	Repair/replace control valve
	Brake out of adjustment	Adjust brake/repair or replace automatic adjustment device as necessary
	Damaged brake chamber	Replace brake chamber
	Damaged brake assembly	Replace or repair brake assembly
Dog tracking	Axle not properly aligned	Align axle
	Slider assembly racked or NOT aligned properly	Repair or replace slider assembly
	Frame bent or NOT aligned properly	Repair or align frame
	Damaged suspension component	Repair or replace suspension component
	Bent axle	Replace axle
Uneven tire wear	Improper tire inflation	Inflate tire to proper pressure
	Loose wheel stud nuts	Inspect for and repair any resultant wheel end damage and tighten properly
	Excessive wheel end play	Inspect for and repair any resultant wheel end damage and end play (Section 7.1)
	Axle NOT properly aligned	Align axle
	Slider assembly racked or NOT aligned properly	Repair or replace slider assembly
	Frame bent or NOT aligned properly	Repair or align frame
	Damaged suspension component	Repair or replace suspension component
	Bent axle	Replace axle
	Mismatched tire sizes	Properly match tire sizes
	Unequal brake balance or timing	Repair brakes as necessary
	Overly aggressive braking	Instruct/train driver in proper brake use
	High speed turns	Instruct/train driver in proper vehicle speeds
	High level of side scrub	Instruct/train driver in proper vehicle maneuvering
	Anti-Lock Brake System malfunction	Refer to ABS manufacturer's service literature

PROBLEM	POSSIBLE CAUSE	POSSIBLE REMEDY
Grabbing brakes	Contaminants on brake lining	Replace brake pads
	Brake out of adjustment	Adjust brake/repair or replace automatic adjustment device as necessary
	Warped brake rotor	Machine or replace brake rotor
	Damaged brake chamber	Replace brake chamber
	Damaged brake assembly	Replace or repair brake assembly
	Unequal brake balance or timing	Repair brakes as necessary
	Anti-Lock Brake System malfunction	Refer to ABS manufacturer's service literature
Excessive heat cracks in rotor	Brake out of adjustment	Adjust brake/repair or replace automatic adjustment device as necessary
	Overly aggressive braking	Instruct/train driver in proper brake use
	Unequal brake balance or timing	Repair brakes as necessary
	Anti-Lock Brake System malfunction	Refer to ABS manufacturer's service literature
	Damaged brake chamber	Replace brake chamber
	Damaged brake assembly	Replace or repair brake assembly

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-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.

SAF-HOLLAND USA • 888.396.6501 • Fax 800.356.3929
www.safholland.us

SAF-HOLLAND CANADA • 519.537.3494 • Fax 800.565.7753
WESTERN CANADA • 604.574.7491 • Fax 604.574.0244
www.safholland.ca

SAF-HOLLAND MEXICO • 52.55.5362.8743 • Fax 52.55.5362.8743
www.safholland.com.mx

info@safholland.com

SAF-HOLLAND, INC.
1950 Industrial Blvd., Muskegon, MI 49442
www.safholland.com

Group

CHANGE RECORD				
LTR.	DESCRIPTION OF CHANGE	BY	E.C.N.	DATE
-	CREATED	AC	307048	2017-08-07

DISC WHEEL INSTALLATION PROCEDURES

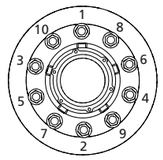
SAF-HOLLAND Group

MAINTENANCE PRECAUTIONS

- Use only SAF® approved replacement parts.
- After the first 50-100 miles, retorque all nuts to 450-500 ft.-lbs.
- DO NOT get lubricant on the face of the hub, or wheel.
- See service manual for more details.

HUB PILOT WHEEL MOUNTING SYSTEM (22mm Wheel Studs)

- Clean all mating surfaces.
- Position a pilot boss at the top (12 o'clock) position.
- Place the wheel(s) into position.
- Tighten top wheel nut first to 50 ft.-lbs. of torque to draw the wheel(s) fully against the hub
- Install the remaining wheel nuts using the sequence shown to 50 ft.-lbs. of torque.
- Repeating the sequence shown, retighten all wheel nuts to 450-500 ft.-lbs. of torque.



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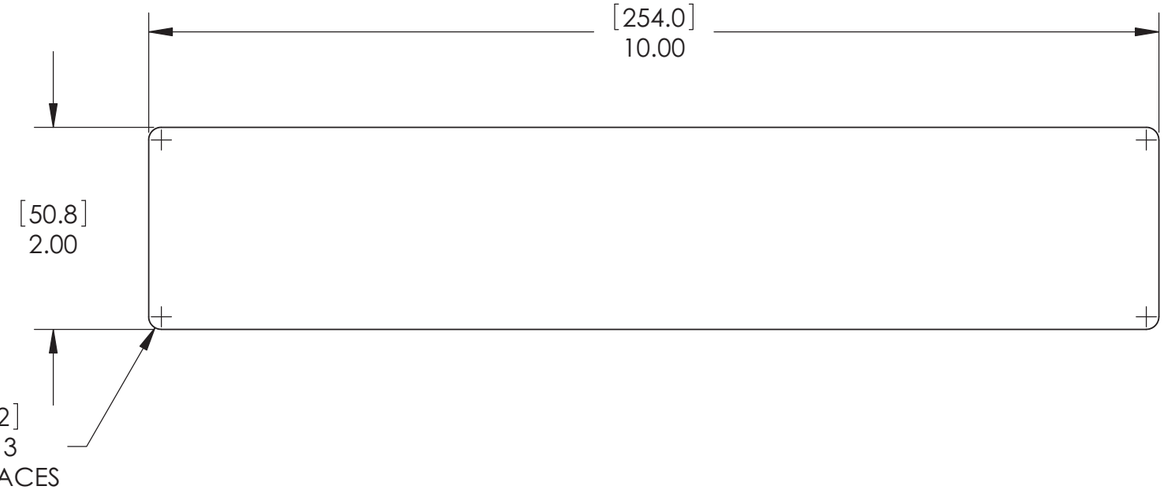
XL-SA20040DC-en-US



NOTES:

1. DECAL MATERIAL PER SPEC. ESM-027
2. ARTWORK BY SAF-HOLLAND AS SHOWN, WITH WHITE BACKGROUND AND BLACK LETTERS.
3. DECAL MUST PERMANENTLY ADHERE TO PAINTED SURFACE.
4. ORIGINAL ARTWORK ON FILE IN SAF-HOLLAND COMMUNICATIONS DEPT.
5. PREP MOUNTING SURFACE AREA WITH ISOPROPANOL ALCOHOL OR EQUIVALENT AND APPLY DECAL USING A WYPALL X60 TERI REINFORCED WIPER OR EQUIVALENT.

UNSPECIFIED TOLERANCES FOR DIMENSIONS ALL DIMS SHOWN ARE IN INCHES MILLIMETERS SHOWN IN BRACKETS [ ] X[X] =±.125[3.18] .X[X] =±.060[1.52] .XX[X.X] =±.030[0.76] .XXX[X.XX] =±.010[0.25] ANGLES ±1° THIRD ANGLE PROJECTION	WEIGHT: -	SAF-HOLLAND
	SCALE: 2:1	
	TITLE: DECAL, DISC WHEEL INSTALLATION	
	MATL: SEE DETAILS	MATL.#: -
	PART NUMBER: XL-SA20040DC-en-US	REV. -