TECHNICAL PROCEDURE

Leaf Spring Assembly for Tata Motors Limited

SUBJECT: Service Instructions
LIT NO: 17730-308
DATE: May 2021 **REVISION:** B

TABLE OF CONTENTS

TATA

HENDRICKSON

SECTION 1
Introduction

This publication is intended to acquaint and assist maintenance personnel in the preventive maintenance, service and repair of the 8.4 tonne front leaf spring assembly as originally equipped on vehicles manufactured by Tata Motors Vehicles.

	THSL Part No.	TML Part No.
Vehicles built AFTER April 1, 2020	40AX078Z00	2207 3210 0138
Vehicles built PRIOR to April 1, 2020	40AX056Z00	2207 3210 0125

NOTE

Use only genuine parts supplied by Tata Motors Limited (TML) vehicles or Tata AutoComp Hendrickson Suspensions Private Limited, (referred as THSL in this publication) for servicing this leaf spring assembly.

It is important to read and understand the entire Technical Procedure publication prior to performing any maintenance, service, repair, or rebuild of this product. The information in this publication contains parts lists, safety information, product specifications, features, proper maintenance, service, repair and rebuild instructions for the THSL front leaf spring assembly.

Tata AutoComp Hendrickson Suspensions Private Limited (THSL) reserves the right to make changes and improvements to its products and publications at any time. Contact THSL Tech Services for information on the latest version of this manual at +91 21 35670670 or e-mail: service@tacohendrickson.com.

The latest revision of this publication is available online at **www.tacohendrickson.com**

SECTION 2

Product Description

The THSL 8.4 tonne capacity front leaf spring assembly features a 4-leaf single stage spring design for long life, and a soft spring rate for improved ride. The springs are equipped with state of the art high performance rubber bushings to offer improved performance ride. Spring eye bushings are designed as a system with the spring design, providing optimum performance in the areas of roll stability, ride and durability.

8.4 tonne Front Leaf Spring Assembly, see Figure 2-1

- Single stage spring design designed for long life
- Soft spring rate for improved ride
- High performance rubber bushings offer improved ride
- The secondary leaf design wraps around the front of the main leaf spring. This means there are two complete leaves wrapped around the front eye for greater strength and performance

FIGURE 2-1

Vehicles built AFTER April 1, 2020

THSL Part No.	TML Part No.
40AX078Z00	2207 3210 0138

Vehicles built PRIOR to April 1, 2020

THSL Part No.	TML Part No.
40AX056Z00	2207 3210 0125

THSL FRONT LEAF SPRING ASSEMBLY SPECIFICATIONS

Suspension Rating	8.4 tonne Maximum Continuous Load Rating
Gross Vehicle Weight (GVW) Approval	Per OEM[1]
Gross Combination Weight (GCW) Approval	Per OEM[1]
Spring Type	4-leaf Parabolic
Spring Rate (Clamped)	50.0 kg / mm
Flat Length	Front 860 mm x Rear 820 mm
Spring Width	90 mm
Axle Location	Front (Non-Drive)
Maximum Travel	152.2 mm

Front leaf spring assembly is approved for use on or use on TML tipper applications. All such applications must comply with applicable specifications and must also be approved by the respective vehicle manufacturer with the vehicle in its original, as-built configuration. Contact Tata AutoComp Hendrickson Suspensions Private Limited (THSL) and the respective vehicle manufacturer for approval of additional applications.

1. Front leaf spring assembly must be paired with appropriate axle rating.

Actual product performance may vary depending upon vehicle configuration, operation, service and other factors.

SECTION 3

Important Safety Notice

Proper maintenance, service and repair are important to the reliable operation of the front leaf spring assembly. The procedures recommended by Tata AutoComp Hendrickson Suspensions Private Limited (THSL) and described in this technical publication are methods of performing such maintenance, service and repair.

The warnings and cautions should be read carefully to help prevent personal injury and to assure that proper methods are used. Improper maintenance, service or repair may damage the vehicle, cause personal injury, render the vehicle unsafe in operation.

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

EXPLANATION OF SIGNAL WORDS

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

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

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

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

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

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

NOTE An operating procedure, practice condition, etc. which is essential to emphasize.

SERVICE HINT A helpful suggestion that will make the servicing being performed a little easier and/or faster.

Also note that particular service operations may require the use of special tools designed for specific purposes. These special tools can be found in the Special Tools Section in this publication.

The torque symbol alerts you to tighten the fasteners to a specific torque value, refer to the Torque Specifications Section in this publication.

SAFETY PRECAUTIONS

WARNING

TORCH/WELDING

DO NOT USE A CUTTING TORCH TO REMOVE ANY FASTENERS OR BUSHINGS. THE USE OF HEAT ON THE FRONT LEAF SPRING ASSEMBLY OR ANY ADJACENT SUSPENSION COMPONENTS WILL ADVERSELY AFFECT THE STRENGTH OF THESE PARTS. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN THE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

EXERCISE EXTREME CARE WHEN HANDLING OR PERFORMING MAINTENANCE IN THE AREA OF THE FRONT LEAF SPRING ASSEMBLY. DO NOT CONNECT WELDING GROUND LINE TO THE LEAF SPRINGS. DO NOT STRIKE AN ARC WITH THE ELECTRODE ON THE FRONT LEAF SPRING ASSEMBLY. DO NOT USE HEAT NEAR THE FRONT LEAF SPRING ASSEMBLY. DO NOT NICK OR GOUGE THE LEAF SPRINGS. SUCH IMPROPER ACTIONS CAN DAMAGE THE FRONT LEAF SPRING ASSEMBLY AND CAUSE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

WARNING

SECOND LEAF

THE SECOND LEAF PROVIDES A WRAP AROUND THE EYE TO PROVIDE AN IMPORTANT REDUNDANCY TO THE FRONT LEAF SPRING ASSEMBLY. DO NOT OPERATE THE VEHICLE IF THE SECOND LEAF OR ANY OTHER LEAF SPRINGS ARE BROKEN OR DAMAGED IN ANY WAY. FAILURE TO DO SO CAN CAUSE DAMAGE TO ADJACENT SUSPENSION COMPONENTS AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

CAUTION

LOAD CAPACITY

ADHERE TO THE PUBLISHED CAPACITY RATINGS FOR THE SUSPENSION AS PER THIS MANUAL. ADD-ON AXLE ATTACHMENTS AND OTHER LOAD TRANSFERRING DEVICES CAN INCREASE THE SUSPENSION LOAD ABOVE ITS RATED AND APPROVED CAPACITIES, WHICH CAN RESULT IN COMPONENT DAMAGE.

WARNING

MODIFYING COMPONENTS

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

WARNING

PERSONAL PROTECTIVE EQUIPMENT

ALWAYS WEAR PROPER EYE, HEAD, HAND AND FOOT PROTECTION AND OTHER PERSONAL PROTECTIVE EQUIPMENT AS RECOMMENDED PER JOB SITE TO HELP PREVENT PERSONAL INJURY WHEN PERFORMING VEHICLE MAINTENANCE, REPAIR OR SERVICE.

CAUTION

PROCEDURES AND TOOLS

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

WARNING

SUPPORT THE VEHICLE PRIOR TO SERVICING

PLACE THE VEHICLE ON A LEVEL FLOOR AND CHOCK THE WHEELS TO PREVENT THE VEHICLE FROM MOVING OR ROLLING. DO NOT WORK AROUND OR UNDER A RAISED VEHICLE SUPPORTED BY ONLY A FLOOR JACK OR OTHER LIFTING DEVICE. ALWAYS SUPPORT A RAISED VEHICLE WITH RIGID SAFETY STANDS. FAILURE TO DO SO CAN CAUSE SERIOUS PERSONAL INJURY OR DAMAGE TO EQUIPMENT.

WARNING

PARTS CLEANING USING SOLVENT CLEANERS

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

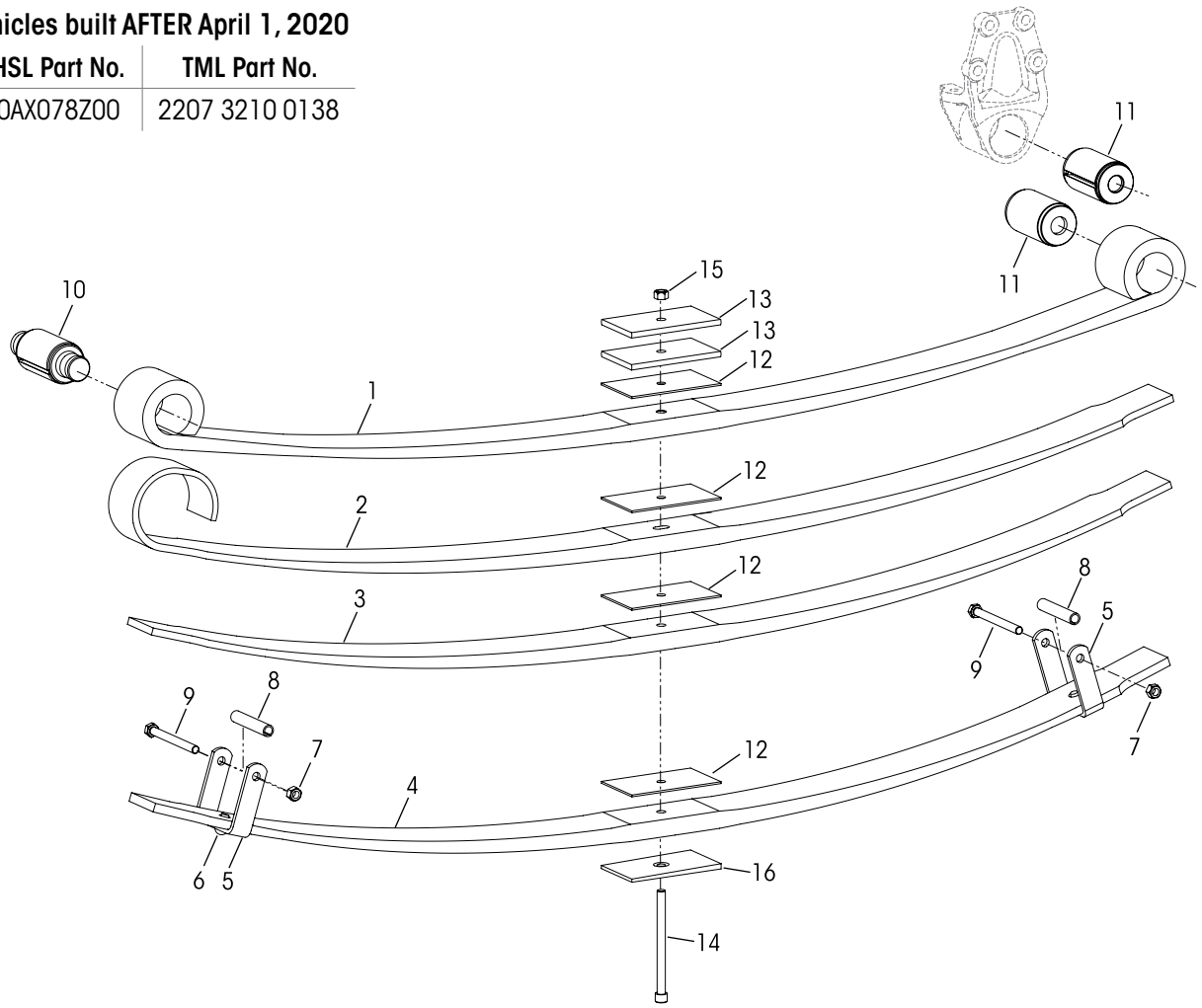
- WEAR PROPER EYE PROTECTION.
- WEAR CLOTHING THAT PROTECTS YOUR SKIN.
- WORK IN A WELL-VENTILATED AREA.
- HOT SOLUTION TANKS OR ALKALINE SOLUTIONS MUST BE USED CORRECTLY. FOLLOW THE MANUFACTURER'S RECOMMENDED INSTRUCTIONS AND GUIDELINES CAREFULLY TO HELP PREVENT PERSONAL ACCIDENT OR INJURY.

TO CLEAN GROUND OR POLISHED PARTS DO NOT USE HOT SOLUTION TANKS. DOING SO WILL CAUSE DAMAGE TO THE PARTS.

SECTION 4
Parts List

Vehicles built AFTER April 1, 2020

THSL Part No.	TML Part No.
40AX078Z00	2207 3210 0138

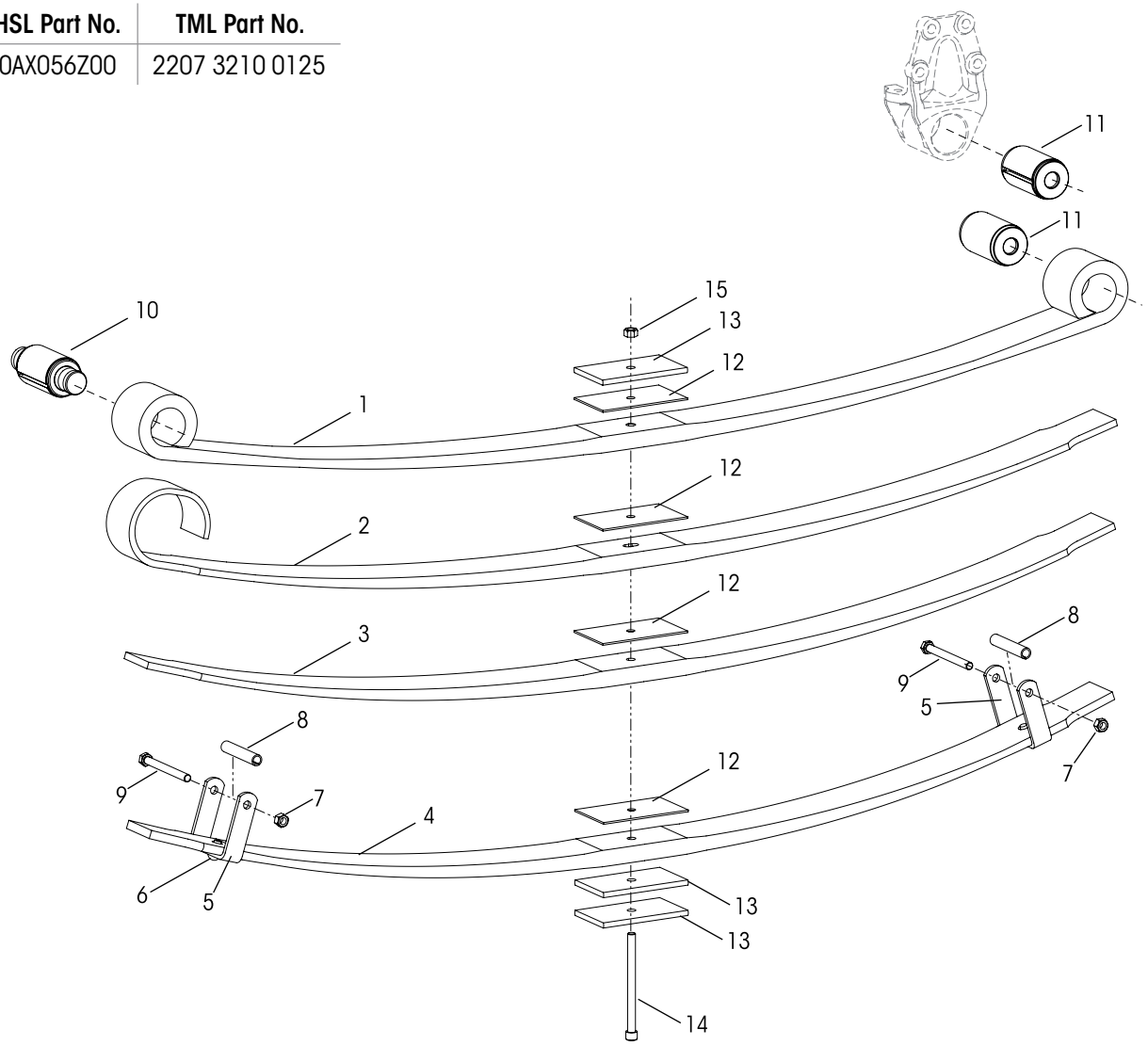


KEY NO.	THSL PART NO.	HENDRICKSON PART NO.	TML PART NO	DESCRIPTION	ASSEMBLY QUANTITY
1	40CX080C01	082371-001	2207 3210 71 31N	Leaf 1, Includes Key Nos. 10-11	1
2	40CX081C01	082371-002	2207 3210 71 32N	Leaf 2	1
3	40CX082C01	082371-003	2207 3210 71 33N	Leaf 3	1
4	40CX083C01	082371-004	2207 3210 71 34N	Leaf 4, Includes Key Nos. 5-9	1
5	–	–	–	*Spring Clip	2
6	–	–	–	*Spring Clip Rivet	2
7	93CX032C01	037985-001	2207 3210 65 03N	Spring Clip Nut M12 X 1.75 Class 10	2
8	40CX105C01	037090-031	2207 3210 86 02N	Spring Clip Spacer SAE 1008-1020	2
9	91CX143C01	051396-009	2207 3210 32 03N	Spring Clip Bolt M12 X 1.75 X 125 Class 8.8	2
10	86CX062C01	079351-000	2207 3210 01 23	Bar Pin Bushing	1
11	86CX067Z00	079382-000	2207 3210 01 26	Thru Bolt Bushing	2
12	40CX084C01	037674-184	2207 3210 86 01N	Galvanized Steel Liners 88.9 x 2.7 x 150	4
13	40CX108C01	051193-019	2207 3210 71 35N	Spacer 88.9 X 8.2 X 150	2
14	91CX138C01	037984-031	2207 3210 32 01N	Center Bolt M12 X 1.75 X 155 Class 10.9	1
15	93CX032C01	037985-001	2207 3210 65 03N	Center Nut M12 X 1.75 Class 10	1
16	40AX078Z00	053121-008	2207 3210 0138	Caster Wedge	1
17	--	--	--	Loctite 290 (Green), 10 ml - one per spring eye bushing	3 (30 ml)

NOTE * Item included in kit/assembly only, part not sold separately.

Vehicles built Prior to April 1, 2020

THSL Part No.	TML Part No.
40AX056Z00	2207 3210 0125



KEY NO.	THSL PART NO.	HENDRICKSON PART NO.	TML PART NO	DESCRIPTION	ASSEMBLY QUANTITY
1	40CX080C01	082371-001	2207 3210 71 31N	Leaf 1, Includes Key Nos. 10 and 11	1
2	40CX081C01	082371-002	2207 3210 71 32N	Leaf 2	1
3	40CX082C01	082371-003	2207 3210 71 33N	Leaf 3	1
4	40CX083C01	082371-004	2207 3210 71 34N	Leaf 4, Includes Key Nos. 5, 6, 7, 8 and 9	1
5	–	–	–	*Spring Clip	2
6	–	–	–	*Spring Clip Rivet	2
7	93CX032C01	037985-001	2207 3210 65 03N	Spring Clip Nut M12 X 1.75 Class 10	2
8	40CX105C01	037090-031	2207 3210 86 02N	Spring Clip Spacer SAE 1008-1020	2
9	91CX143C01	051396-009	2207 3210 32 03N	Spring Clip Bolt M12 X 1.75 X 125 Class 8.8	2
10	86CX062C01	079351-000	2207 3210 01 23	Bar Pin Bushing	1
11	86CX067Z00	079382-000	2207 3210 01 26	Thru Bolt Bushing	2
12	40CX084C01	037674-184	2207 3210 86 01N	Galvanized Steel Liners 88.9 x 2.7 x 150	4
13	40CX108C01	051193-019	2207 3210 71 35N	Spacer 88.9 X 8.2 X 150	3
14	91CX138C01	037984-031	2207 3210 32 01N	Center Bolt M12 X 1.75 X 155 Class 10.9	1
15	93CX032C01	037985-001	2207 3210 65 03N	Center Nut M12 X 1.75 Class 10	1
16	--	--	--	Loctite 290 (Green), 10 ml - one per spring eye bushing	3 (30 ml)

NOTE * Item included in kit/assembly only, part not sold separately.

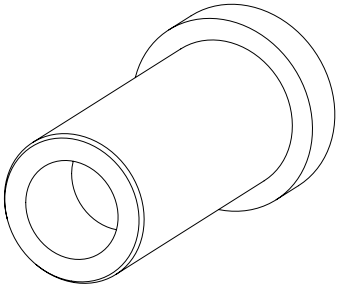
SECTION 5
Special Tools

FRONT LEAF SPRING ASSEMBLY SPRING EYE AND SHACKLE HANGER BRACKET BUSHING TOOLS

BUSHING DRIVER TOOL

THSL Part No. 86TX005C01

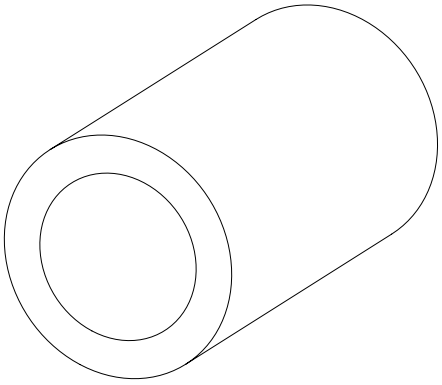
TML Part No. 5064 5890 3209



FRONT LEAF SPRING ASSEMBLY RECEIVING TOOL

THSL Part No. 86TX007C01

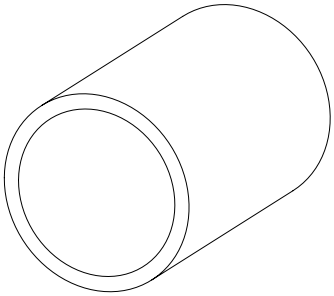
TML Part No. 5064 5890 3210



SHACKLE HANGER BRACKET RECEIVING TOOL

THSL Part No. 86TX006C01

TML Part No. 5064 5890 3211



SECTION 6

Preventive Maintenance

Following appropriate inspection procedures is important to help ensure the proper maintenance and operation of the front leaf spring assembly. The recommendation is that the 8.4 tonne leaf spring assembly be inspected at pre-delivery, the first in-service inspection and regular preventive maintenance intervals. Inspection must include the following items and other components referenced in this section.

NOTE Torque values shown in this publication apply only when THSL supplied fasteners are used. If non-THSL fasteners are used, follow the torque specification listed in the vehicle service manual.

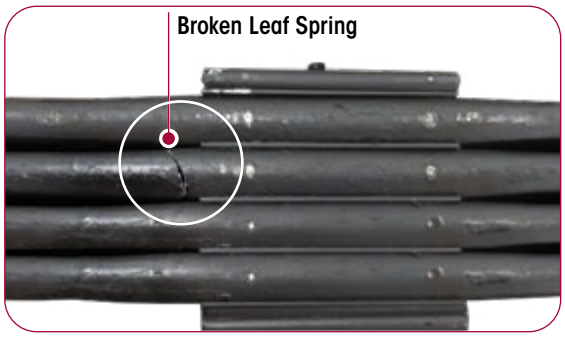
RECOMMENDED INSPECTION INTERVALS	PRE-DELIVERY INSPECTION	FIRST IN-SERVICE INSPECTION	PREVENTIVE MAINTENANCE
Visually inspect for proper assembly and function. Check for all of the following and replace components as necessary: • Signs of unusual movement, loose or missing leaf springs leaves, components • Front leaf spring assembly bushing mounts • Signs of abrasive or adverse contact with other components (example: steering components, anti-roll bar, etc.) • Damaged, or cracked parts	**Prior to delivery to customer**	**Within the first 500 hours**	**Not to exceed 3 Months / 500 Hours**
Inspect fasteners for proper torque as recommended by the vehicle service manual with special attention to the following suspension connections: • U-bolts • Shackle fasteners • Front spring eye fasteners • Clip Bolts and center bolts (see Torque Specifications Section in this publication)			**Every 12 Months / 2,000 Hours**

COMPONENT INSPECTION

Following appropriate inspection procedures is important to help ensure the proper maintenance and operation of the front leaf spring assembly. Look for and replace worn or damaged parts.

- **Fasteners** — Look for any loose, missing or damaged fasteners on the entire suspension. Make sure all fasteners are tightened to a torque value within the specified torque range. See recommended torque specifications for THSL supplied fasteners in the Torque Specification Section in this publication. For fasteners not supplied by THSL, consult the vehicle service manual. Use a calibrated torque wrench to check torque in the tightening direction. Correct the torque as necessary.
- **Leaf Spring Eyes** — Visually inspect the overall condition of the spring eye for signs of cracks or breakage. Replacement of Leaf 1 with genuine THSL components is necessary if any cracks or breakages are detected.
- **Spring Leaves** — Visually inspect the overall condition of each leaf for signs of cracks or breakage. Replacement of leaves is necessary if any cracks or breakages are detected, see Figure 6-1.
- **Spring Clips** — Visually inspect the spring clip components to ensure that all the clip components are intact and present – clip bolt, clip nut, and clip sleeve. Replacement of missing clip components are necessary if found missing. If the bolt is found loose, re-torque the nut to 25-30 Nm. Inspect for signs of cracks or breakage on the clip body. Replacement of the clip is necessary if any cracks or breakages are detected.

FIGURE 6-1

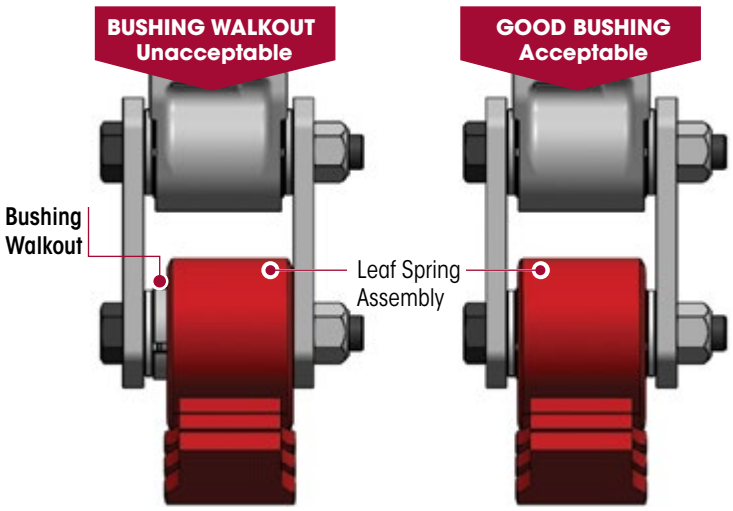


Bushings — The front leaf spring assembly is equipped with rubber spring eye bushings designed to be maintenance-free. An inspection of the spring eye bushings is necessary when a vehicle is in the shop for major repair work and at regular preventive maintenance intervals.

Visually inspect the front leaf spring eye bushing components for the following:

- Signs of excessive movement or wear such as frayed, distorted rubber. If any signs of excessive wear or looseness is noted replacement is necessary.
- If there is an apparent offset between the centerline of the leaf spring eye and the confinement washers, resulting in a stick out condition of the confinement washer outside of the bushing sleeve.
- Check leaf spring eye bushing(s) for walk-out condition. A bushing walkout condition is when the leaf spring eye becomes separated from the outer sleeve of the bushing which can result in abrasive contact with the inner front hanger leg or inner rear shackle bracket. If a walkout condition is present, replacement is necessary, see Figure 6-2.

FIGURE 6-2



SECTION 7

Front Leaf Spring Assembly Best Practices

BEST PRACTICES

- Handle the spring assembly with care to avoid denting, impacting, or scratching the spring. It is recommended to use nylon straps for lifting instead of chains. Any dents, marks or scratches and can result in premature failure of the front leaf spring assembly.
- Replace all removed fasteners with new equivalent fasteners including U-bolts and the front and rear bushing clamp fasteners. Maintain correct torque values at all times refer to torque specifications and intervals listed in the vehicle service manual. Maintain proper U-bolt torque specifications using a calibrated torque wrench to ensure the clamp force is maintained. A loose clamp group can result in premature failure of the front leaf spring assembly.
- Inspect for and immediately replace broken clamp components (top pad, spring seat, spacers, etc). Broken clamp components can result in premature failure of the front leaf spring assembly.
- **DO NOT** modify front leaf spring assembly or the attaching frame hangers or shackles.
- Operate the front leaf spring assembly within the design loads and deflection limits specified in the Product Description Section of this publication. **DO NOT** overload the front leaf spring assembly beyond the maximum load capacity specified.
- Bump stops must be in the correct position to prevent over-travel condition. Shock absorbers are recommended to help prevent over travel in rebound condition.
- Inspect for worn shock absorbers as per the vehicle service manual. Faulty shock absorbers can cause premature wear of the front leaf spring assembly.
- Replace bushings when worn or damaged, as per the this publication. Bushings used beyond their service life can result in damage to the spring eye. Ensure proper bushing orientation during installation per the Component Replacement Section of this publication.
- Inspect the front leaf spring assembly periodically for any signs of cracks or breakage, refer to the Preventive Maintenance Section of this publication. If any cracks are present, replacement of the individual leaf spring(s) with genuine THSL leaf springs is required. After removal inspect the other spring leaves for damage or wear.
- Clean the leaf springs on a regular basis with non-acid based cleaners. Solutions should be neutralized and rinsed with water. Ensure the area between the leaves are clear of rocks and debris to help reduce corrosion and premature leaf spring assembly failure.
- **DO NOT** alter or modify the front leaf spring assembly shape or length. **DO NOT** change the amount of leaf springs from the original design to change load capacity or ride performance. Maintain the same amount of spring leaves in the same location as originally designed.
- **DO NOT** heat, cut, grind or drill the front leaf spring assembly. This will affect the integrity of the steel, reducing the life of the component.
- **DO NOT** attach sway bars, accessories, or any other non-approved components to any part of the front leaf spring assembly as this would can adversely affect performance and cause premature wear to the front leaf spring assembly.
- **DO NOT** attempt to remove corrosion from the leaf springs. Abrasive tools and chemicals will damage the spring. Painting over corroded areas will accelerate corrosion.
- **DO NOT** use the front leaf spring assembly as a jacking point to lift the vehicle. **DO NOT** use tow chains or straps on any part of the front leaf spring assembly for towing the vehicle. Doing so will damage the front leaf spring assembly.

SECTION 8
Component Replacement

FASTENERS

When servicing a THSL 8.4 tonne front leaf spring assembly, it is recommended to replace all removed fasteners with new equivalent fasteners. Maintain correct torque values at all times. Refer to torque specifications and intervals listed in this publication and in the vehicle service manual.

FRONT AND REAR LEAF SPRING EYE BUSHINGS

The THSL front leaf spring assembly spring eye bushings are designed for the life of the leaf spring assembly. If premature wear occurs careful consideration must be given to the contributing factor that caused the wear. This must be corrected in order to help prevent the new bushing from wearing in the same manner.

Note the orientation of the front and rear spring eye bushings and ensure the orientations are maintained during installation, the bar pin bushing position is in front and the thru-bolt is in the rear, see Figures 8-1 and 8-2. Mark the location of the bushing split prior to removal and use the same orientation when installed.

FIGURE 8-1
Vehicles built AFTER April 1, 2020

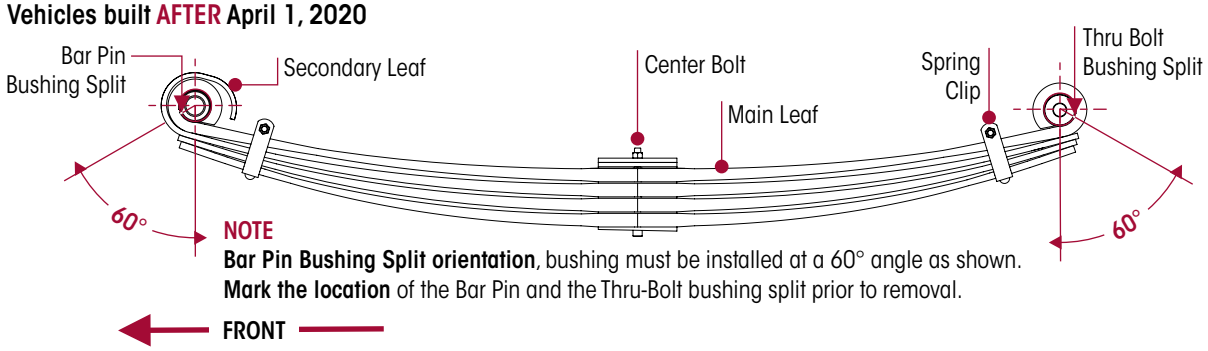
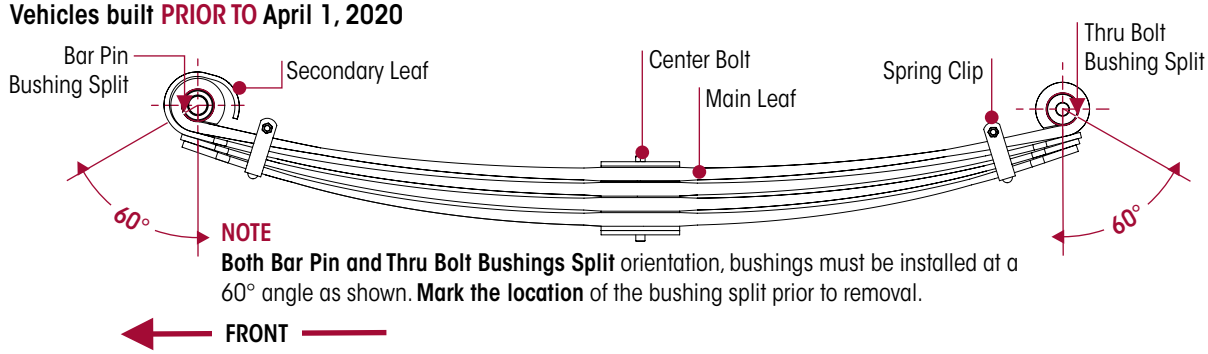


FIGURE 8-2
Vehicles built PRIOR TO April 1, 2020



FRONT BAR BIN BUSHING

YOU WILL NEED:

- A hydraulic press with a minimum operating capacity of 5 tonne.
- Bushing Driver and Leaf Spring Receiving tools, see specifications in the Special Tools Section of this publication.

DISASSEMBLY

1. Remove front leaf spring assembly from the vehicle per the vehicle service manual.

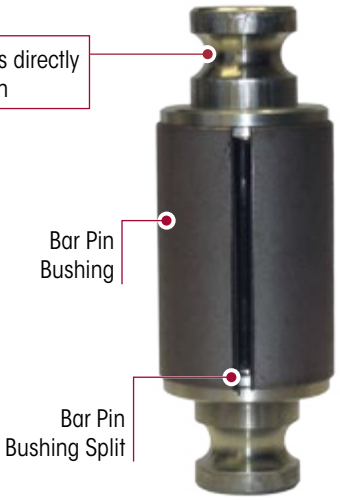
WARNING

DO NOT USE HEAT OR A CUTTING TORCH TO REMOVE THE BUSHING FROM THE STEEL SPRING. THE USE OF SUCH HEAT CAN ADVERSELY AFFECT THE STRENGTH OF THE SPRING ASSEMBLY. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN THE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

2. Prior to bushing removal use a paint stick to mark the position of the bar pin bushing split on the leaf spring, see Figures 8-3 and 8-4.
3. Support and center the steel leaf spring end hub on the receiving tool. The leaf spring must be level to distribute the vertical pushing load equally on the bushing.
4. **DO NOT** press directly on the bar pin of the bushing, see Figure 8-3.

FIGURE 8-3

FIGURE 8-4

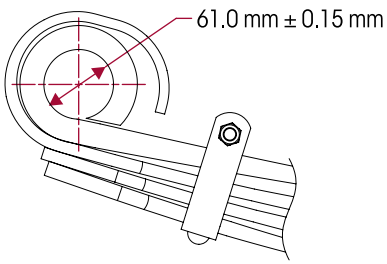


5. Place the bushing driver centered on the spring eye bushing, see Figure 8-5 and 8-6. Care must be taken to prevent damage to spring eye.
6. Press out the spring eye bushing. Push directly on the bushing driver until the bushing clears the leaf spring eye bore.

FIGURE 8-5

FIGURE 8-6

FIGURE 8-7



INSPECTION

1. Inspect the inside surface of the spring eye for any deep scratches, burrs or cracks. If cracks are present replacement of the front leaf spring assembly is necessary.
2. Measure the inner diameter (I.D.) of the spring eye bore. The specification for the front leaf spring assembly bore inner diameter is 61 mm ± 0.15 mm, see Figure 8-7. If measurement is **NOT** within the specified range replacement of the Number 1 leaf spring is required.

3. Ensure that the new bushing and spring eye surface are free of grease, oil, or other contaminants prior to pressing in the new bushing.

ASSEMBLY

1. Support and center the leaf spring end hub on the receiving tool. The steel leaf spring must be level to distribute the vertical pushing load equally on the bushing.
2. With a brush, apply Loctite 290 or equivalent **ONLY** to the outer surface of the spring eye bushing that enters the spring eye end hub first in the location specified in Figure 8-8. **DO NOT** apply Loctite 290 to the spring eye bushing split or to the spring eye bore.
3. Ensure to align the new spring eye bushing split with the paint mark on spring eye bore completed as prior to removal, see Figure 8-3, or if the paint mark is not visible, align at 60° ± 10°, see Figure 8-9.
4. Install the bushing driver tool on the new spring eye bushing.

FIGURE 8-8

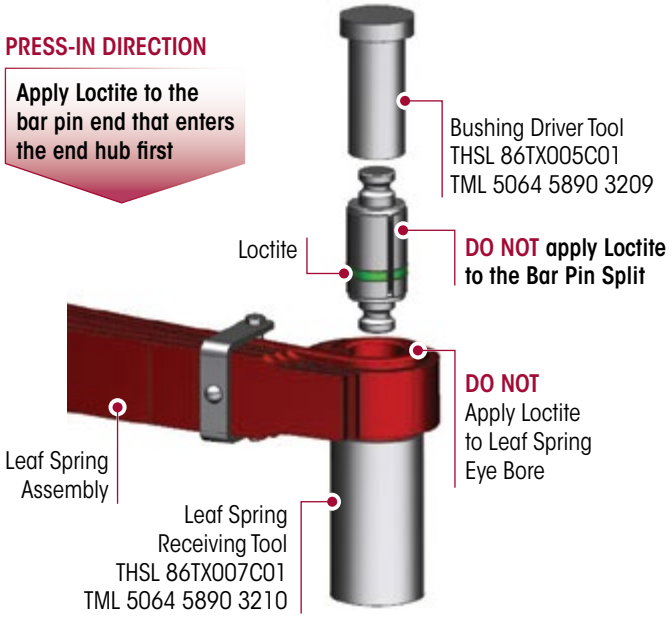
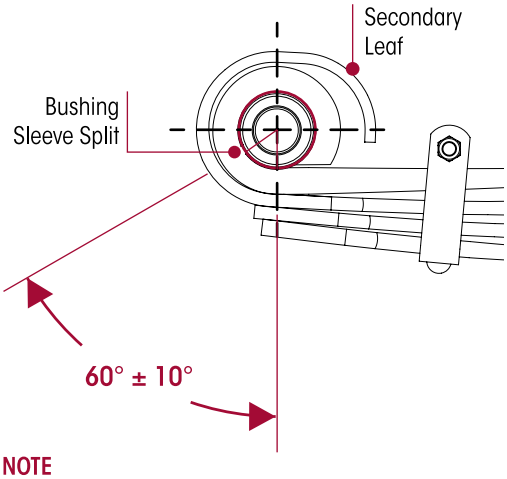
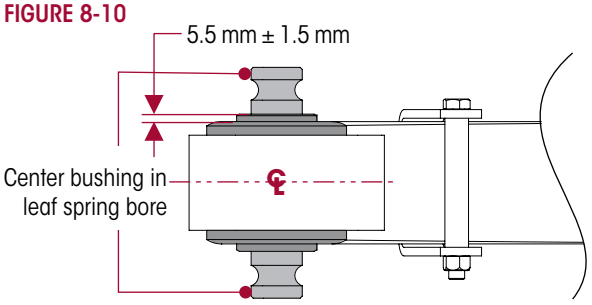


FIGURE 8-9



NOTE
Bushing Split orientation. Bushing must be installed at a 60° ± 10° angle as shown.

FIGURE 8-10



Front Bar Pin Bushing

5. Press the bar pin bushing in until it is centered in the spring eye bore, with a dimension of 5.5 mm ± 1.5 mm of the outer can of the bushing showing from the width of the leaf spring bore, see Figure 8-10.
6. Once the bar pin bushing is installed follow the procedure for front leaf spring assembly component replacement per the vehicle service manual.

REAR THRU BOLT BUSHING

YOU WILL NEED:

- A hydraulic press with an minimum operating capacity of 5 tonne.
- Bushing Driver and Leaf Spring Receiving tools, see specifications in the Special Tools Section of this publication.

DISASSEMBLY

1. Follow the procedure for the front leaf spring assembly removal per the vehicle service manual.

⚠ WARNING

DO NOT USE HEAT OR A CUTTING TORCH TO REMOVE THE BUSHING FROM THE STEEL SPRING. THE USE OF SUCH HEAT CAN ADVERSELY AFFECT THE STRENGTH OF THE SPRING ASSEMBLY. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN THE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

2. Prior to bushing removal use a paint stick to mark the position of the thru bolt bushing split on the leaf spring, see Figures 8-11 and 8-12.
3. Support and center the steel leaf spring end hub on the receiving tool. The leaf spring must be level to distribute the vertical pushing load equally on the bushing.

FIGURE 8-11

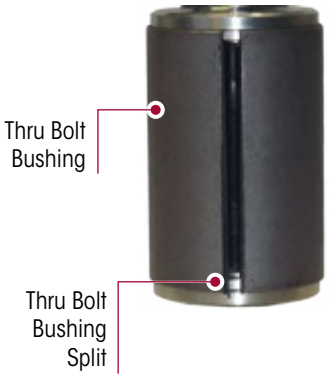
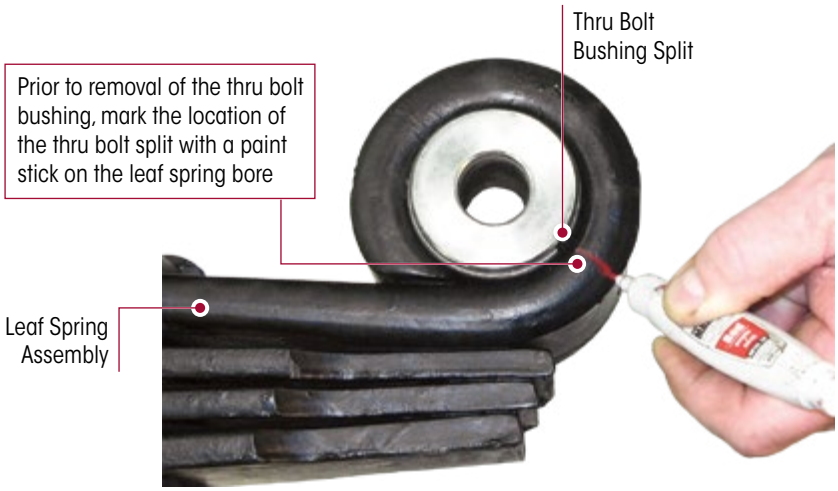


FIGURE 8-12



4. Place the bushing driver centered on the spring eye bushing, see Figures 8-13 and 8-14. Care must be taken to prevent damage to spring eye.
5. Press out the spring eye bushing. Push directly on the bushing driver until the bushing clears the leaf spring eye bore.

FIGURE 8-13

FIGURE 8-14

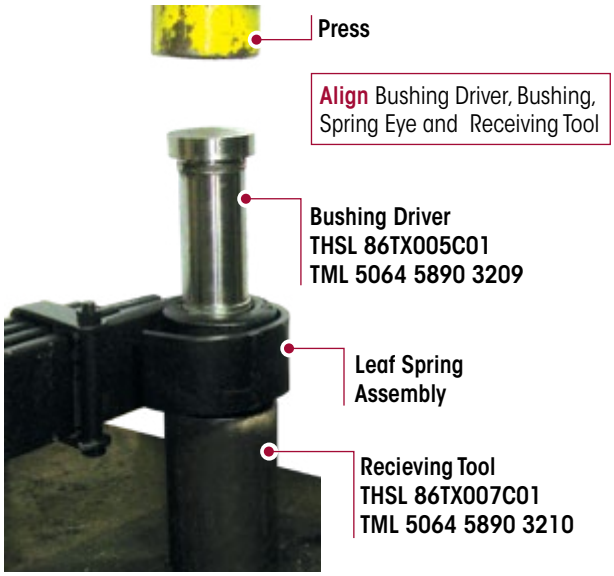
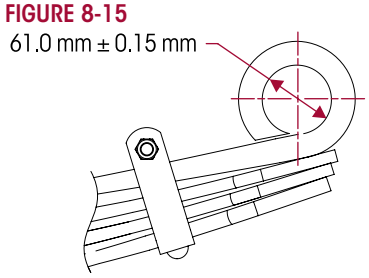


FIGURE 8-15



INSPECTION

1. Inspect the inside surface of the spring eye for any deep scratches, burrs or cracks. If cracks are present replacement of the front leaf spring assembly is necessary.

2. Measure the inner diameter (I.D.) of the spring eye bore. The specification for the front leaf spring assembly bore inner diameter is 61 mm ± 0.15 mm, see Figure 8-15. If the measurement is **NOT** within the specified range, replacement of the leaf spring is required.
3. Ensure that the new bushing and spring eye surface are free of grease, oil, or other contaminants prior to pressing in the new bushing.

ASSEMBLY

1. Support and center the leaf spring end hub on the receiving tool. The steel leaf spring must be level to distribute the vertical pushing load equally on the bushing.
2. With a brush, apply Loctite 290 or equivalent **ONLY** to the outer surface of the spring eye bushing that enters the spring eye end hub first in the location specified in Figure 8-16. **DO NOT** apply Loctite 290 to the spring eye bushing split or the leaf spring eye bore.
3. Ensure to align the new spring eye thru bolt bushing split with the paint mark on spring eye bore completed prior to removal, see Figure 8-12, or if the paint mark is not visible, align at 60° ± 10° see Figures 8-17.

FIGURE 8-16

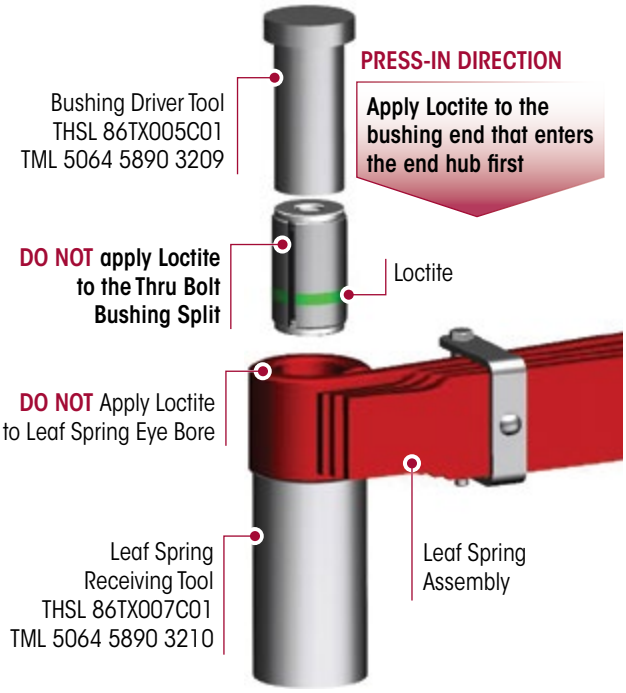
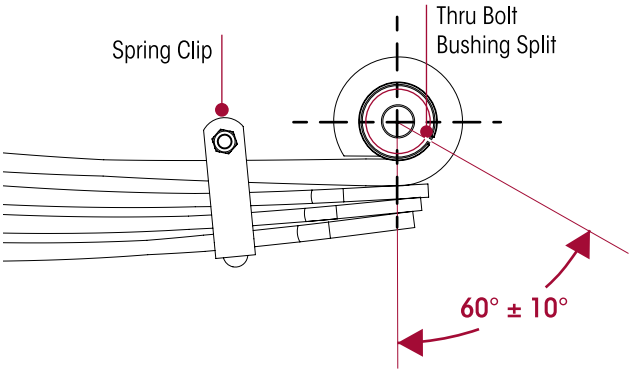
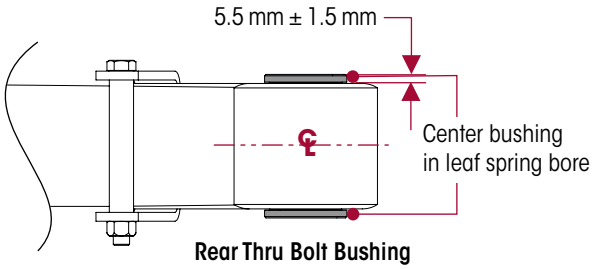


FIGURE 8-17



NOTE
Bushing Split orientation. Bushing must be installed at a 60° ± 10° angle as shown.

FIGURE 8-18



4. Install the bushing driver tool on the new spring eye thru bolt bushing.
5. Press the thru bolt bushing in until it is centered in the spring eye bore, with a dimension of 5.5 mm ± 1.5 mm of the outer can of the bushing showing from the width of the leaf spring bore, see Figure 8-18.
6. Once the thru bolt bushing is installed follow the procedure for front leaf spring assembly component replacement per the vehicle service manual.

REAR SHACKLE BRACKET THRU BOLT BUSHING

YOU WILL NEED:

- A hydraulic press with an minimum operating capacity of 5 tonne.
- Bushing Driver and Shackle Hanger Bracket Receiving tools, see specifications in the Special Tools Section of this publication.

DISASSEMBLY

1. Follow the procedure for the rear shackle bracket removal per the vehicle service manual.

WARNING

DO NOT USE HEAT OR A CUTTING TORCH TO REMOVE THE BUSHING FROM THE REAR SHACKLE BRACKET. THE USE OF SUCH HEAT CAN ADVERSELY AFFECT THE STRENGTH OF THE REAR SHACKLE BRACKET. A COMPONENT DAMAGED IN THIS MANNER CAN RESULT IN THE ADVERSE VEHICLE HANDLING AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

2. Prior to bushing removal use a paint stick to mark the position of the thru bolt bushing split on the rear shackle bracket bore, see Figures 8-19 and 8-20.

FIGURE 8-19

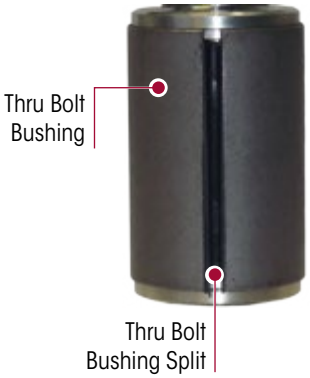
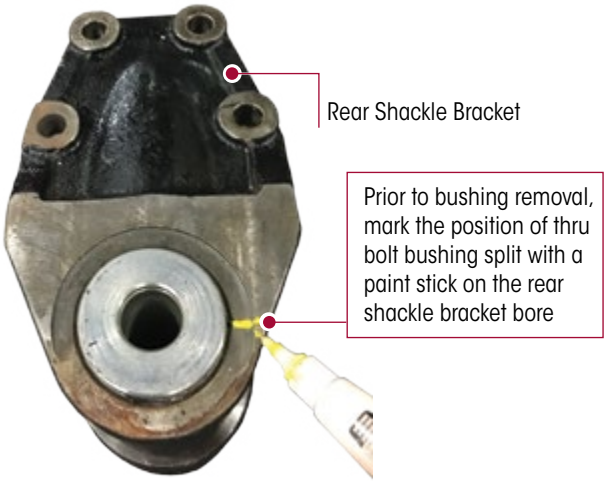


FIGURE 8-20

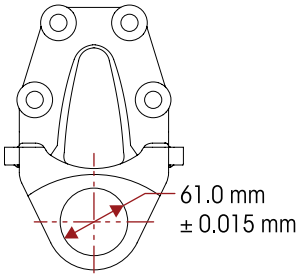


3. Support and center the rear shackle bracket hub on the receiving tool. The rear shackle bracket must be level to distribute the vertical pushing load equally on the bushing.
4. Place the bushing driver centered on the rear shackle bracket bushing, see Figures 8-21 and 8-22. Care must be taken to prevent damage to the bore of the rear shackle bracket.
5. Press out the rear shackle bracket bushing. Push directly on the bushing driver until the bushing clears the rear shackle bracket eye bore.

FIGURE 8-21

FIGURE 8-22

FIGURE 8-23



INSPECTION

1. Inspect the inside surface of the shackle bore for any deep scratches, burrs or cracks. If cracks are present replacement of the rear shackle bracket is necessary.
2. Measure the inner diameter (I.D.) of the rear shackle bracket eye bore. The specification for the rear shackle bracket bore inner diameter is 61 mm ± 0.15 mm, see Figure 8-23. If measurement is **NOT** within the specified range replacement of the rear shackle bracket is required.
3. Prior to pressing in the new bushing, ensure that the new bushing and rear shackle bracket bore surface are free of grease, oil, or other contaminants.

ASSEMBLY

1. Support and center the rear shackle bracket bore on the receiving tool. The rear shackle bracket must be level to distribute the vertical pushing load equally on the bushing.
2. With a brush, apply Loctite 290 or equivalent **ONLY** to the outer surface of the thru bolt bushing that enters the rear shackle bore first in the location specified in Figure 8-24. **DO NOT** apply Loctite 290 to the bushing split or the rear shackle bracket eye bore, see Figure 8-24.

FIGURE 8-24

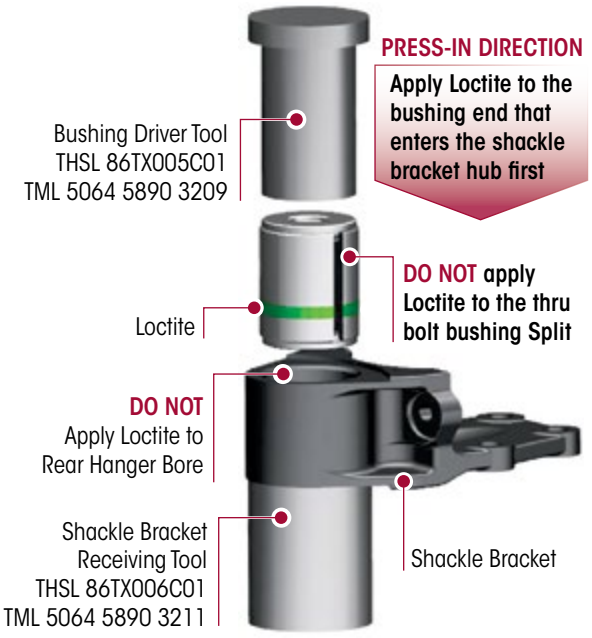
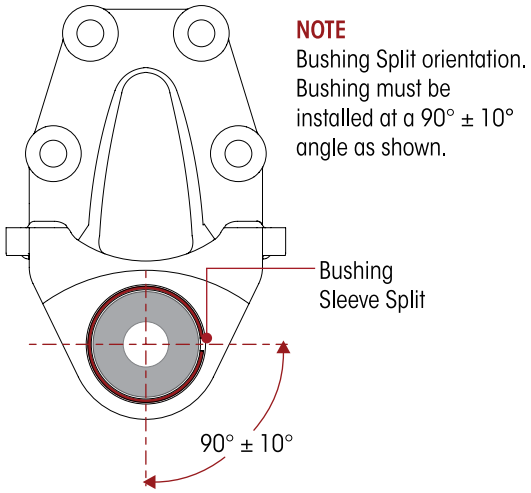
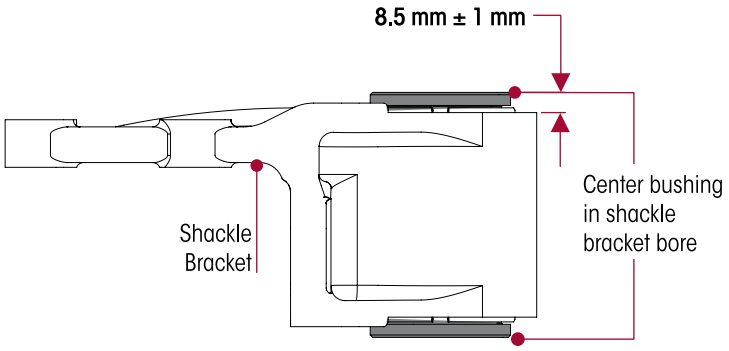


FIGURE 8-25



3. Ensure to align the new thru bolt bushing split with the paint mark on rear shackle bracket bore completed prior to removal, see Figure 8-20 or if the paint mark is not visible, align at 90° ± 10°, see Figure 8-25.
4. Install the bushing driver tool on the new spring eye bushing.
5. Press the bushing in until it is centered in the shackle bracket, with a dimension of 8.5 mm ± 1 mm of the outer can of the bushing showing from the width of the rear shackle bracket bore, see Figure 8-26.
6. Once the bushing is installed follow the procedure for front rear shackle bracket assembly component replacement per the vehicle service manual.

FIGURE 8-26



FRONT LEAF SPRING ASSEMBLY COMPONENTS

YOU WILL NEED:

- Large C-Clamp
- Wood Support Blocks

NOTE Leaves within the spring pack assembly are not interchangeable and are designed specific for that particular spring pack location. Example: leaf No. 2 cannot be used as leaf No. 3.

DISASSEMBLY

WARNING THE SECOND LEAF PROVIDES A WRAP AROUND THE EYE TO PROVIDE IMPORTANT REDUNDANCY TO THE FRONT LEAF SPRING ASSEMBLY. DO NOT OPERATE THE VEHICLE IF THE SECOND LEAF OR ANY OTHER LEAF SPRINGS ARE BROKEN OR DAMAGED IN ANY WAY. FAILURE TO DO SO CAN CAUSE DAMAGE TO ADJACENT SUSPENSION COMPONENTS AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

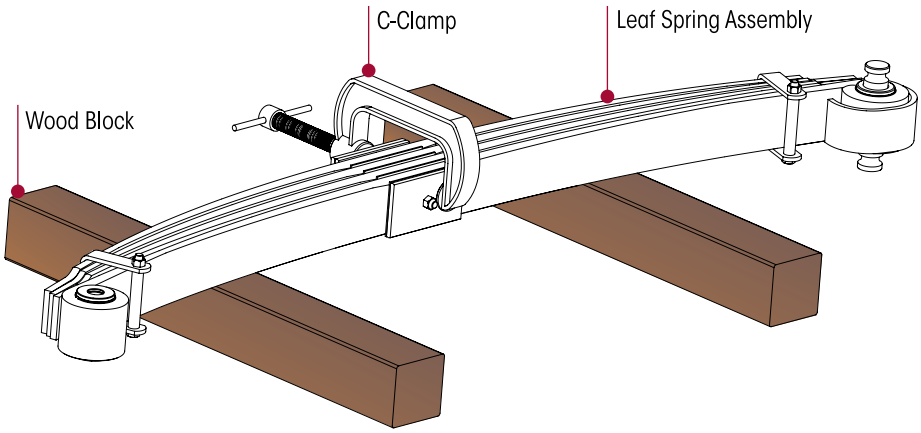
1. Remove the front leaf spring assembly from the vehicle per the vehicle service manual.

CAUTION THE WEIGHT OF THE FRONT LEAF SPRING ASSEMBLY IS APPROXIMATELY 100 KG. CARE SHOULD BE TAKEN AT REMOVAL AND INSTALLATION TO PREVENT PERSONAL INJURY OR DAMAGE TO COMPONENTS.

2. Lay the spring on its side supporting it with wood blocks, see Figure 27.

NOTE If replacement of the No. 1 leaf spring is necessary, the replacement leaf available from THSL is equipped with both front and rear bushings installed. If replacement of the No. 4 leaf spring is necessary, the replacement leaf spring available from THSL is equipped with spring clips and fasteners installed.

FIGURE 8-27



3. Remove and discard both clip fasteners, see Figures 8-28 and 8-29. **DO NOT** re-use fasteners.
4. Remove both clip sleeves.
5. To remove the front leaf spring assembly center bolt:
   a. Place a C-Clamp within the center seat area of the spring and hand tighten to close, see Figure 8-27. **DO NOT** over tighten the C-clamp, doing so will result in damage to the metal spacer.
   b. Remove and discard center bolt and fasteners. **DO NOT** re-use fasteners.

⚠ CAUTION NOTE THE LOCATION AND ORIENTATION OF THE LINERS, SPACERS AND LEAF SPRINGS. INSTALL IN THE SAME LOCATION AS WAS REMOVED, FAILURE TO DO MAY RESULT IN LOSS OF CLAMP FORCE AND CAUSE PREMATURE FRONT LEAF SPRING ASSEMBLY DAMAGE AND/OR FAILURE.

NOTE It is significant to note the orientation of the leaf prior to replacement as the lengths are not symmetric. Also note the location of the liners and spacers, see Figures 8-28 and 8-29. It is important to ensure the liners and spacers are re-installed in the correct locations.

6. Remove the broken or damaged leaf spring(s).
7. Inspect other spring leaves for signs of cracks or other damage. Replace as necessary.

FIGURE 8-28

Vehicles built AFTER April 1, 2020

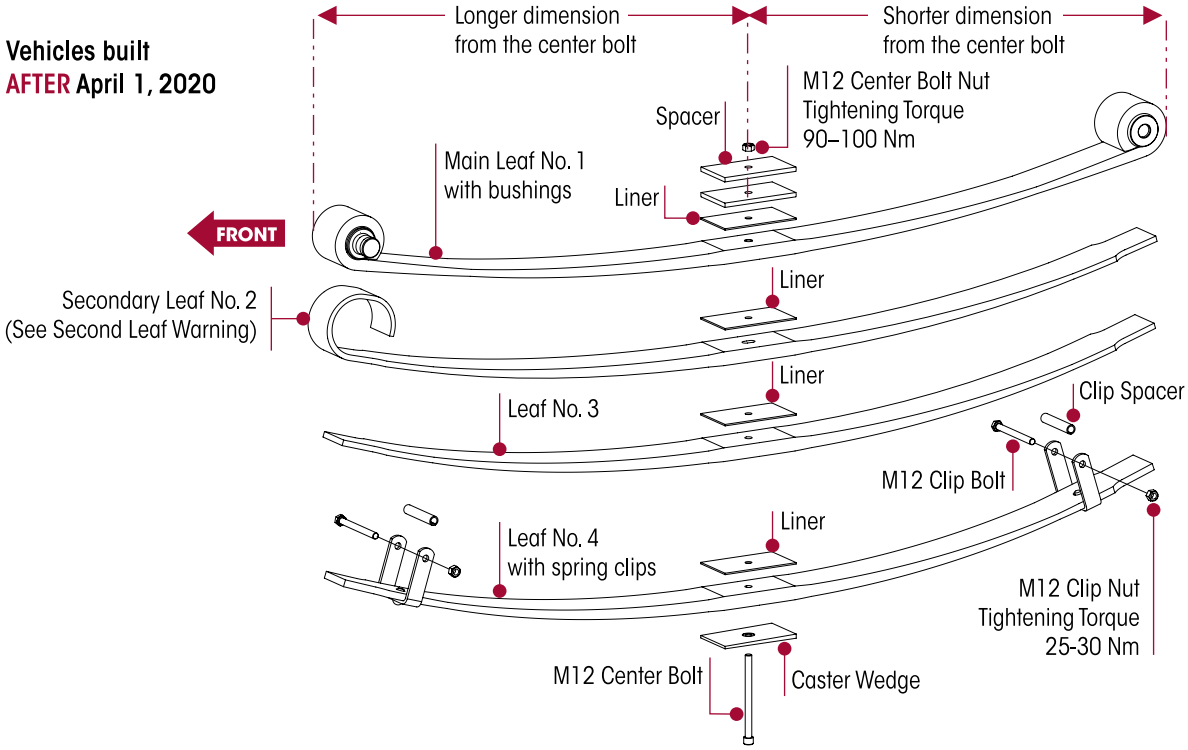
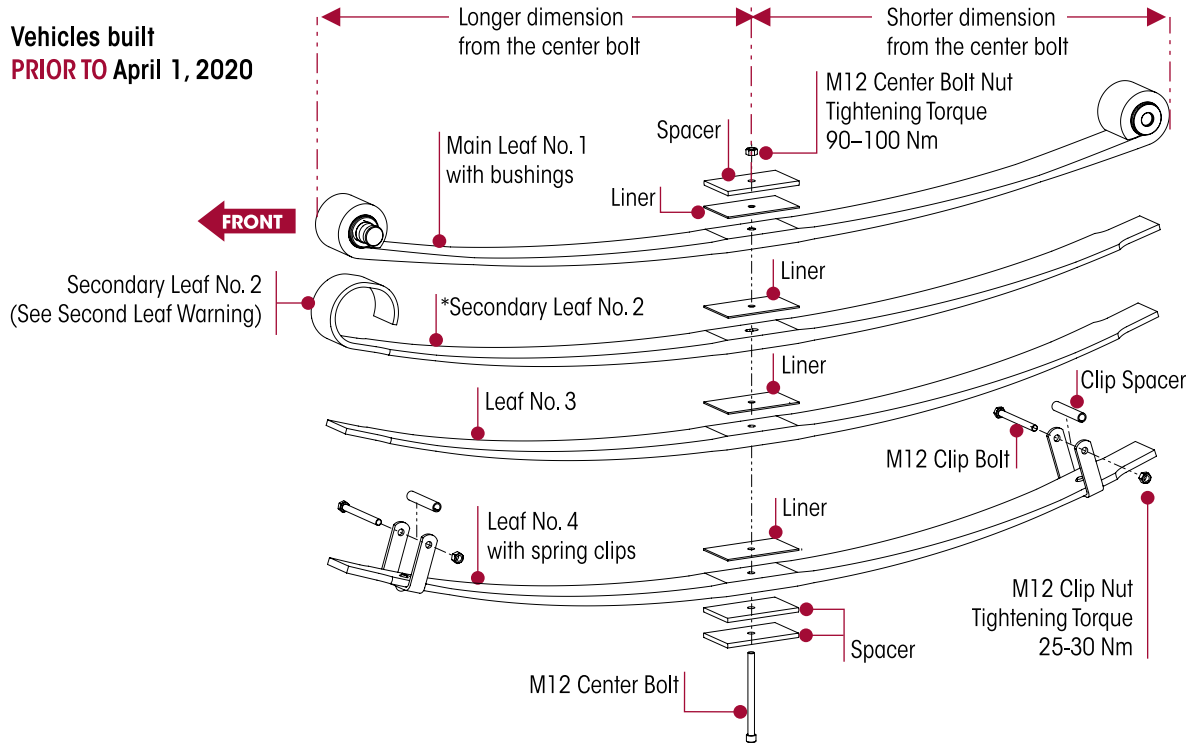


FIGURE 8-29

Vehicles built PRIOR TO April 1, 2020



ASSEMBLY

WARNING

LEAVES WITHIN THE SPRING PACK ARE NOT INTERCHANGEABLE WITH EACH OTHER AND ARE DESIGNED SPECIFICALLY FOR THAT PARTICULAR SPRING PACK LOCATION (EXAMPLE: LEAF NO. 2 CANNOT BE USED AS LEAF NO. 3). INTERCHANGING LEAVES AT IMPROPER LOCATIONS CAN CAUSE DAMAGE TO ADJACENT SUSPENSION COMPONENTS AND POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.

CAUTION

NOTE THE LOCATION AND ORIENTATION OF THE LINERS, SPACERS AND LEAF SPRINGS. INSTALL IN THE SAME LOCATION AS WAS REMOVED, FAILURE TO DO MAY RESULT IN LOSS OF CLAMP FORCE AND CAUSE PREMATURE FRONT LEAF SPRING ASSEMBLY DAMAGE AND/OR FAILURE.

1. Assemble the leaf spring, spacers and liners in the correct order location and orientation as was removed.

NOTE Thicker end of bottom caster wedge (if equipped) is towards the rear of the spring.

2. It is important to note the orientation of the leaf during replacement as the lengths are not symmetric. The longer end from the center hole to the end of the leaf spring leaf is towards the front (spring eye wrap on leaf No. 2), see Figures 8-28 and 8-29.
3. Assemble the center bolt, re-clamp the center seat of the leaf spring assembly using a C-clamp. **DO NOT** over tighten the C-Clamp as it will result in damage to the metal liner.
4. Install the center bolt and the new center bolt fasteners. Tighten to 90-100 Nm torque.

CAUTION

ENSURE THAT THE CLIP SPACER IS RE-ASSEMBLED. FAILURE TO DO SO WILL RESULT IN A BINDING CONDITION OF THE LEAF SPRINGS TO THE CLIP AND RESULT IN IMPROPER VERTICAL ALIGNMENT OF THE FRONT LEAF SPRING ASSEMBLY AND CAN CAUSE PREMATURE LEAF SPRING ASSEMBLY WEAR.

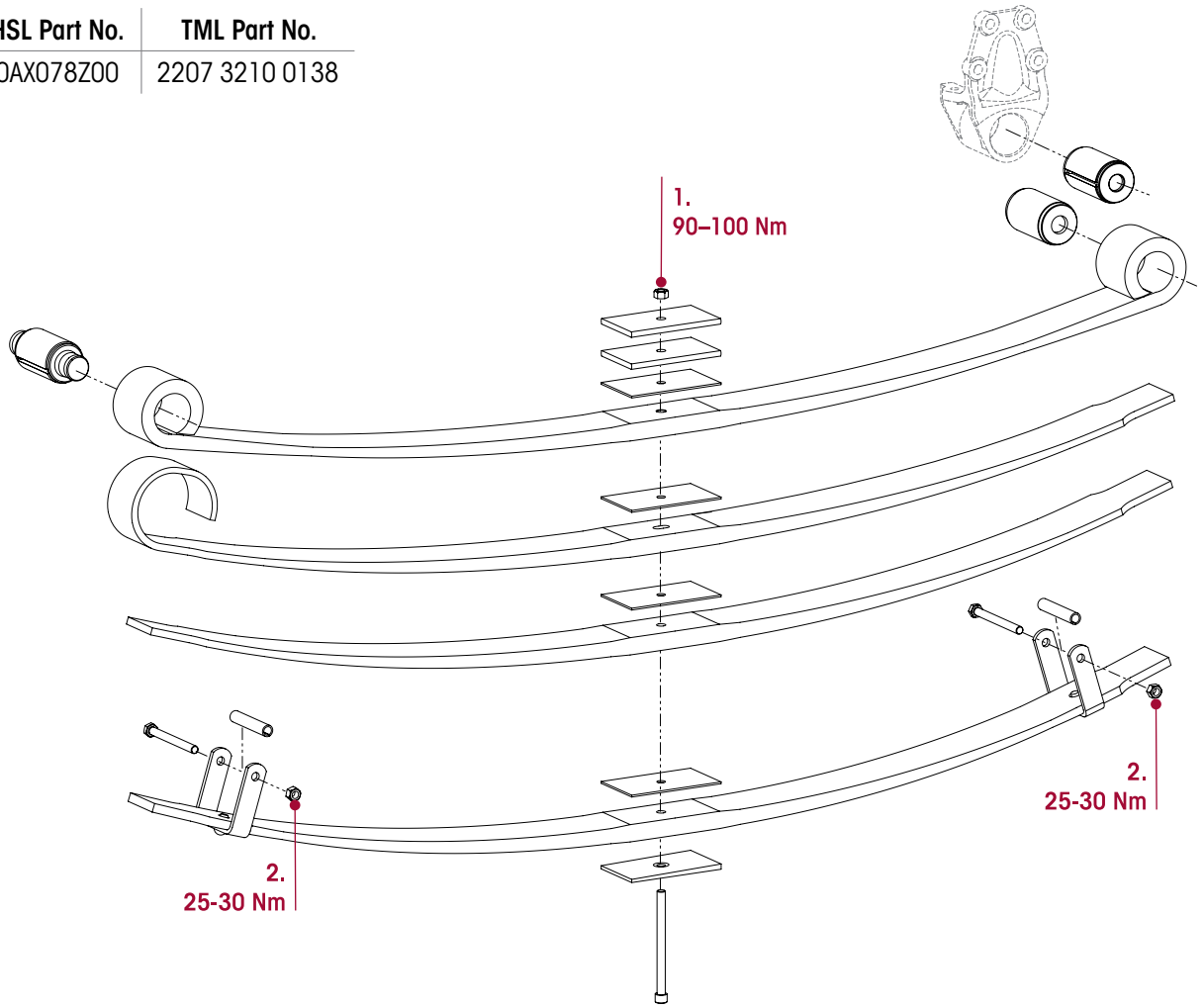
5. Install the clip spacer and new fasteners. Ensure that the clip spacer is re-assembled. Failure to do so will result in a binding condition.
6. Tighten the M12 locknut to 25-30 Nm torque. **DO NOT** overtighten as it will result in damage to the clip spacer.
7. Follow the procedure for front leaf spring assembly component replacement per the vehicle service manual.

SECTION 9
Torque Specifications

THSL RECOMMENDED TORQUE VALUES PROVIDED IN NEWTON METERS

VEHICLES BUILT AFTER APRIL 1, 2020

THSL Part No.	TML Part No.
40AX078Z00	2207 3210 0138



FRONT LEAF SPRING ASSEMBLY

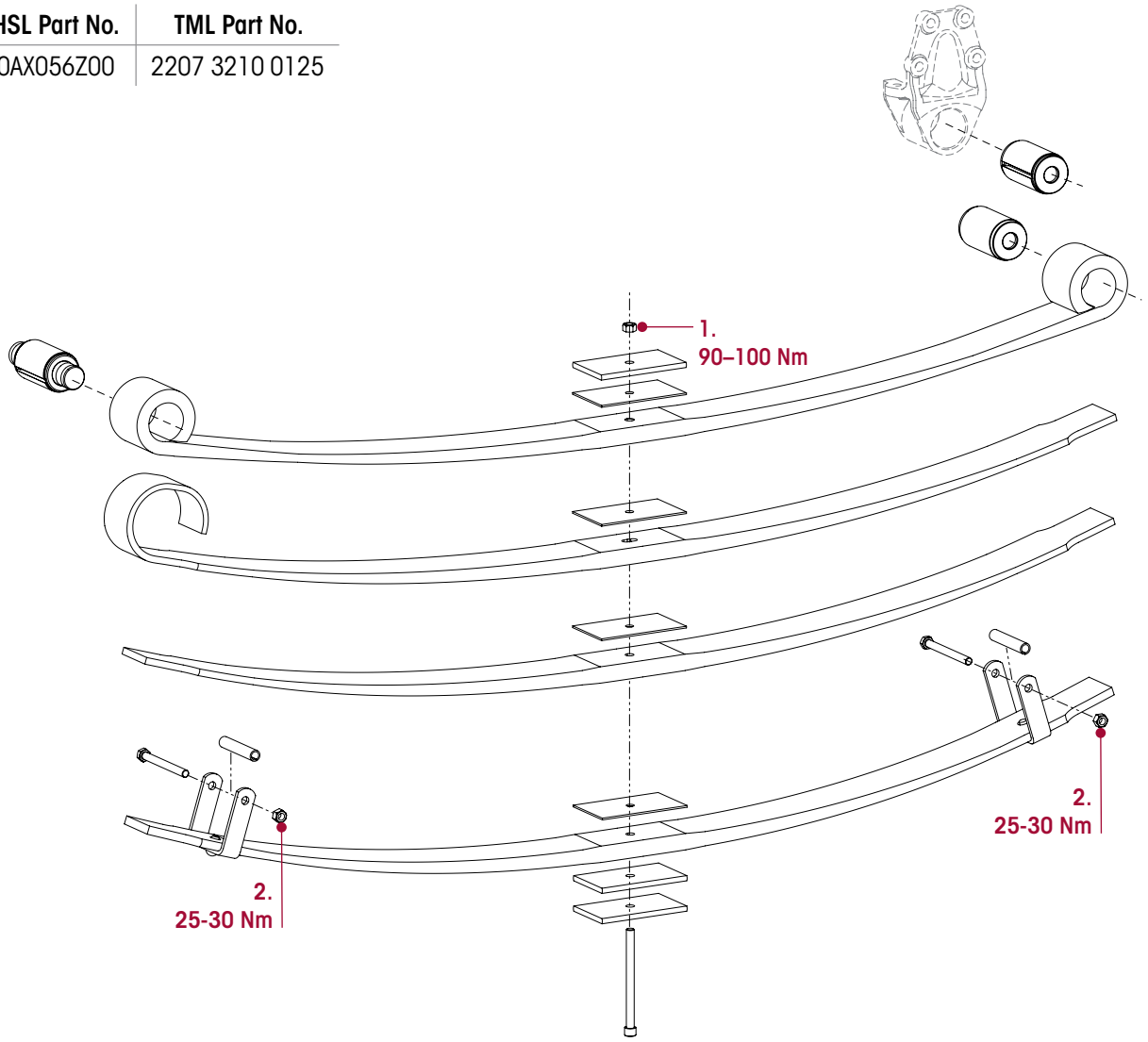
THSL RECOMMENDED TORQUE SPECIFICATIONS				
NO.	COMPONENT	FASTENER		TORQUE VALUE IN NEWTON METERS
		SIZE	*QUANTITY	
1.	Spring Pack Center Bolt Nut	M12	2	90-100
2.	Spring Clip Nut	M12	4	25-30

NOTE: * Quantities shown are per front leaf spring assembly.

Torque values shown in this publication apply only if THSL supplied fasteners are used. If non THSL fasteners are used, follow the torque specification listed in the vehicle service manual.

VEHICLES BUILT PRIOR APRIL 1, 2020

THSL Part No.	TML Part No.
40AX056Z00	2207 3210 0125



FRONT LEAF SPRING ASSEMBLY

THSL RECOMMENDED TORQUE SPECIFICATIONS				
NO.	COMPONENT	FASTENER		TORQUE VALUE IN NEWTON METERS
		SIZE	*QUANTITY	
1.	Spring Pack Center Bolt Nut	M12	2	90-100
2.	Spring Clip Nut	M12	4	25-30

NOTE: * Quantities shown are per leaf spring assembly.

Torque values shown in this publication apply only if THSL supplied fasteners are used. If non THSL fasteners are used, follow the torque specification listed in the vehicle service manual.

SECTION 10

Troubleshooting Guide

LEAF SPRING ASSEMBLY

TROUBLESHOOTING GUIDE		
CONDITION	**POSSIBLE CAUSE**	**CORRECTION**
Suspension has harsh or bumpy ride	Broken leaf spring	Replace leaf spring(s) with genuine THSL components as required.
	Suspension overloaded	Redistribute load or reduce load to correct weight.
Vehicle leans	Broken leaf spring /	Replace leaf spring(s) with genuine THSL components as required.
	Weight bias	Redistribute load to correct weight bias so the weight on both sides of the vehicle are the same.
Loose or missing leaf spring assembly attachment fasteners	Suspension is overloaded	Reduce and/or redistribute load to correct weight.
		Replace and/or properly tighten fasteners to the proper torque specification.
	Improper torque or over torque	Increase inspection interval of fastener.
		Replace and/or properly tighten fasteners to the proper torque specification.
Excessive leaf spring play	Broken front and / or rear spring clips	Replace spring clip and spring clip hardware with genuine THSL components.

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

*Call Hendrickson at **2066 409937** for additional information.*

TATA HENDRICKSON

TATA AUTOCOMP HENDRICKSON
Gate 431, 1 Medankarwadi
Chackan - Alandi Road
Taluka Khed, Pune 410 501, India
+91 2066 409937

HENDRICKSON
Truck Commercial Vehicle Systems
800 South Frontage Road
Woodridge, IL 60517-4904 USA
1 630 910 2800

www.tacohendrickson.com

17730-308 Rev B 05-21