

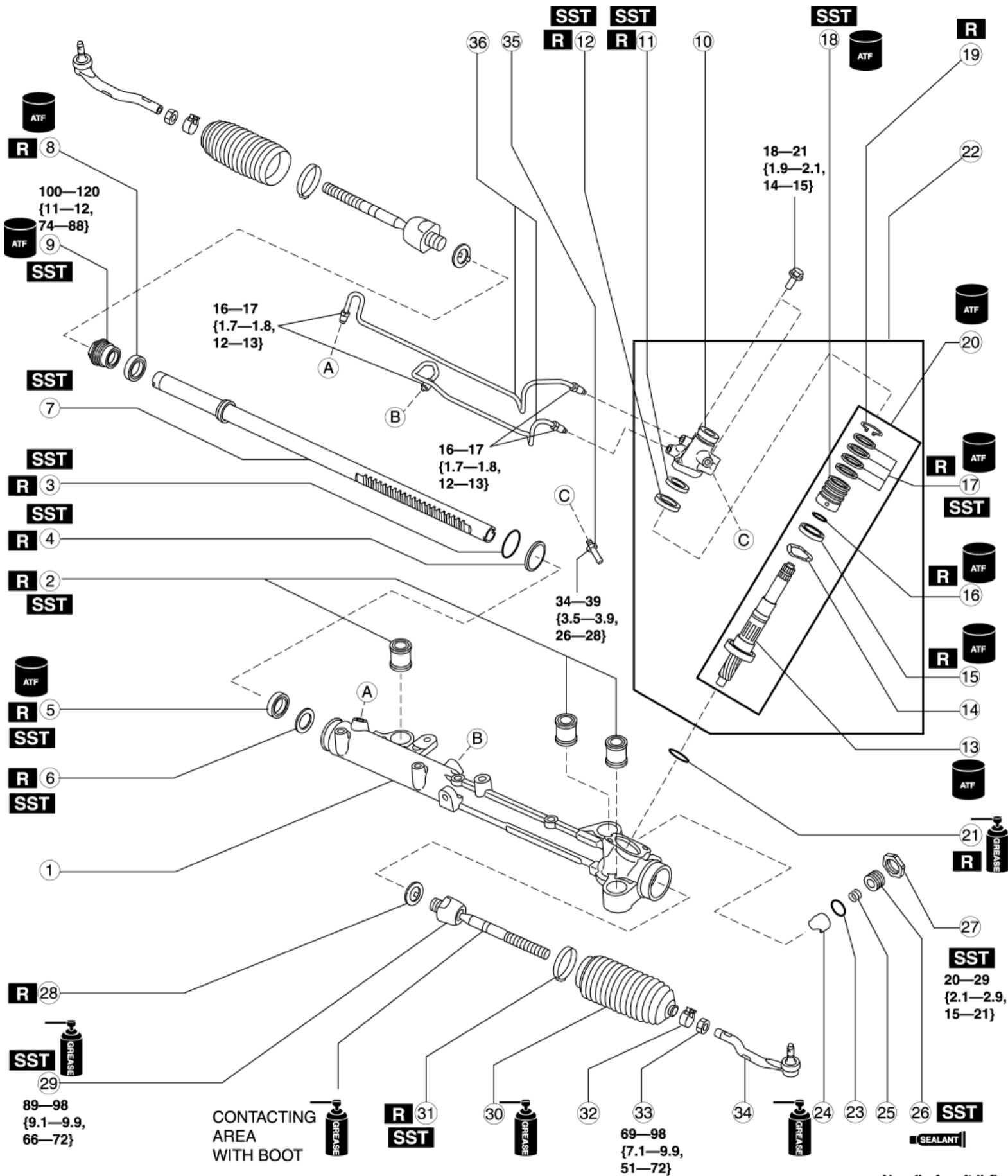
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2012 - Mazda6 - Steering

STEERING GEAR AND LINKAGE ASSEMBLY

CAUTION:

- To prevent damage to the steering gear when securing it in a vice, always secure it using aluminum plates and clean rags.
1. Assemble in the order indicated in the figure.



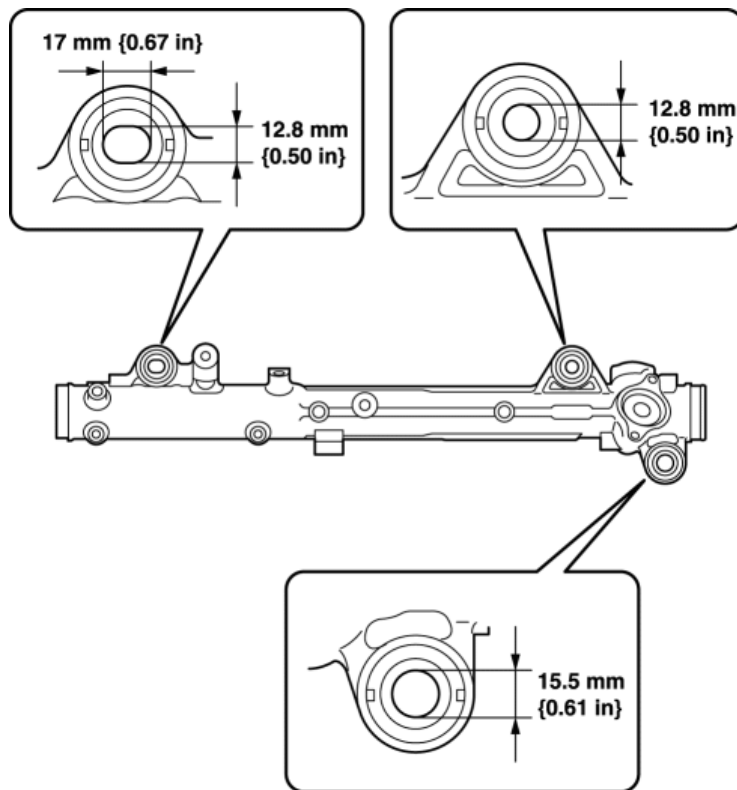
N·m {kgf·m, ft·lbf}

1	Gear housing
2	Mounting rubber (See Mounting Rubber Assembly Note.)
3	O-ring (See O-ring, Seal Ring Assembly Note.)
4	Seal ring (See O-ring, Seal Ring Assembly Note.)
5	Oil seal (pinion shaft side) (See Oil Seal (Piston Shaft Side), Back-up Cylinder Ring, and Steering Rack Assembly Note.)
6	Back-up cylinder ring (See Oil Seal (Piston Shaft Side), Back-up Cylinder Ring, and Steering Rack Assembly Note.)
7	Steering rack (See Oil Seal (Piston Shaft Side), Back-up Cylinder Ring, and Steering Rack Assembly Note.)
8	Oil seal (cylinder end side) (See Oil Seal (Cylinder End Side), Cylinder End Assembly Note.)
9	Cylinder end (See Oil Seal (Cylinder End Side), Cylinder End Assembly Note.)
10	Valve housing
11	Oil seal (See Oil Seal Assembly Note.)
12	Bush (See Bush Assembly Note.)
13	Pinion shaft
14	Wave washer (See Wave Washer and Oil Seal Assembly Note.)
15	Oil seal (See Wave Washer and Oil Seal Assembly Note.)
16	O-ring (See O-ring Assembly Note.)
17	Seal ring (See Seal Ring Assembly Note.)
18	Sleeve (See Sleeve, Clip Assembly Note.)
19	Clip (See Sleeve, Clip Assembly Note.)

20	Pinion shaft component (See Pinion Shaft Component Assembly Note.)
21	O-ring
22	Valve housing component
23	O-ring
24	Support yoke
25	Yoke spring
26	Adjusting cover (See Adjusting Cover, Locknut (Adjusting Cover) Assembly Note.)
27	Locknut (adjusting cover) (See Adjusting Cover, Locknut (Adjusting Cover) Assembly Note.)
28	Tie-rod lock washer (See Tie-Rod Lock Washer, Tie Rod Assembly Note.)
29	Tie rod (See Tie-Rod Lock Washer, Tie Rod Assembly Note.)
30	Boot
31	Boot band (See Boot Band Assembly Note.)
32	Boot clamp
33	Locknut
34	Tie-rod end (See Tie-Rod End Assembly Note.)
35	Return pipe
36	Oil pipe

Mounting Rubber Assembly Note

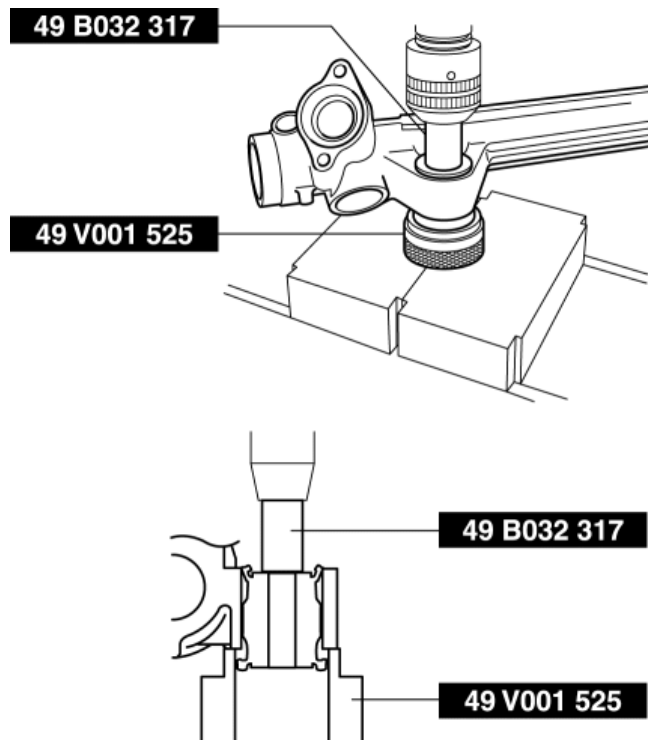
1. Apply soapy water to the rubber part of the mounting rubber.
2. Temporarily install the gear housing so that the mounting rubber is positioned as shown in the figure.



CAUTION:

- If the mounting rubber is assembled in the incorrect position and direction, it could result in a mis-installation when it is installed to the vehicle. When assembling the mounting rubber, assemble while verifying the position and direction.

3. Press fit the ear portion of the mounting rubber (lower side) using the **SSTs** until it projects from the gear housing as shown in the figure.



NOTE:

- Press fit the ear portion of the mounting rubber (upper side) until it partially enters the gear housing.

Substitution SST

- 49 B032 317

Outer diameter: 20—24.5 mm {0.79—0.96 in}

Height: 40 mm {1.6 in} or more

- **49 V001 525**

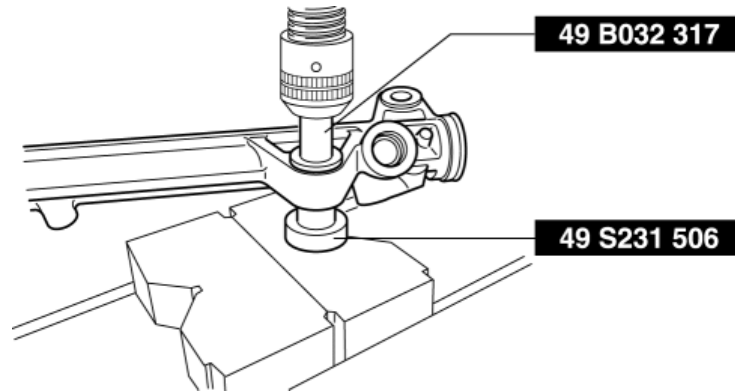
Inner diameter: 34 mm {1.3 in} or more

Outer diameter: 36—39 mm {1.42—1.53 in}

Plate thickness: 1 mm {0.04 in} or more

Height: 40 mm {1.6 in} or more

4. Reverse the gear housing as shown in the figure, and set the gear housing and the **SSTs** into the press.



Substitution SST

- **49 B032 317**

Outer diameter: 20—24.5 mm {0.79—0.96 in}

Height: 40 mm {1.6 in} or more

- **49 S231 506**

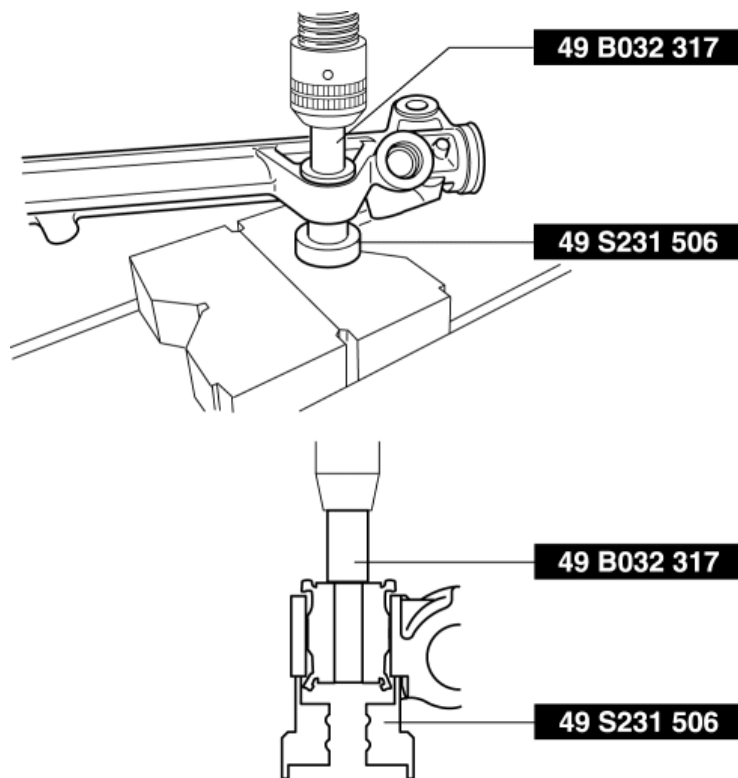
Inner diameter: 34 mm {1.3 in} or more

Outer diameter: 36—38 mm {1.42—1.49 in}

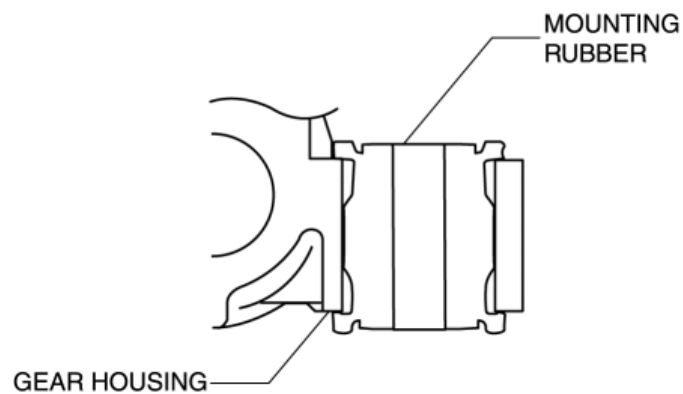
Plate thickness: 1—2 mm {0.04—0.07 in} or more

Height: 20 mm {0.79 in} or more

5. Press fit the mounting rubber using the **SSTs** and the press until the mounting rubber ear portion (upper side) contacts the gear housing.



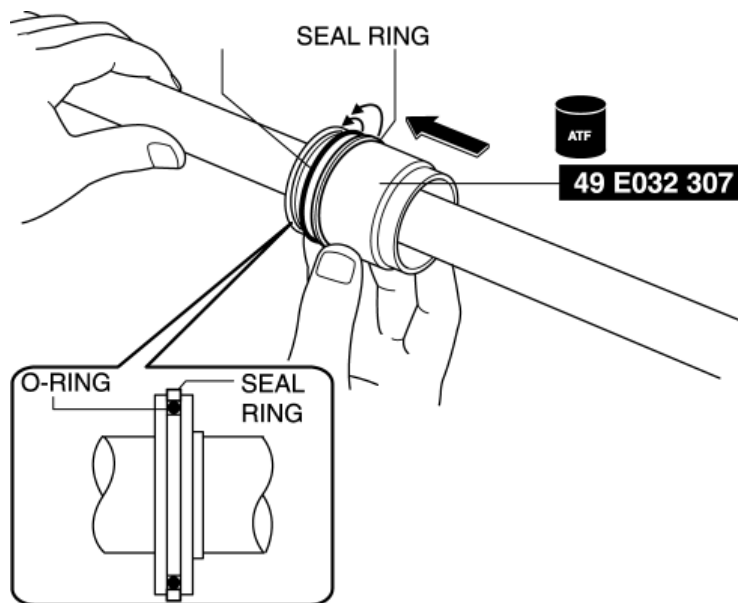
6. Verify that both mounting rubber ears are correctly assembled with no gaps between them and the gear housing as shown in the figure.



- If there are gaps, readjust their positions using the **SSTs** and the press.

O-ring, Seal Ring Assembly Note

1. Apply ATF to the surface of the **SST** (49 E032 307).
2. Press in the O-ring from the smaller diameter side of the **SST** and slide it to the end of the **SST**.



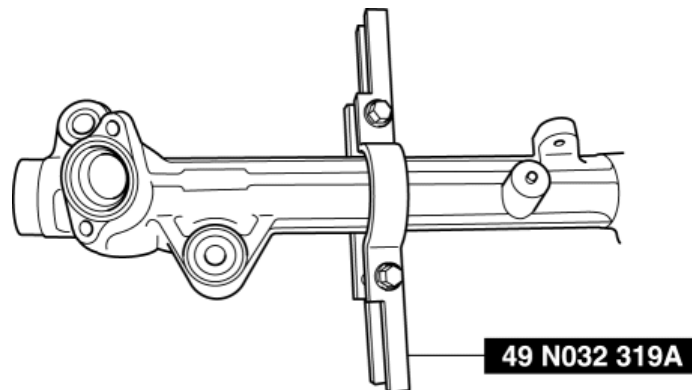
3. Run the **SST** (49 E032 307) along the steering rack, align it with the steering rack piston area, and assemble the O-ring to the piston groove.
4. Press in the seal ring from the small diameter side of the **SST** (49 E032 307), and uniformly press the seal ring while sliding it to the end of the **SST**.
5. While sliding the seal ring, assemble it to the top of the O-ring.
6. Press the perimeter of the seal ring by hand to seat it.

CAUTION:

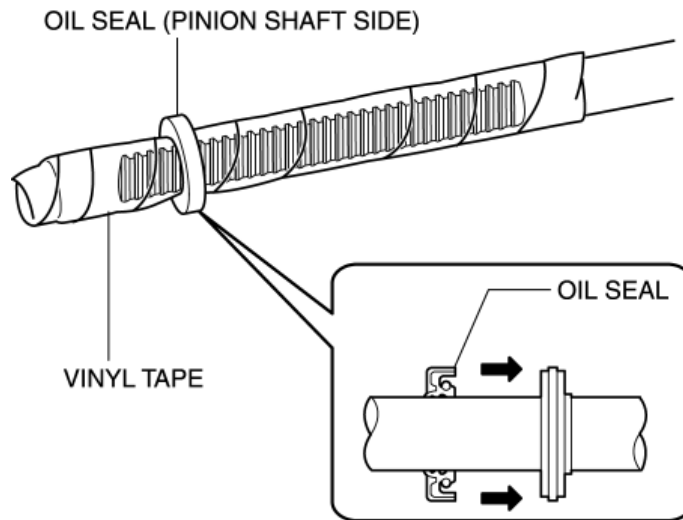
- Be careful not to damage the seal ring while seating it. When seating the seal ring be careful that it does not protrude or fall out of the groove.

Oil Seal (Piston Shaft Side), Back-up Cylinder Ring, and Steering Rack Assembly Note

1. Install the **SST** to the gear housing as shown in the figure.



2. Apply ATF to the oil seal (piston shaft side).
3. Wrap the engagement surface of the steering rack and its end in vinyl tape, and apply ATF to the surface.



4. Press the oil seal (piston shaft side) onto the steering rack, slowly pass it along the engagement surface until it contacts the steering rack piston.

NOTE:

- Assemble the oil seal (piston shaft side) groove area so that groove is facing the piston.

5. Remove the vinyl tape wrapped around the steering rack.

6. Insert the back-up cylinder ring onto the steering rack and slide it until it contacts the oil seal (piston shaft side).

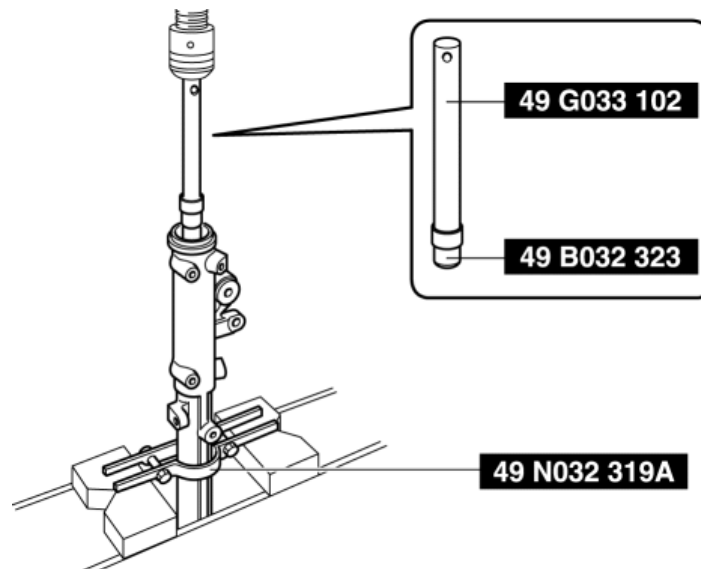
7. Apply grease to the steering rack engagement surface and to the perimeter of the engagement surface underside.

8. Insert the steering rack into the gear housing and press in until the back-up cylinder ring and oil seal (pinion shaft side) contacts the end of the gear housing.

CAUTION:

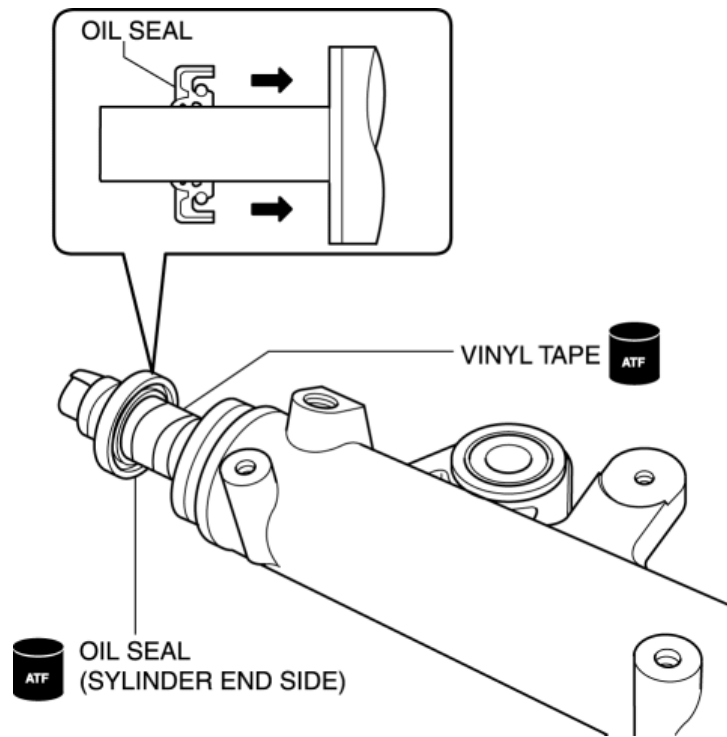
- When inserting the steering rack, be careful not to deform or damage the oil seal (piston shaft side) and seal ring.;
When inserting the steering rack, assemble slowly and do not apply excessive force so as to prevent deformation and damage to the oil seal (piston shaft side) and the seal ring.

9. Press the steering rack using the **SSTs** and the press, and assemble the oil seal (piston shaft side) and the back-up cylinder ring.



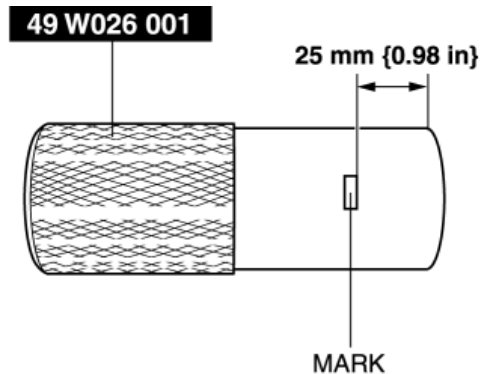
Oil Seal (Cylinder End Side), Cylinder End Assembly Note

1. Wrap the end of the steering rack in vinyl tape, and apply ATF to the surface.
2. Apply ATF to the oil seal (cylinder end side) and assemble to the steering rack.



NOTE:

- Assemble the oil seal (cylinder end side) groove area so that the groove is facing the steering rack piston.
3. Press the oil seal (cylinder end side) into the gear housing and remove the vinyl tape.
 4. Place a mark on the **SST** at the position **25 mm { 0.98 in }** from the end of the **SST**.



Substitution SST

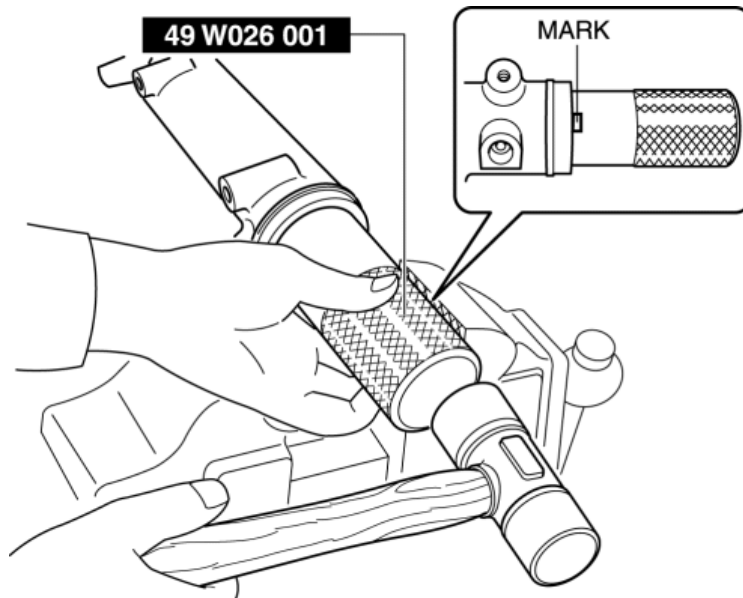
• **49 W026 001**

Outer diameter: 40—44 mm {1.6—1.7 in}

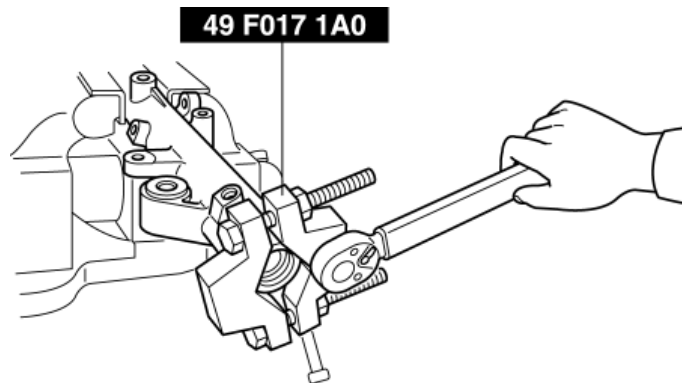
Inner diameter: 26 mm {1.0 in} or more

Height: 120 mm {4.72 in} or more

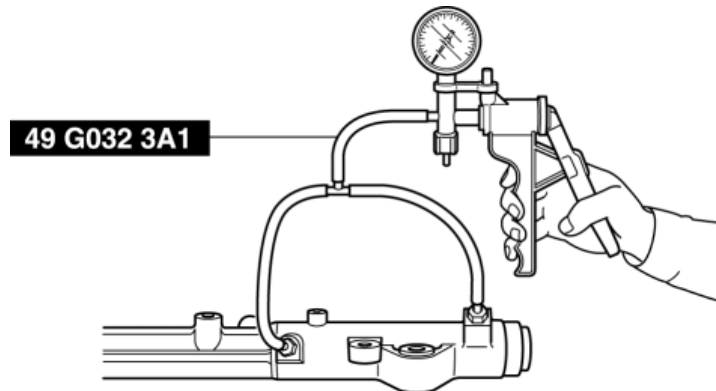
5. Move the steering rack towards the steering rack piston side until it stops.
6. Tap in the oil seal (cylinder end side) to the position where the mark placed in Step 4 is lined up with the gear housing end using the **SST**.



7. Apply ATF to the inner surface of the cylinder end.
8. Apply thread-locking compound to three threads or more of the cylinder end and assemble the cylinder end to the gear housing.
9. Tighten the cylinder end to the specified torque using the **SST**.



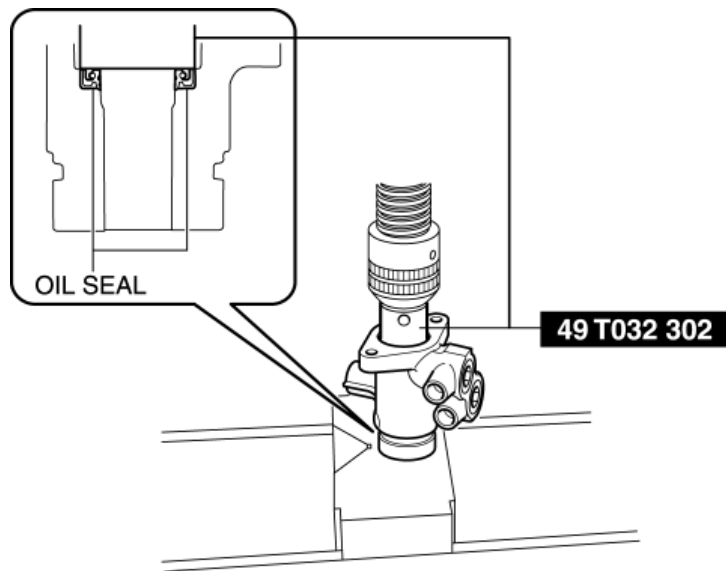
10. Perform the cylinder air tightness inspection using the following procedure.



11. Install the **SST** to the power cylinder section of the gear housing.
12. Apply **53.3 kPa { 400 mmHg, 15.7 inHg }** of vacuum with a vacuum pump and verify that it holds for **30 s**.
 - If there is a malfunction, inspect the gear housing inner surface and the oil seal, and the O-ring and seal ring for damage, and repair or replace if necessary.

Oil Seal Assembly Note

1. Using the **SST** and press, assemble the oil seal to the valve housing.



NOTE:

- Assemble the oil seal groove area so that it is facing the gear housing.

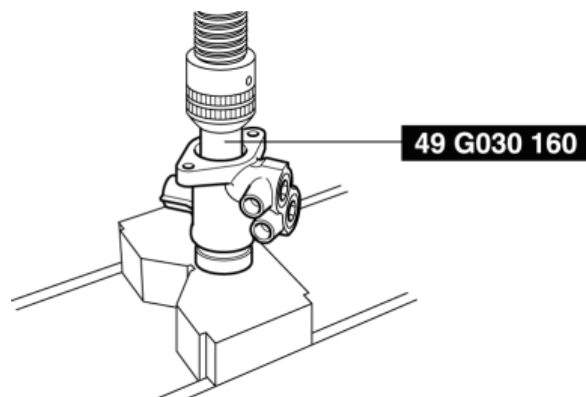
Substitution SST

- **49 T032 302**

Outer diameter: 27—30 mm {1.07—1.18 in}

Bush Assembly Note

1. Assemble the bush to the valve housing using the **SST** and a press.



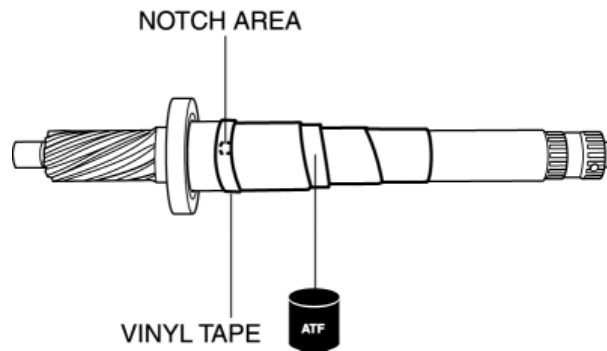
Substitution SST

- **49 G030 160**

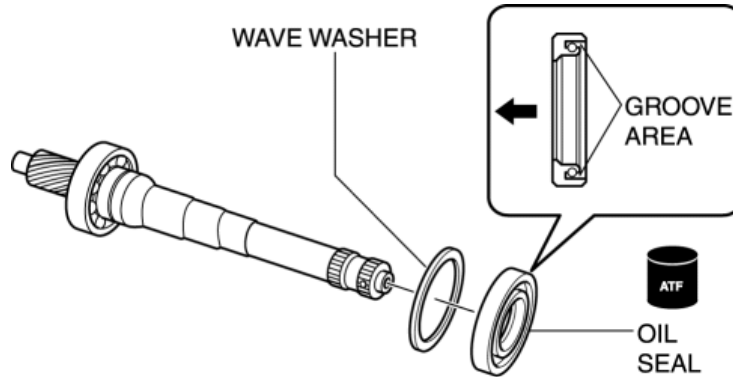
Outer diameter: 28—32 mm {1.11—1.25 in}

Wave Washer and Oil Seal Assembly Note

1. Wrap vinyl tape around the pinion shaft from the notch area of the pinion shaft as shown in the figure, and apply ATF to the surface.



2. Apply ATF to the oil seal and assemble the wave washer and oil seal to the pinion shaft.



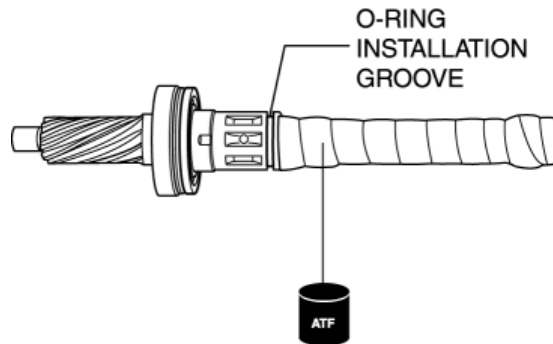
NOTE:

- Assemble the oil seal groove area so that it is facing the opposite direction from the bearing.

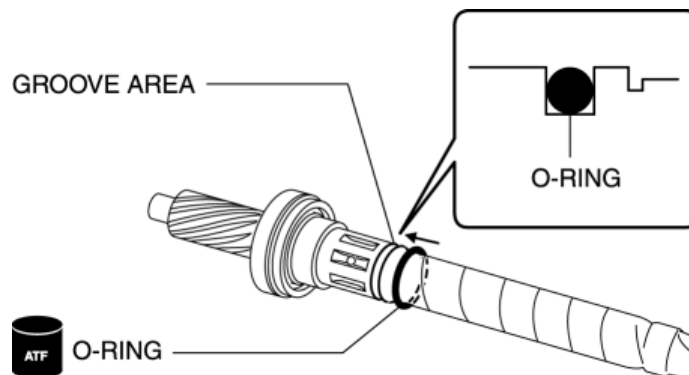
3. Remove the tape wrapped around the pinion shaft.

O-ring Assembly Note

1. Wrap vinyl tape from the O-ring installation groove to the end of the pinion shaft, and apply ATF to the surface.



2. Apply ATF to the O-ring and slide it to the pinion shaft groove area.



CAUTION:

- If the O-ring is widened excessively, it could deform or be damaged when it is installed to the sleeve. Be careful not to widen the O-ring beyond what is necessary.

3. Remove the vinyl tape wrapped around the pinion shaft.

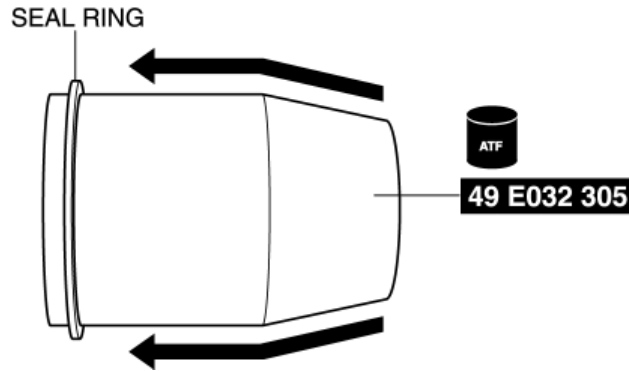
4. Press the O-ring perimeter by hand to seat it.

CAUTION:

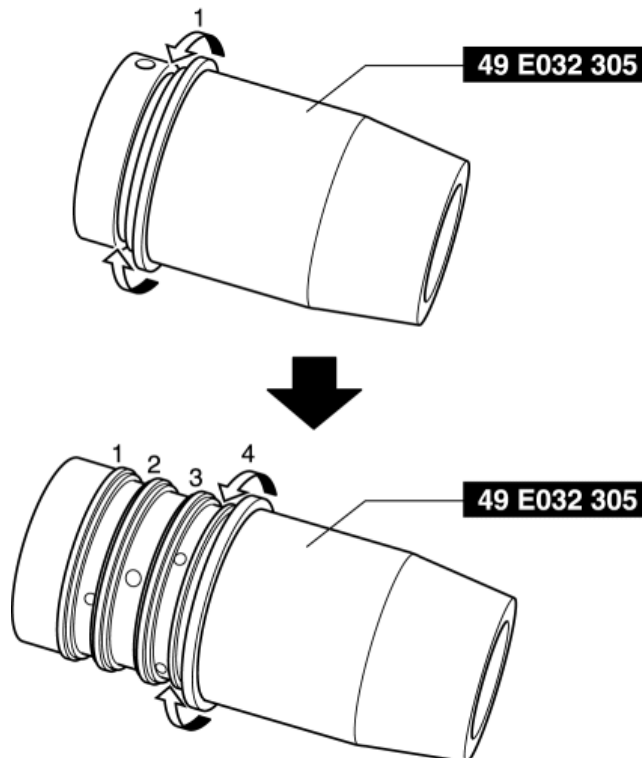
- Be careful not to damage the O-ring when seating it. When seating the O-ring, be careful that the O-ring does not protrude from or fall out of the groove.

Seal Ring Assembly Note

1. Apply ATF to the surface of the **SST** (49 E032 305).
2. Press the seal ring from the tapered side of the **SST**, and slide it to the end of the **SST** while pressing the seal ring uniformly.



3. Align the end of the **SST** (seal ring assembly side) with the sleeve groove.

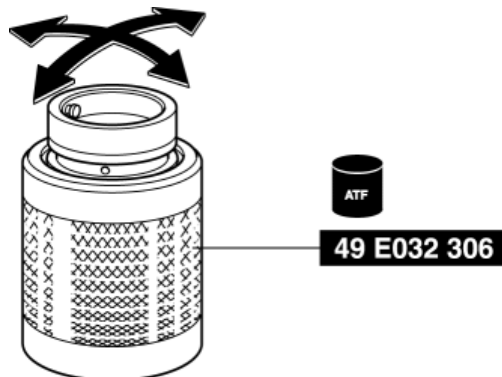


4. Slide and assemble the seal ring to the sleeve groove.
5. Repeating Steps 1 to 4, assemble the 4 seal rings.

Sleeve, Clip Assembly Note

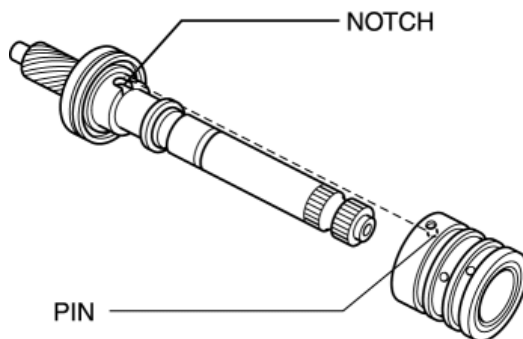
1. Apply ATF to the inner surface of the **SST** (49 E032 306).

2. Slowly insert the sleeve into the **SST** while tilting it to each end, and seat the seal ring.



3. Apply ATF to the inner surface of the sleeve and to the pinion shaft.

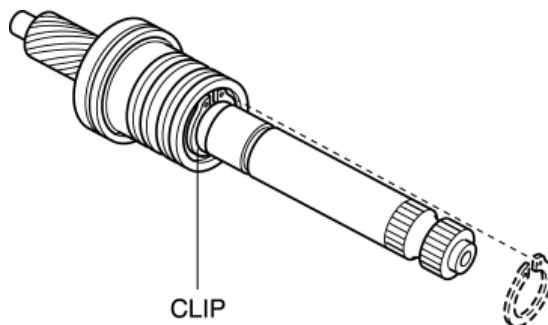
4. Align the pin of the sleeve inner surface with the pinion shaft notch as shown in the figure, and assemble the sleeve to the pinion shaft.



CAUTION:

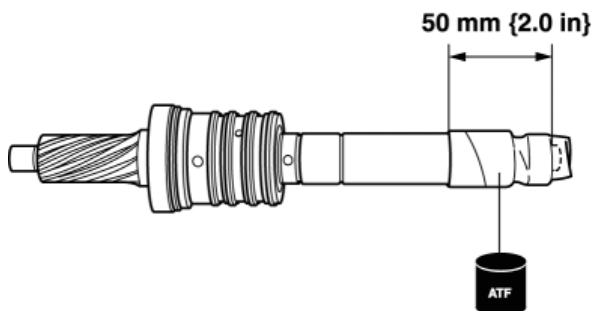
- When assembling the sleeve, be careful not to deform or damage the seal ring assembled to the pinion shaft. When assembling the sleeve, assemble slowly and do not apply excessive force so as to prevent deformation and damage to the seal ring.

5. Assemble the clip to the groove of the pinion shaft as shown in the figure.

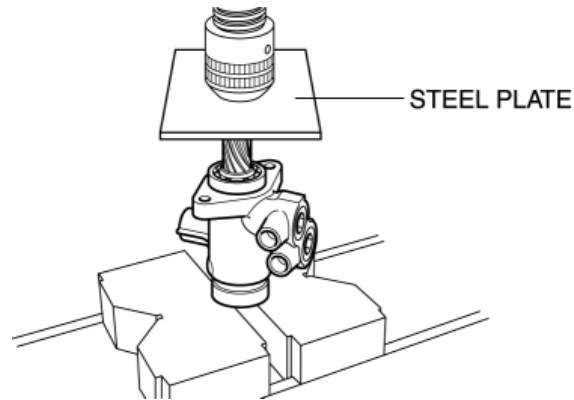


Pinion Shaft Component Assembly Note

1. Wrap vinyl tape to the end of the pinion shaft at the position **50 mm { 2.0 in }** from the end of the piston shaft, and apply ATF to the surface.



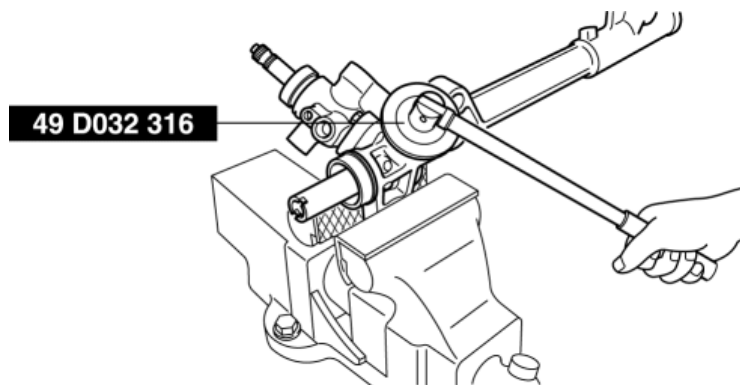
2. Assemble the pinion shaft component to the valve housing using a press and steel plate.



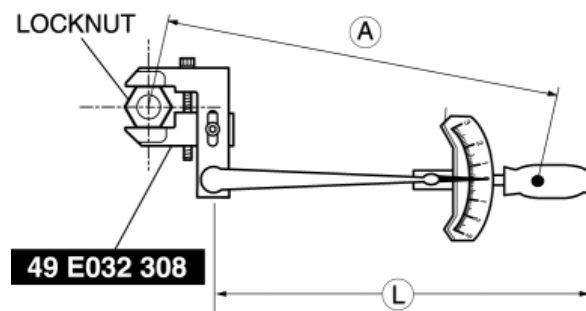
3. Remove the vinyl tape wrapped around the pinion shaft.

Adjusting Cover, Locknut (Adjusting Cover) Assembly Note

1. Apply screw locking agent to the screw area of the adjusting cover, and assemble to the gear housing.
2. Tighten the adjusting cover with a tightening torque of **20—29 N·m { 2.1—2.9 kgf·m, 15—21 ft·lbf }** and then loosen.
3. Tighten the adjusting cover again with a tightening torque of **5.9 N·m { 60 kgf·cm, 52 in·lbf }**.
4. Return the adjusting cover to **10—20°** using the **SST**.

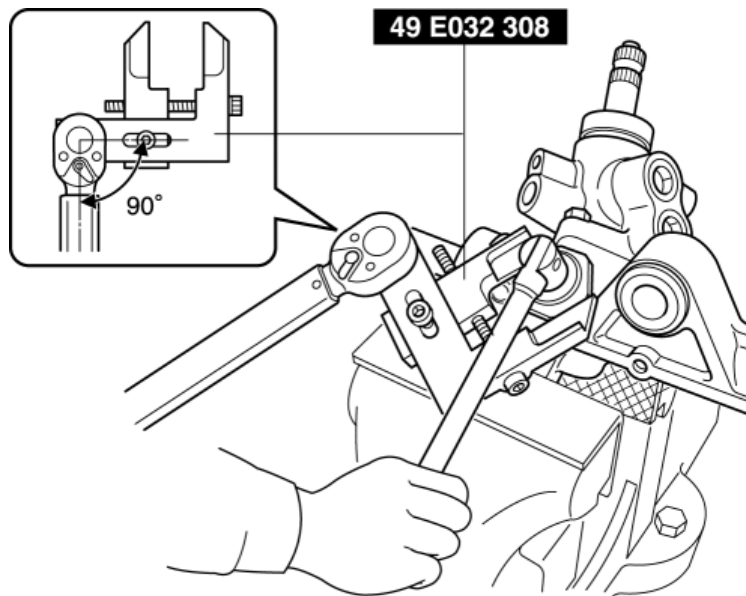


5. Combine the the **SST** with the torque wrench, then measure A and L as shown in the figure.



- A: Length from the center of the locknut to the grip.
- L: Length of the torque wrench.

6. Recalculate the torque by using torque formulas, then lock the adjusting cover against rotation and tighten the locknut (adjusting cover) using the **SST**.



CAUTION:

- If a tool is installed to the SST (49 E032 308), install it perpendicular as shown in the figure. If it is installed incorrectly, the SST will readily come off the locknut which could result in damage to the locknut during the servicing.

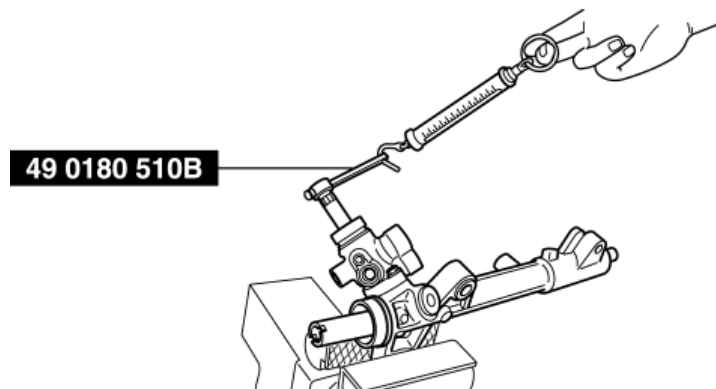
Tightening torque

- 20—29 N·m {2.1—2.9 kgf·m, 15—21 ft·lbf}

Torque formula

Torque unit	Formula
N·m	$N \cdot m \times [L/A]$
kgf·m	$kgf \cdot m \times [L/A]$
ft·lbf	$ft \cdot lbf \times [L/A]$

7. Measure the rotational torque of the pinion shaft using the **SST** and a pull scale.



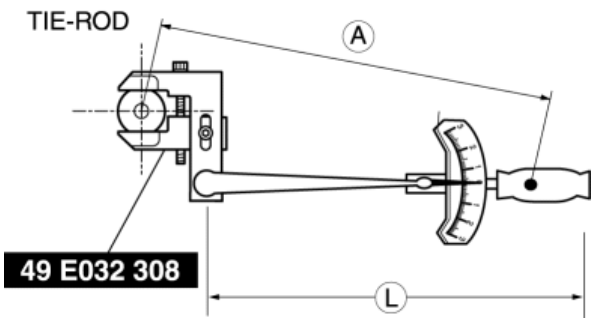
Pinion shaft rotation torque

- Center of rack $\pm 90^\circ$: 1.4—1.8 N·m {15—18 kgf·cm, 13—15 in·lbf}
- [Pull scale reading: 14—18 N {1.5—1.8 kgf, 3.2—4.0 lbf}
- Except center of rack $\pm 90^\circ$: 2.1 N·m {21 kgf·cm, 19 in·lbf} or less
- [Pull scale reading: 21 N {2.1 kgf, 4.7 lbf} or less

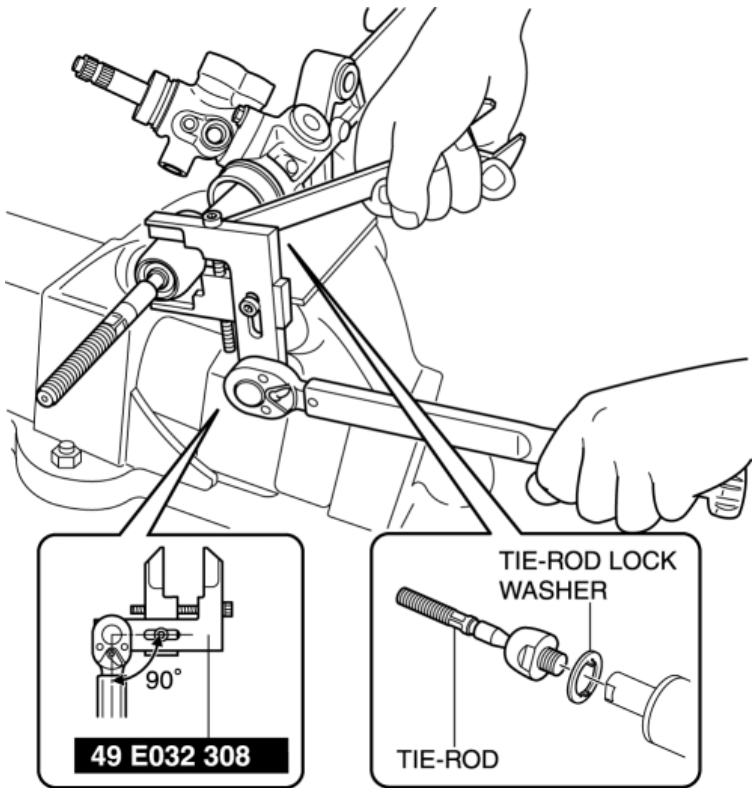
8. If it is not within the specification, remove the locknut and loosen the adjusting cover, and then repeat Steps 2 to 6.

Tie-Rod Lock Washer, Tie Rod Assembly Note

- 1. Temporarily install the tie-rod lock washer and the tie rod to the steering rack.
- 2. Combine the the **SST** with the torque wrench, then measure A and L as shown in the figure.



- A: Length from the center of the tie-rod to the grip.
 - L: Length of the torque wrench.
3. Recalculate the torque by using torque formulas, then set the **SST** against the flat surface area of the tie rod and set the wrench against the flat surface area of the steering rack, and then tighten the tie rod to the specified torque.



CAUTION:

- If a tool is installed to the SST (49 E032 308), install it perpendicular as shown in the figure. If it is installed incorrectly, the SST will readily come off the tie rod which could result in damage to the tie rod during the servicing.

Tightening torque

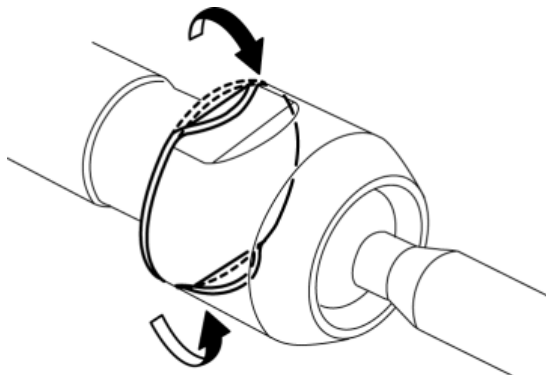
- 89—98 N·m { 9.1—9.9 kgf·m, 66—72 ft·lbf }

Torque formula

Torque unit	Formula
N·m	$N \cdot m \times [L/A]$
kgf·m	$kgf \cdot m \times [L/A]$

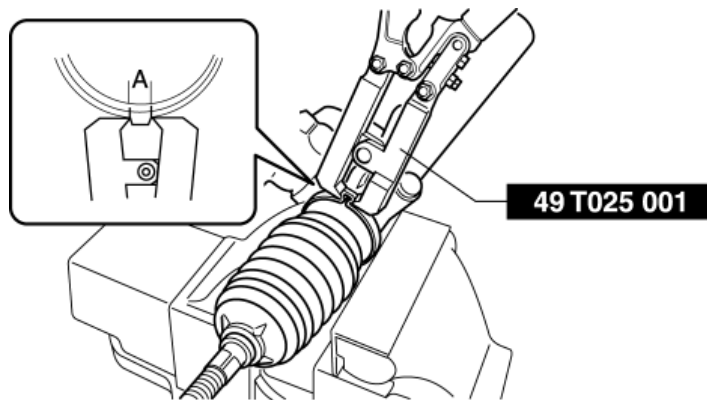
ft·lbf	$\text{ft} \cdot \text{lbf} \times [L/A]$
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4. Using a hammer, flatten the tabs on the tie-rod lock washer to lock the tie rod.



Boot Band Assembly Note

1. Crimp the boot band using the **SST**.



2. Verify that width A of the crimp is within the specification.

- If width A of the crimp exceeds the specification, reduce opening width A of the **SST** and recrimp the boot band.
- If width A of the crimp is less than the specification, increase opening width A of the **SST** and crimp a new boot band.

Standard Width A

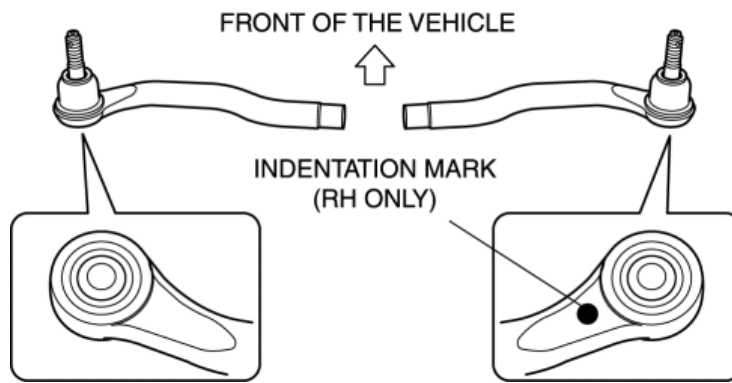
- 2—3 mm {0.08—0.11 in}

3. Rotate the boot by hand and verify that it is securely assembled with the boot band.

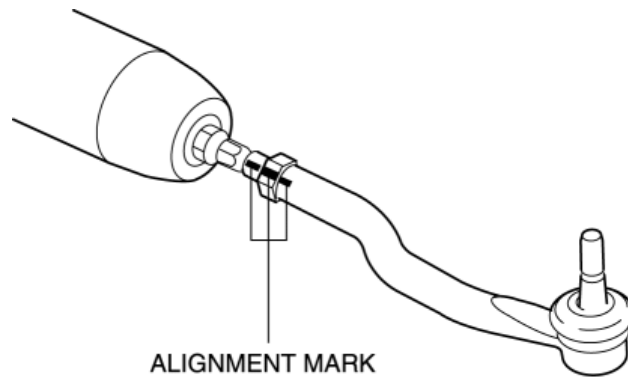
Tie-Rod End Assembly Note

NOTE:

- Only the tie-rod end on the right side has the indentation mark in the position shown in the figure. Verify if the part is for the left or right side before installation because the left and right parts of the tie-rod end have different shapes.

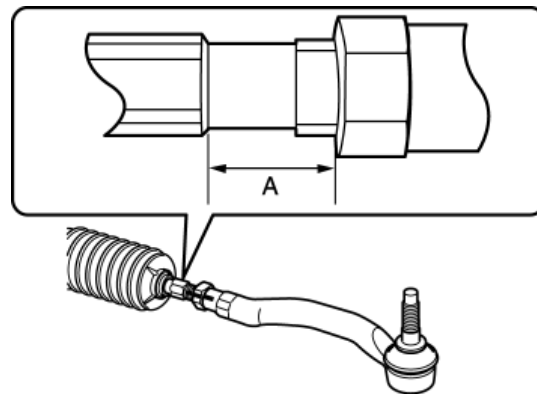


1. Align the alignment marks made before removing the tie-rod end, and then assemble it to the tie-rod.



- If there are no alignment marks, go to the following procedure.

2. Adjust dimension A shown in the figure to the standard, and assemble.



Standard Dimension A

- 15.7—22.7 mm {0.619—0.893 in}

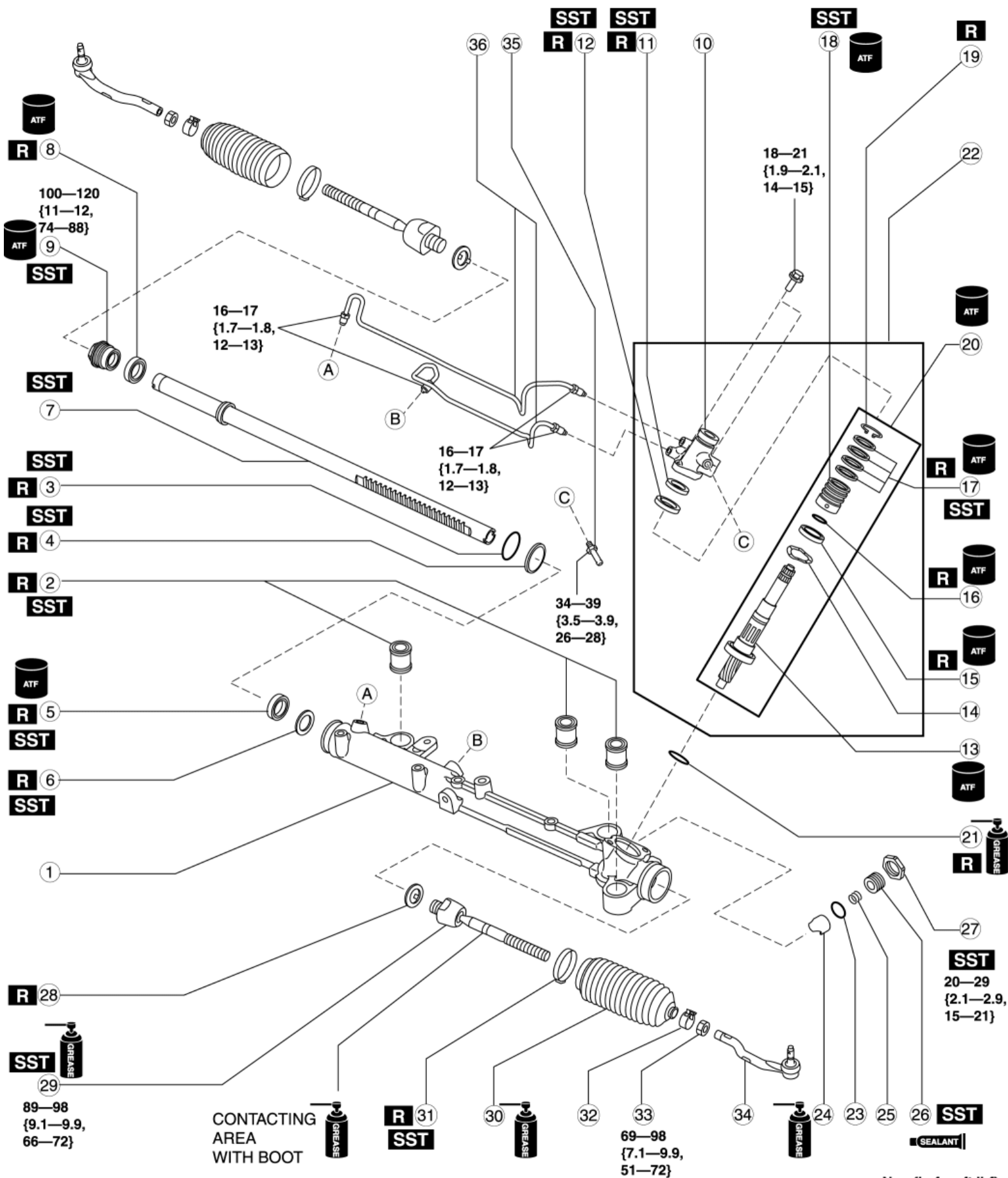
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2012 - Mazda6 - Steering

STEERING GEAR AND LINKAGE ASSEMBLY

CAUTION:

- To prevent damage to the steering gear when securing it in a vice, always secure it using aluminum plates and clean rags.
1. Assemble in the order indicated in the figure.



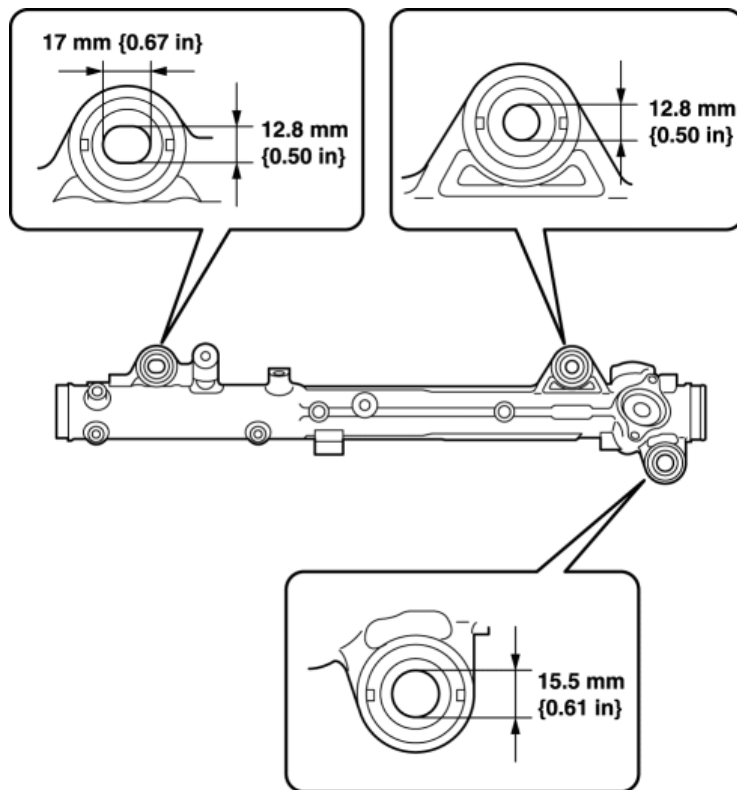
N·m {kgf·m, ft·lbf}

1	Gear housing
2	Mounting rubber (See Mounting Rubber Assembly Note.)
3	O-ring (See O-ring, Seal Ring Assembly Note.)
4	Seal ring (See O-ring, Seal Ring Assembly Note.)
5	Oil seal (pinion shaft side) (See Oil Seal (Piston Shaft Side), Back-up Cylinder Ring, and Steering Rack Assembly Note.)
6	Back-up cylinder ring (See Oil Seal (Piston Shaft Side), Back-up Cylinder Ring, and Steering Rack Assembly Note.)
7	Steering rack (See Oil Seal (Piston Shaft Side), Back-up Cylinder Ring, and Steering Rack Assembly Note.)
8	Oil seal (cylinder end side) (See Oil Seal (Cylinder End Side), Cylinder End Assembly Note.)
9	Cylinder end (See Oil Seal (Cylinder End Side), Cylinder End Assembly Note.)
10	Valve housing
11	Oil seal (See Oil Seal Assembly Note.)
12	Bush (See Bush Assembly Note.)
13	Pinion shaft
14	Wave washer (See Wave Washer and Oil Seal Assembly Note.)
15	Oil seal (See Wave Washer and Oil Seal Assembly Note.)
16	O-ring (See O-ring Assembly Note.)
17	Seal ring (See Seal Ring Assembly Note.)
18	Sleeve (See Sleeve, Clip Assembly Note.)
19	Clip (See Sleeve, Clip Assembly Note.)

20	Pinion shaft component (See Pinion Shaft Component Assembly Note.)
21	O-ring
22	Valve housing component
23	O-ring
24	Support yoke
25	Yoke spring
26	Adjusting cover (See Adjusting Cover, Locknut (Adjusting Cover) Assembly Note.)
27	Locknut (adjusting cover) (See Adjusting Cover, Locknut (Adjusting Cover) Assembly Note.)
28	Tie-rod lock washer (See Tie-Rod Lock Washer, Tie Rod Assembly Note.)
29	Tie rod (See Tie-Rod Lock Washer, Tie Rod Assembly Note.)
30	Boot
31	Boot band (See Boot Band Assembly Note.)
32	Boot clamp
33	Locknut
34	Tie-rod end (See Tie-Rod End Assembly Note.)
35	Return pipe
36	Oil pipe

Mounting Rubber Assembly Note

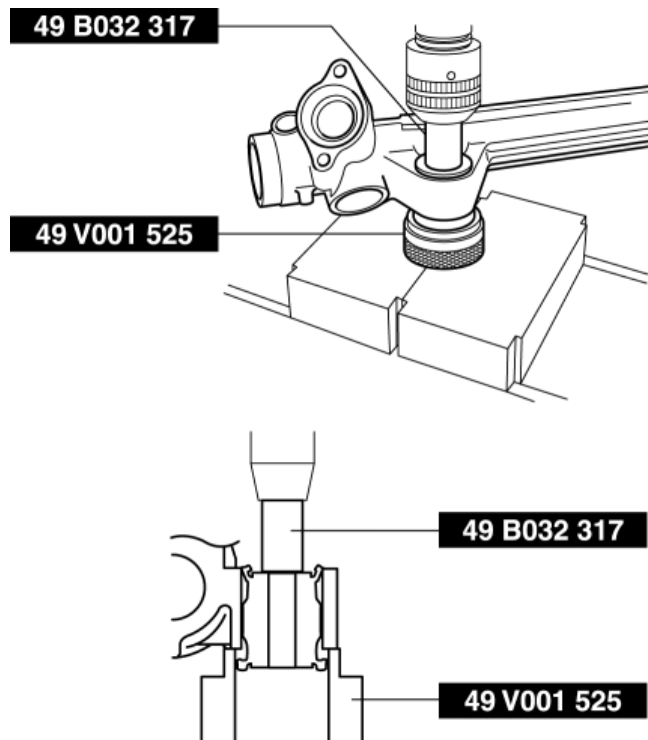
1. Apply soapy water to the rubber part of the mounting rubber.
2. Temporarily install the gear housing so that the mounting rubber is positioned as shown in the figure.



CAUTION:

- If the mounting rubber is assembled in the incorrect position and direction, it could result in a mis-installation when it is installed to the vehicle. When assembling the mounting rubber, assemble while verifying the position and direction.

3. Press fit the ear portion of the mounting rubber (lower side) using the **SSTs** until it projects from the gear housing as shown in the figure.



NOTE:

- Press fit the ear portion of the mounting rubber (upper side) until it partially enters the gear housing.

Substitution SST

- 49 B032 317

Outer diameter: 20—24.5 mm {0.79—0.96 in}

Height: 40 mm {1.6 in} or more

- **49 V001 525**

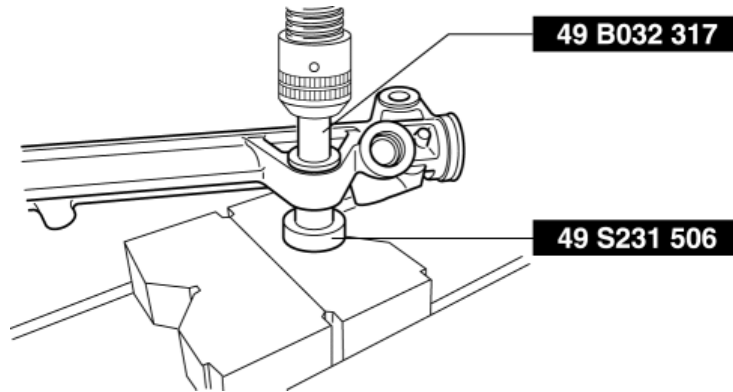
Inner diameter: 34 mm {1.3 in} or more

Outer diameter: 36—39 mm {1.42—1.53 in}

Plate thickness: 1 mm {0.04 in} or more

Height: 40 mm {1.6 in} or more

4. Reverse the gear housing as shown in the figure, and set the gear housing and the **SSTs** into the press.



Substitution SST

- **49 B032 317**

Outer diameter: 20—24.5 mm {0.79—0.96 in}

Height: 40 mm {1.6 in} or more

- **49 S231 506**

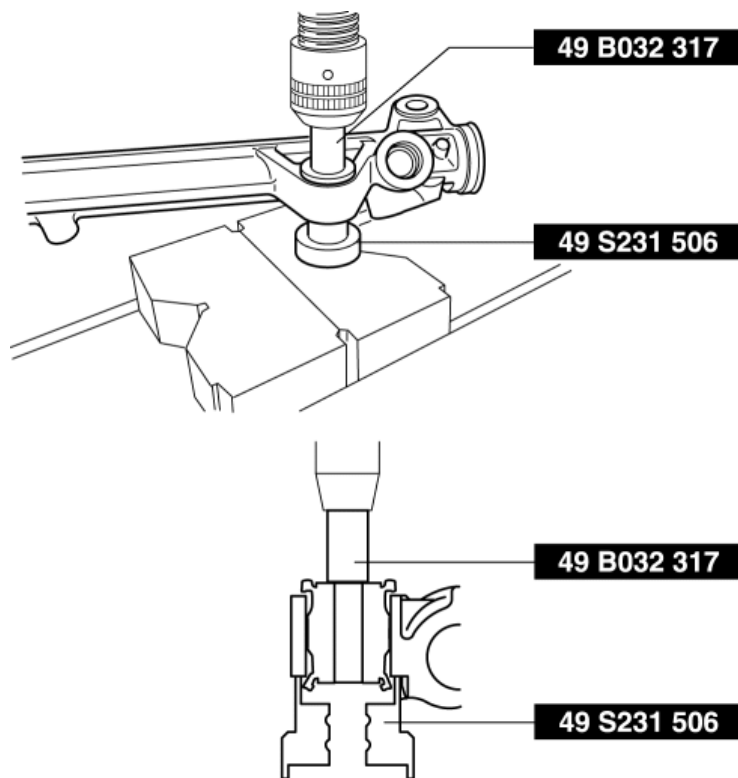
Inner diameter: 34 mm {1.3 in} or more

Outer diameter: 36—38 mm {1.42—1.49 in}

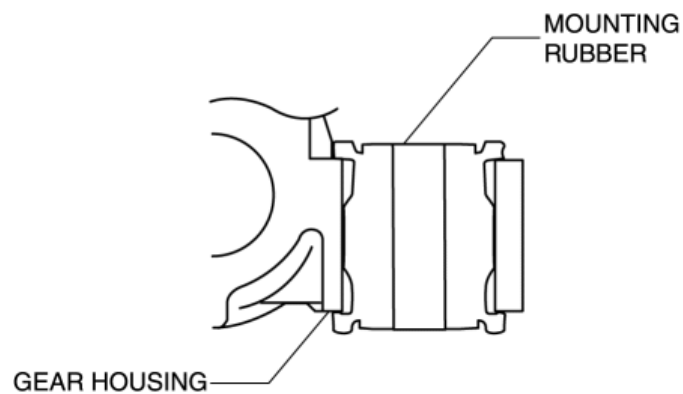
Plate thickness: 1—2 mm {0.04—0.07 in} or more

Height: 20 mm {0.79 in} or more

5. Press fit the mounting rubber using the **SSTs** and the press until the mounting rubber ear portion (upper side) contacts the gear housing.



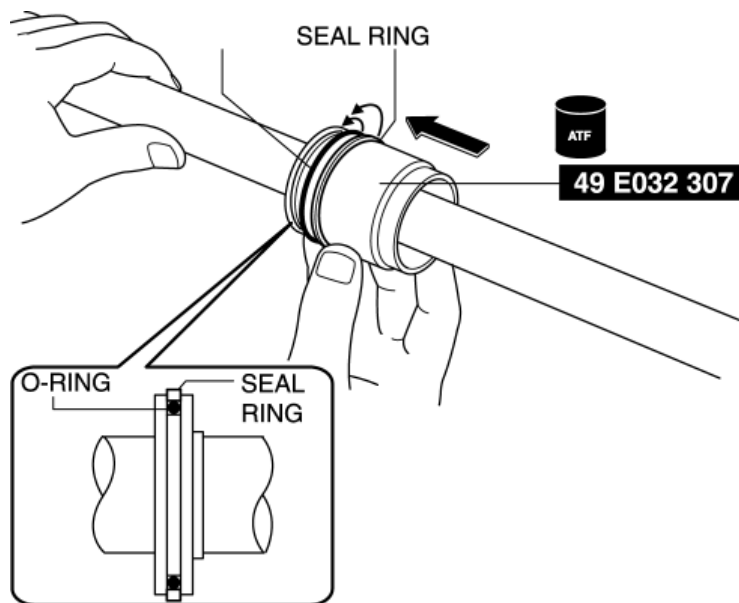
6. Verify that both mounting rubber ears are correctly assembled with no gaps between them and the gear housing as shown in the figure.



- If there are gaps, readjust their positions using the **SSTs** and the press.

O-ring, Seal Ring Assembly Note

1. Apply ATF to the surface of the **SST** (49 E032 307).
2. Press in the O-ring from the smaller diameter side of the **SST** and slide it to the end of the **SST**.



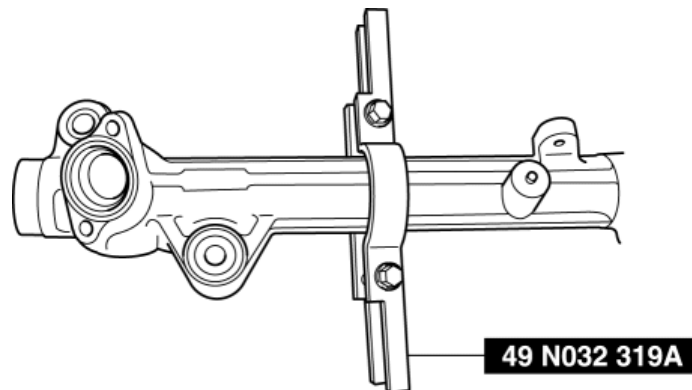
3. Run the **SST** (49 E032 307) along the steering rack, align it with the steering rack piston area, and assemble the O-ring to the piston groove.
4. Press in the seal ring from the small diameter side of the **SST** (49 E032 307), and uniformly press the seal ring while sliding it to the end of the **SST**.
5. While sliding the seal ring, assemble it to the top of the O-ring.
6. Press the perimeter of the seal ring by hand to seat it.

CAUTION:

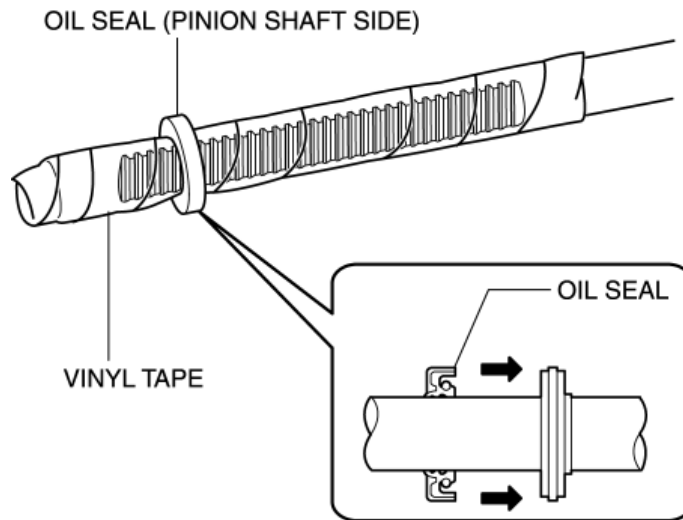
- Be careful not to damage the seal ring while seating it. When seating the seal ring be careful that it does not protrude or fall out of the groove.

Oil Seal (Piston Shaft Side), Back-up Cylinder Ring, and Steering Rack Assembly Note

1. Install the **SST** to the gear housing as shown in the figure.



2. Apply ATF to the oil seal (piston shaft side).
3. Wrap the engagement surface of the steering rack and its end in vinyl tape, and apply ATF to the surface.



4. Press the oil seal (piston shaft side) onto the steering rack, slowly pass it along the engagement surface until it contacts the steering rack piston.

NOTE:

- Assemble the oil seal (piston shaft side) groove area so that groove is facing the piston.

5. Remove the vinyl tape wrapped around the steering rack.

6. Insert the back-up cylinder ring onto the steering rack and slide it until it contacts the oil seal (piston shaft side).

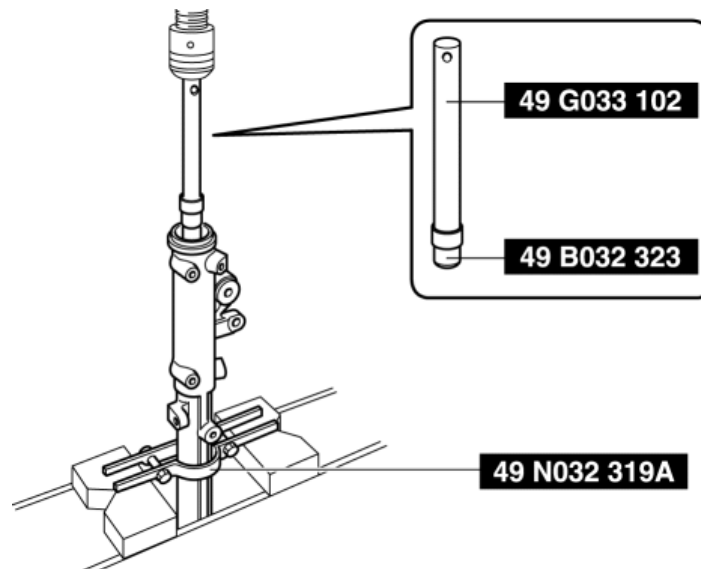
7. Apply grease to the steering rack engagement surface and to the perimeter of the engagement surface underside.

8. Insert the steering rack into the gear housing and press in until the back-up cylinder ring and oil seal (pinion shaft side) contacts the end of the gear housing.

CAUTION:

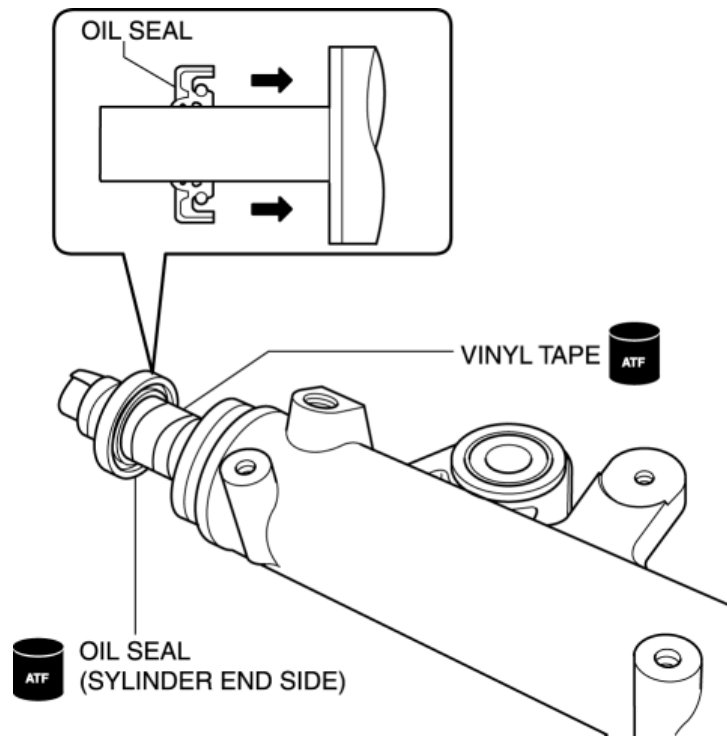
- When inserting the steering rack, be careful not to deform or damage the oil seal (piston shaft side) and seal ring.;
When inserting the steering rack, assemble slowly and do not apply excessive force so as to prevent deformation and damage to the oil seal (piston shaft side) and the seal ring.

9. Press the steering rack using the **SSTs** and the press, and assemble the oil seal (piston shaft side) and the back-up cylinder ring.



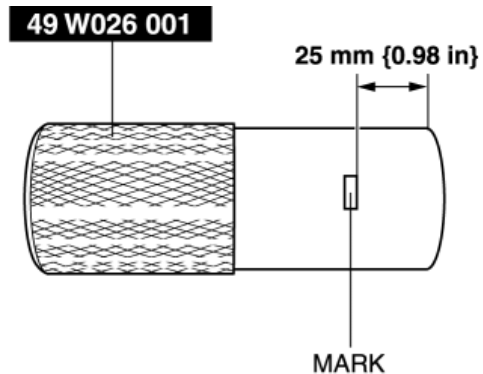
Oil Seal (Cylinder End Side), Cylinder End Assembly Note

1. Wrap the end of the steering rack in vinyl tape, and apply ATF to the surface.
2. Apply ATF to the oil seal (cylinder end side) and assemble to the steering rack.



NOTE:

- Assemble the oil seal (cylinder end side) groove area so that the groove is facing the steering rack piston.
3. Press the oil seal (cylinder end side) into the gear housing and remove the vinyl tape.
 4. Place a mark on the **SST** at the position **25 mm { 0.98 in }** from the end of the **SST**.



Substitution SST

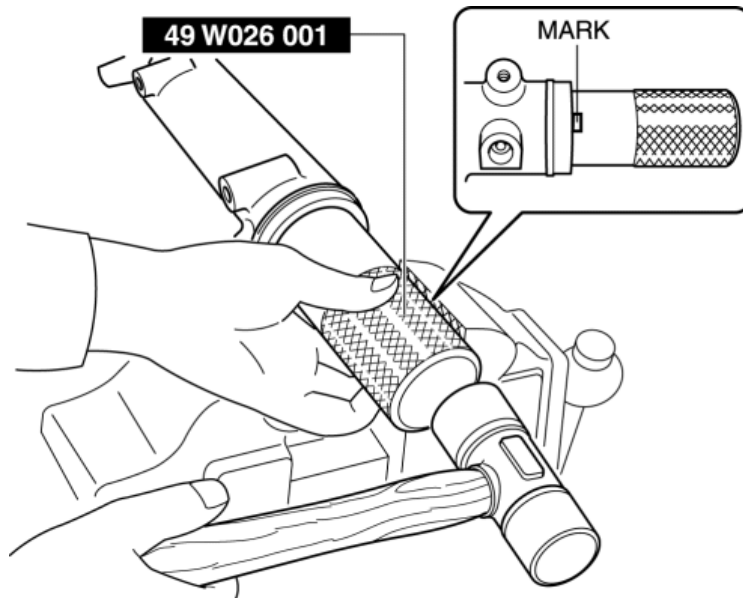
• **49 W026 001**

Outer diameter: 40—44 mm {1.6—1.7 in}

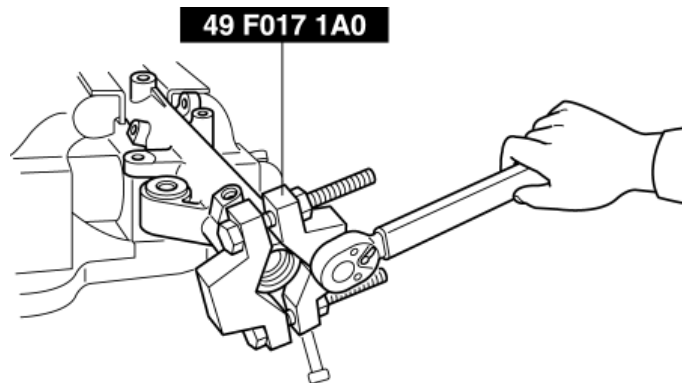
Inner diameter: 26 mm {1.0 in} or more

Height: 120 mm {4.72 in} or more

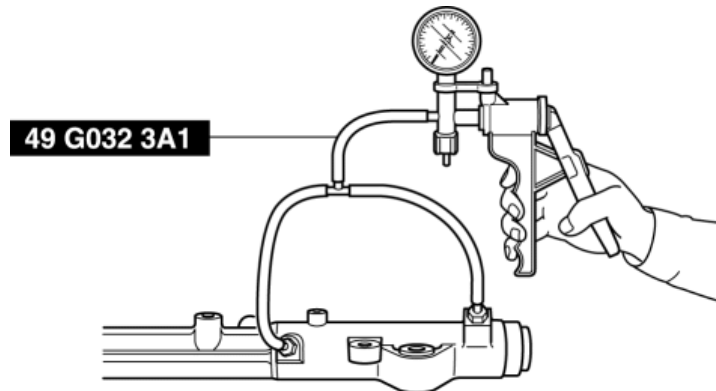
5. Move the steering rack towards the steering rack piston side until it stops.
6. Tap in the oil seal (cylinder end side) to the position where the mark placed in Step 4 is lined up with the gear housing end using the **SST**.



7. Apply ATF to the inner surface of the cylinder end.
8. Apply thread-locking compound to three threads or more of the cylinder end and assemble the cylinder end to the gear housing.
9. Tighten the cylinder end to the specified torque using the **SST**.



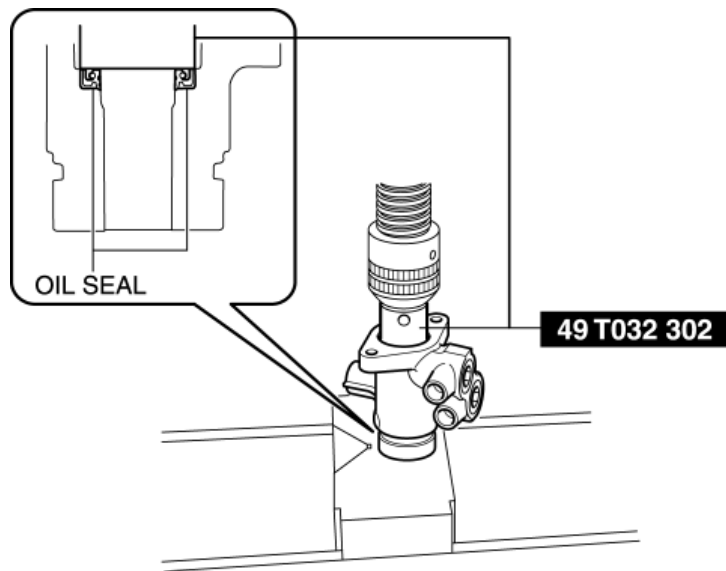
10. Perform the cylinder air tightness inspection using the following procedure.



11. Install the **SST** to the power cylinder section of the gear housing.
12. Apply **53.3 kPa { 400 mmHg, 15.7 inHg }** of vacuum with a vacuum pump and verify that it holds for **30 s**.
 - If there is a malfunction, inspect the gear housing inner surface and the oil seal, and the O-ring and seal ring for damage, and repair or replace if necessary.

Oil Seal Assembly Note

1. Using the **SST** and press, assemble the oil seal to the valve housing.



NOTE:

- Assemble the oil seal groove area so that it is facing the gear housing.

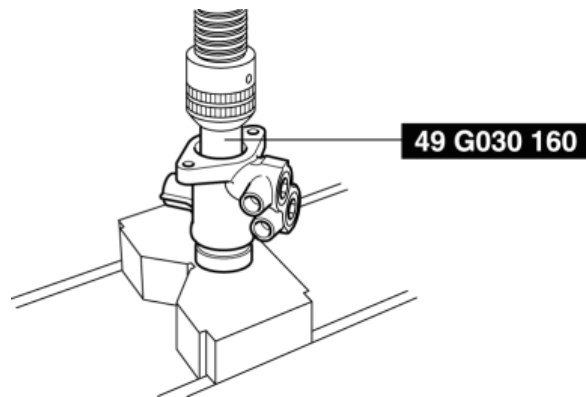
Substitution SST

- **49 T032 302**

Outer diameter: 27—30 mm {1.07—1.18 in}

Bush Assembly Note

1. Assemble the bush to the valve housing using the **SST** and a press.



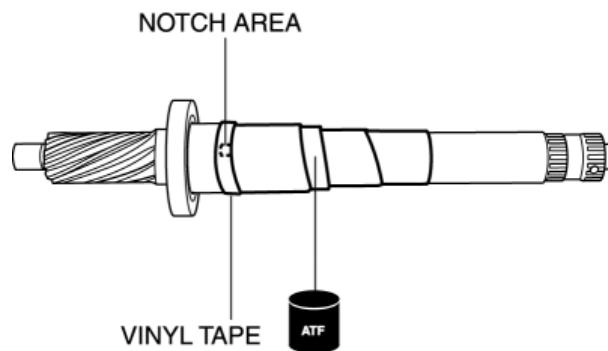
Substitution SST

- **49 G030 160**

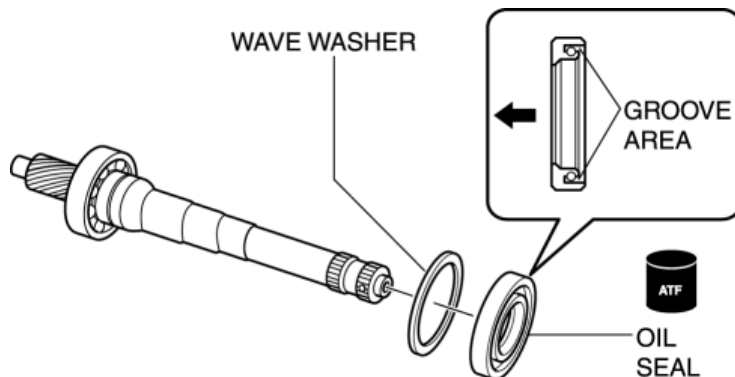
Outer diameter: 28—32 mm {1.11—1.25 in}

Wave Washer and Oil Seal Assembly Note

1. Wrap vinyl tape around the pinion shaft from the notch area of the pinion shaft as shown in the figure, and apply ATF to the surface.



2. Apply ATF to the oil seal and assemble the wave washer and oil seal to the pinion shaft.



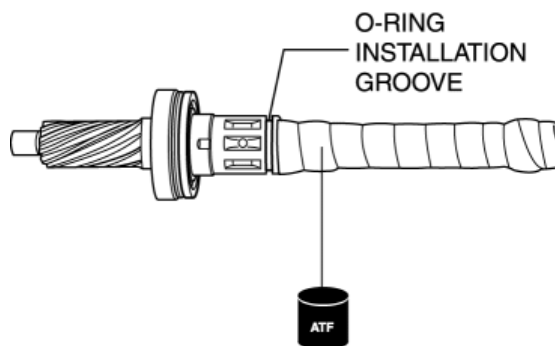
NOTE:

- Assemble the oil seal groove area so that it is facing the opposite direction from the bearing.

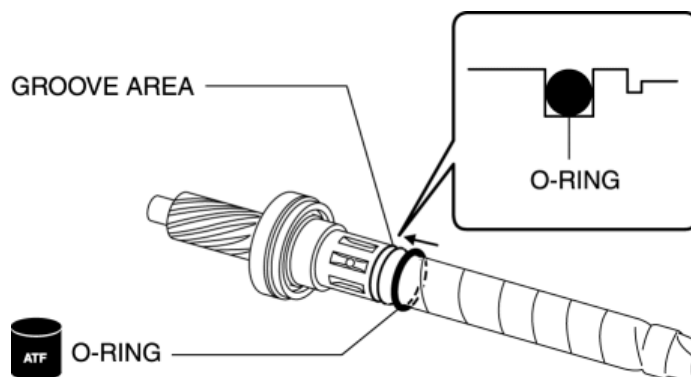
3. Remove the tape wrapped around the pinion shaft.

O-ring Assembly Note

1. Wrap vinyl tape from the O-ring installation groove to the end of the pinion shaft, and apply ATF to the surface.



2. Apply ATF to the O-ring and slide it to the pinion shaft groove area.



CAUTION:

- If the O-ring is widened excessively, it could deform or be damaged when it is installed to the sleeve. Be careful not to widen the O-ring beyond what is necessary.

3. Remove the vinyl tape wrapped around the pinion shaft.

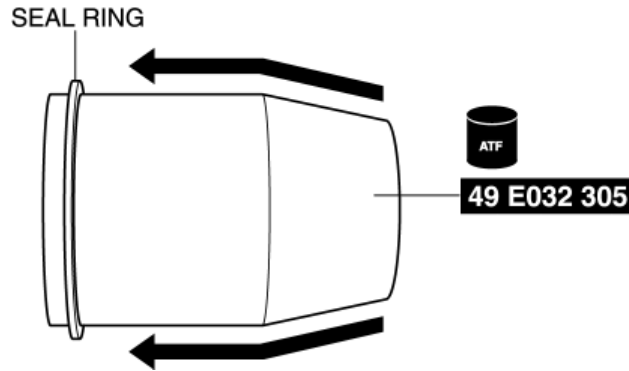
4. Press the O-ring perimeter by hand to seat it.

CAUTION:

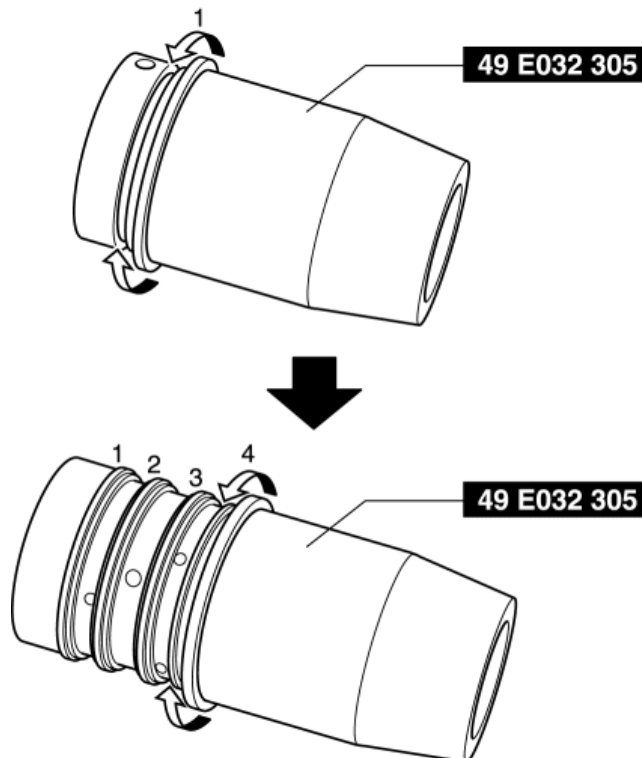
- Be careful not to damage the O-ring when seating it. When seating the O-ring, be careful that the O-ring does not protrude from or fall out of the groove.

Seal Ring Assembly Note

1. Apply ATF to the surface of the **SST** (49 E032 305).
2. Press the seal ring from the tapered side of the **SST**, and slide it to the end of the **SST** while pressing the seal ring uniformly.



3. Align the end of the **SST** (seal ring assembly side) with the sleeve groove.



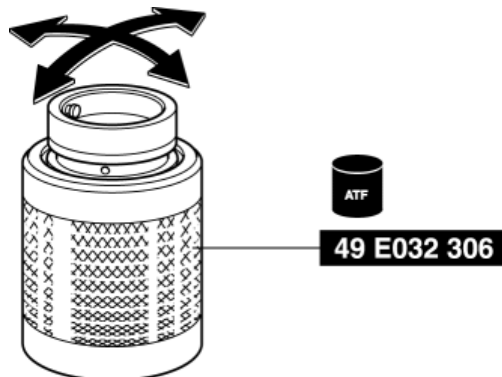
4. Slide and assemble the seal ring to the sleeve groove.

5. Repeating Steps 1 to 4, assemble the 4 seal rings.

Sleeve, Clip Assembly Note

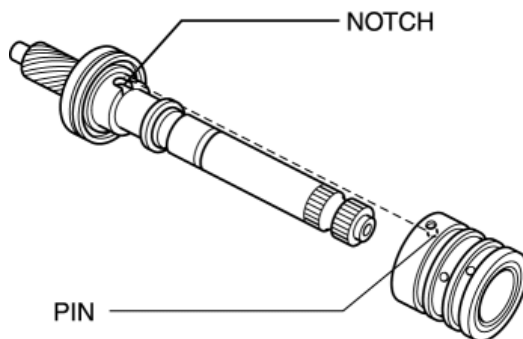
1. Apply ATF to the inner surface of the **SST** (49 E032 306).

2. Slowly insert the sleeve into the **SST** while tilting it to each end, and seat the seal ring.



3. Apply ATF to the inner surface of the sleeve and to the pinion shaft.

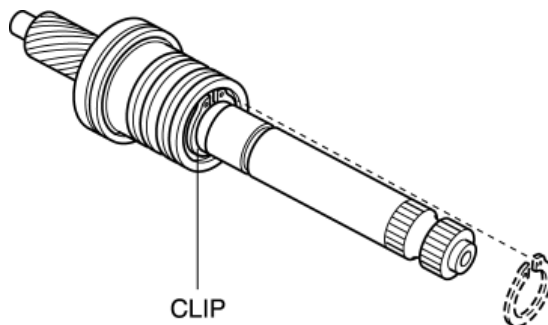
4. Align the pin of the sleeve inner surface with the pinion shaft notch as shown in the figure, and assemble the sleeve to the pinion shaft.



CAUTION:

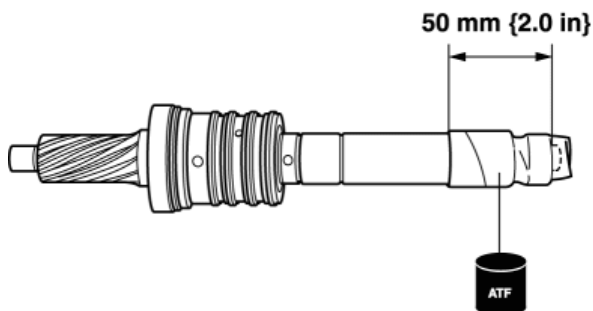
- When assembling the sleeve, be careful not to deform or damage the seal ring assembled to the pinion shaft. When assembling the sleeve, assemble slowly and do not apply excessive force so as to prevent deformation and damage to the seal ring.

5. Assemble the clip to the groove of the pinion shaft as shown in the figure.

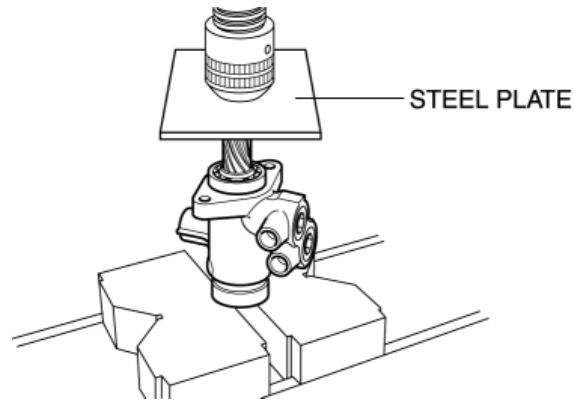


Pinion Shaft Component Assembly Note

1. Wrap vinyl tape to the end of the pinion shaft at the position **50 mm { 2.0 in }** from the end of the piston shaft, and apply ATF to the surface.



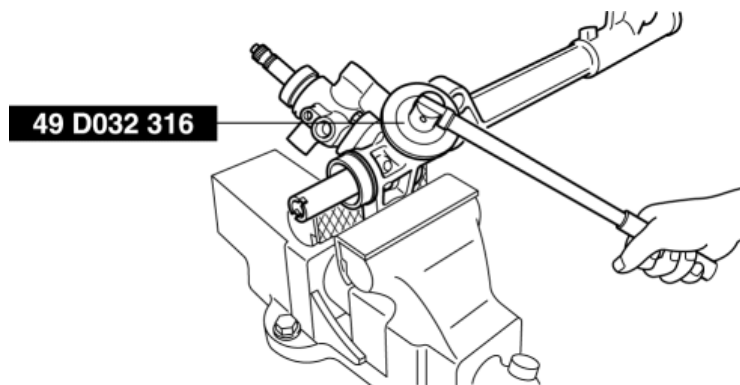
2. Assemble the pinion shaft component to the valve housing using a press and steel plate.



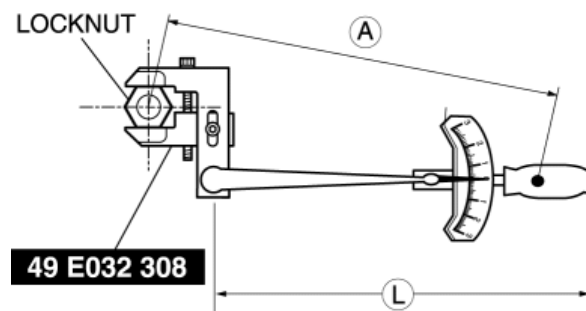
3. Remove the vinyl tape wrapped around the pinion shaft.

Adjusting Cover, Locknut (Adjusting Cover) Assembly Note

1. Apply screw locking agent to the screw area of the adjusting cover, and assemble to the gear housing.
2. Tighten the adjusting cover with a tightening torque of **20—29 N·m { 2.1—2.9 kgf·m, 15—21 ft·lbf }** and then loosen.
3. Tighten the adjusting cover again with a tightening torque of **5.9 N·m { 60 kgf·cm, 52 in·lbf }**.
4. Return the adjusting cover to **10—20°** using the **SST**.

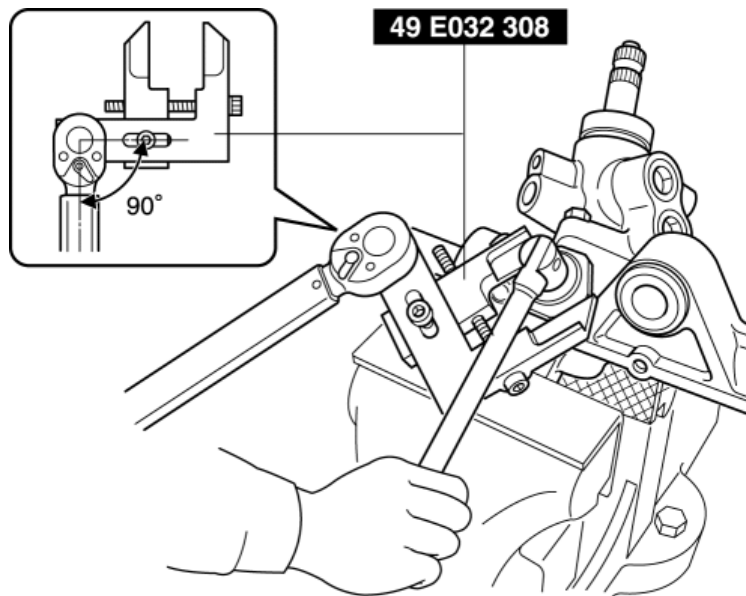


5. Combine the the **SST** with the torque wrench, then measure A and L as shown in the figure.



- A: Length from the center of the locknut to the grip.
- L: Length of the torque wrench.

6. Recalculate the torque by using torque formulas, then lock the adjusting cover against rotation and tighten the locknut (adjusting cover) using the **SST**.



CAUTION:

- If a tool is installed to the SST (49 E032 308), install it perpendicular as shown in the figure. If it is installed incorrectly, the SST will readily come off the locknut which could result in damage to the locknut during the servicing.

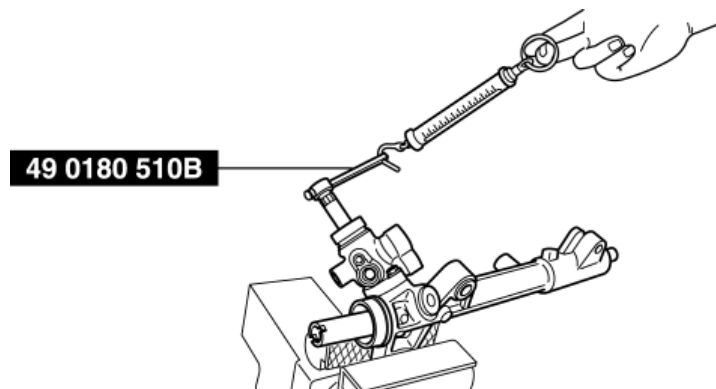
Tightening torque

- 20—29 N·m {2.1—2.9 kgf·m, 15—21 ft·lbf}

Torque formula

Torque unit	Formula
N·m	$N \cdot m \times [L/A]$
kgf·m	$kgf \cdot m \times [L/A]$
ft·lbf	$ft \cdot lbf \times [L/A]$

7. Measure the rotational torque of the pinion shaft using the **SST** and a pull scale.



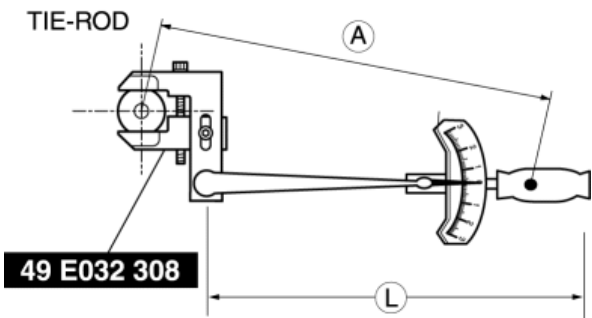
Pinion shaft rotation torque

- Center of rack $\pm 90^\circ$: 1.4—1.8 N·m {15—18 kgf·cm, 13—15 in·lbf}
- [Pull scale reading: 14—18 N {1.5—1.8 kgf, 3.2—4.0 lbf}
- Except center of rack $\pm 90^\circ$: 2.1 N·m {21 kgf·cm, 19 in·lbf} or less
- [Pull scale reading: 21 N {2.1 kgf, 4.7 lbf} or less

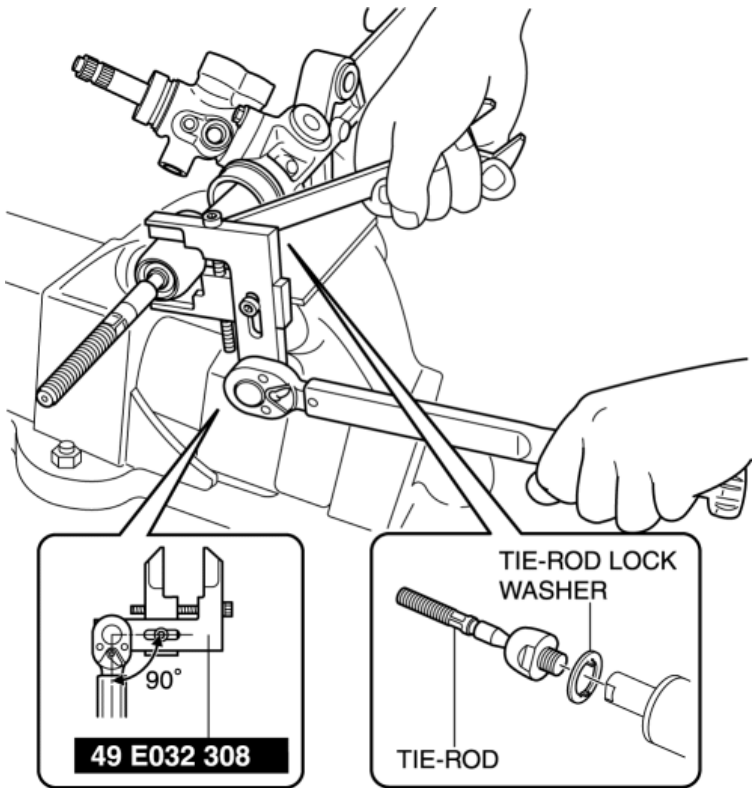
8. If it is not within the specification, remove the locknut and loosen the adjusting cover, and then repeat Steps 2 to 6.

Tie-Rod Lock Washer, Tie Rod Assembly Note

- 1. Temporarily install the tie-rod lock washer and the tie rod to the steering rack.
- 2. Combine the the **SST** with the torque wrench, then measure A and L as shown in the figure.



- A: Length from the center of the tie-rod to the grip.
 - L: Length of the torque wrench.
3. Recalculate the torque by using torque formulas, then set the **SST** against the flat surface area of the tie rod and set the wrench against the flat surface area of the steering rack, and then tighten the tie rod to the specified torque.



CAUTION:

- If a tool is installed to the SST (49 E032 308), install it perpendicular as shown in the figure. If it is installed incorrectly, the SST will readily come off the tie rod which could result in damage to the tie rod during the servicing.

Tightening torque

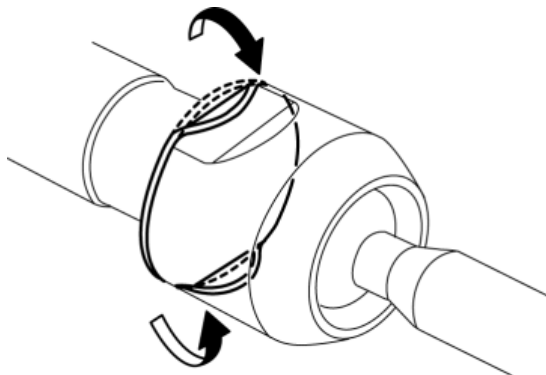
- 89—98 N·m { 9.1—9.9 kgf·m, 66—72 ft·lbf }

Torque formula

Torque unit	Formula
N·m	$N \cdot m \times [L/A]$
kgf·m	$kgf \cdot m \times [L/A]$

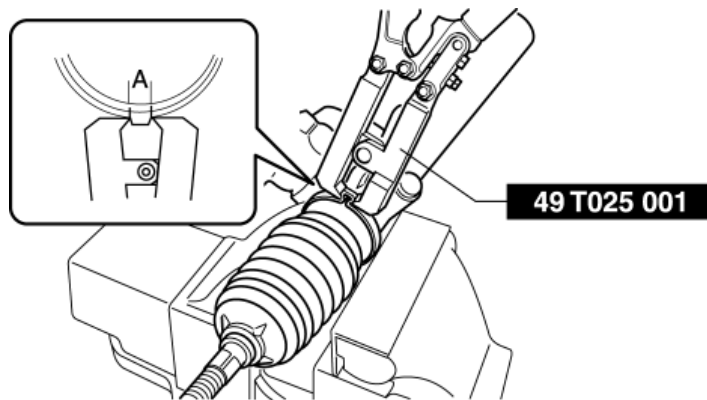
ft·lbf	$\text{ft} \cdot \text{lbf} \times [L/A]$
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4. Using a hammer, flatten the tabs on the tie-rod lock washer to lock the tie rod.



Boot Band Assembly Note

1. Crimp the boot band using the **SST**.



2. Verify that width A of the crimp is within the specification.

- If width A of the crimp exceeds the specification, reduce opening width A of the **SST** and recrimp the boot band.
- If width A of the crimp is less than the specification, increase opening width A of the **SST** and crimp a new boot band.

Standard Width A

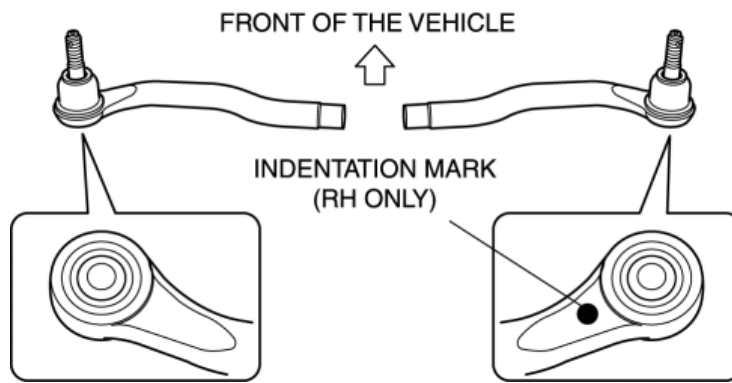
- 2—3 mm {0.08—0.11 in}

3. Rotate the boot by hand and verify that it is securely assembled with the boot band.

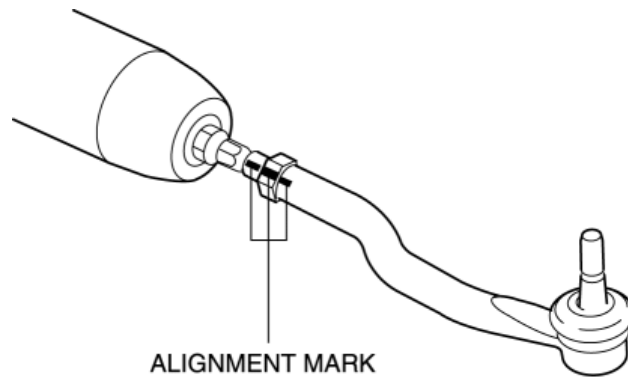
Tie-Rod End Assembly Note

NOTE:

- Only the tie-rod end on the right side has the indentation mark in the position shown in the figure. Verify if the part is for the left or right side before installation because the left and right parts of the tie-rod end have different shapes.

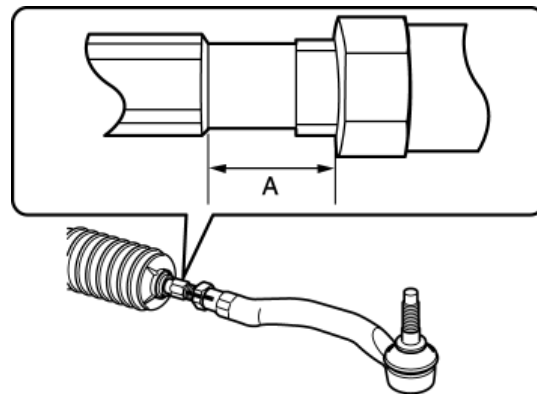


1. Align the alignment marks made before removing the tie-rod end, and then assemble it to the tie-rod.



- If there are no alignment marks, go to the following procedure.

2. Adjust dimension A shown in the figure to the standard, and assemble.



Standard Dimension A

- 15.7—22.7 mm {0.619—0.893 in}