

Component Procedures: Tie Rod End

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Component Procedures: Tie Rod End

Parts and Labor (itype_189)

Parts

Qualifier	Part #	Name	Price	Note
Hydraulic > Inner Tie Rod	92227430	3 - Inner Tie Rod	57.29	

Labor

Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
Remove & Replace	Power Electric > Steering Gear & Linkage > In?	B	0.7	0.0
Remove & Replace	Power Electric > Steering Gear & Linkage > In?	B	1.2	0.0
Remove & Replace	Power Electric > Steering Gear & Linkage > Ou?	B	0.4	0.0
Remove & Replace	Power Electric > Steering Gear & Linkage > Ou?	B	0.7	0.0
Remove & Replace	Power Hydraulic > Steering Gear & Linkage > I?	B	0.7	0.0
Remove & Replace	Power Hydraulic > Steering Gear & Linkage > I?	B	1.2	0.0
Remove & Replace	Power Hydraulic > Steering Gear & Linkage > O?	B	0.4	0.4
Remove & Replace	Power Hydraulic > Steering Gear & Linkage > O?	B	0.7	0.6

Steering Linkage Outer Tie Rod Replacement (N41) (Article 13474)

Special Tools

J-42188-B - Ball Joint Separator

For equivalent regional tools, refer to Special Tools .

Removal Procedure

- Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
- Remove the front tire and wheel assembly. Refer to Tire and Wheel Removal and Installation .
- Use paint in order to place match marks (5) on the steering linkage inner tie rod nut (2) and on the steering linkage outer tie rod (3). Click for full-size image
- Measure and record the distance of the thread (A) in relation to the inner tie rod nut.
- Loosen the inner tie rod nut half a turn.
- Loosen the outer tie rod nut (1) to the top of the stud. Click for full-size image
- Use the J-42188-B - separator (1) in order to disengage the outer tie rod from the steering knuckle (2). Click for full-size image
- Remove and discard the outer tie rod nut (1). Click for full-size image
- Separate the outer tie rod (3) from the steering knuckle (2).
- Remove the outer tie rod (2) from the inner tie rod (1). Count and record the number of turns necessary in order to remove the outer tie rod. Click for full-size image

Installation Procedure

- Install the outer tie rod (3) to the inner tie rod (1). Use the same number of turns as recorded during the removal procedure. Click for full-size image
- Ensure the distance (A) is the same as recorded during the removal procedure.
- Connect the outer tie rod to the steering knuckle (4).
- Install the NEW outer tie rod nut (5) and tighten to 30 Nm (22 lb ft) .
- Tighten the outer tie rod nut an additional 120 degrees .
- Align the match marks (6).
- Install the front tire and wheel assembly. Refer to Tire and Wheel Removal and Installation .
- Measure and adjust the front toe. refer to Wheel Alignment - Steering Wheel Angle and/or Front Toe Adjustment .
- Tighten the inner tie rod nut to 75 Nm (55 lb ft) .
- Lower the vehicle.

Steering Linkage Outer Tie Rod Replacement (NV9) (Article 13475)

Special Tools

J-42188-B - Ball Joint Separator

For equivalent regional tools, refer to Special Tools .

Removal Procedure

- Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
- Remove the front tire and wheel assembly. Refer to Tire and Wheel Removal and Installation .

- Use paint in order to place match marks (5) on the steering linkage inner tie rod nut (2) and on the steering linkage outer tie rod (3). Click for full-size image
- Measure and record the distance of the exposed threads (A) in relation to the steering linkage inner tie rod nut (2).
- Loosen the steering linkage inner tie rod nut (2) half a turn.
- Loosen the steering linkage outer tie rod nut (1) to the top of the tie rod stud but do not remove. Click for full-size image
- Use the J-42188-B - separator (1) to disengage the steering linkage outer tie rod (3) from the steering knuckle (2). Click for full-size image
- Remove and discard the steering linkage outer tie rod nut (1). Click for full-size image
- Separate the steering linkage outer tie rod (3) from the steering knuckle (2).
- Remove the steering linkage outer tie rod (2) from the steering linkage inner tie rod (1). Count the total number of complete rotations needed to remove the outer tie rod from the inner tie rod. Click for full-size image

Installation Procedure

- Install the steering linkage outer tie rod (3) to the steering linkage inner tie rod (1) but do not tighten the steering linkage inner tie rod nut (2). Use the same number of turns as recorded during the removal procedure. Click for full-size image
- Ensure the distance of the exposed threads (A) in relation to the steering linkage inner tie rod nut (2) is the same as recorded during the removal procedure.
- Connect the steering linkage outer tie rod (3) to the steering knuckle (4).
- Install the NEW steering linkage outer tie rod nut (5) and tighten to 30 Nm (22 lb ft) .
- Tighten the steering linkage outer tie rod nut (5) an additional 120 degrees .
- Align the paint match marks (6).
- Install the front tire and wheel assembly. Refer to Tire and Wheel Removal and Installation .
- Measure and adjust the front toe. Refer to Wheel Alignment - Steering Wheel Angle and/or Front Toe Adjustment .
- Tighten the inner tie rod nut to 55–70 Nm (41–52 lb ft) .
- Lower the vehicle.

Steering Linkage Inner Tie Rod Replacement (N41) (Article 13470)

Callout Component Name

Preliminary Procedures Remove the steering gear boot. Refer to Steering Gear Boot Replacement . Inspect the rack and the inner tie rod for corrosion or contamination on the area covered by the boot. If none is evident, continue with the repair. If corrosion or contamination are evident, replace the steering gear. Refer to Steering Gear Replacement .

Preliminary Procedures

- Remove the steering gear boot. Refer to Steering Gear Boot Replacement .
- Inspect the rack and the inner tie rod for corrosion or contamination on the area covered by the boot. If none is evident, continue with the repair. If corrosion or contamination are evident, replace the steering gear. Refer to Steering Gear Replacement .

1 Steering Linkage Inner Tie Rod Caution: Refer to Fastener Caution . Procedure Use a wrench on the flat areas on the end of the rack in order to hold the rack still. Use a wrench on the flat areas of the inner tie rod housing in order to remove the inner tie rod. Clean the threads on the inner tie rod and on the rack. Remove all traces of adhesive. Evenly apply thread locking adhesive to the threads on the inner tie rod. Refer to Adhesives, Fluids, Lubricants, and Sealers . While holding the rack with a wrench, use a crow foot wrench and a torque wrench in order to install the inner tie rod. After installing the steering linkage inner tie rod, measure and adjust the front toe. refer to Wheel Alignment - Steering Wheel Angle and/or Front Toe Adjustment . Tighten 89 Nm (66 lb ft)

Procedure

- Use a wrench on the flat areas on the end of the rack in order to hold the rack still. Use a wrench on the flat areas of the inner tie rod housing in order to remove the inner tie rod.
 - Clean the threads on the inner tie rod and on the rack. Remove all traces of adhesive.
 - Evenly apply thread locking adhesive to the threads on the inner tie rod. Refer to Adhesives, Fluids, Lubricants, and Sealers .
 - While holding the rack with a wrench, use a crow foot wrench and a torque wrench in order to install the inner tie rod.
 - After installing the steering linkage inner tie rod, measure and adjust the front toe. refer to Wheel Alignment - Steering Wheel Angle and/or Front Toe Adjustment .
- 89 Nm (66 lb ft)

Steering Linkage Inner Tie Rod Replacement (NV9) (Article 13472)

Callout Component Name

Preliminary Procedures Remove the steering gear boot. Refer to Steering Gear Boot Replacement . After removing the steering gear boot, inspect the steering linkage inner tie rod for evidence of corrosion or contamination. If none is evident, continue with the repair. If corrosion or contamination is evident, replace the steering gear. Refer to Steering Gear Replacement .

Preliminary Procedures

- Remove the steering gear boot. Refer to Steering Gear Boot Replacement .
- After removing the steering gear boot, inspect the steering linkage inner tie rod for evidence of corrosion or contamination. If none is evident, continue with the repair. If corrosion or contamination is evident, replace the steering gear. Refer to Steering Gear Replacement .

1 Steering Linkage Inner Tie Rod Caution: Refer to Fastener Caution . Procedure To change the driver's side steering linkage inner tie rod, turn the steering wheel to expose the first two inches of steering gear rack. Hold the rack with a wrench across the two recesses in the rack sides. Care must be taken to avoid any marks or damage on the teeth or on the back of the rack. Use the J-34028 - Inner Tie Rod Wrench in order to remove and install the steering linkage inner tie rod. After installing the steering linkage inner tie rod, measure and adjust the front toe. Refer to Wheel Alignment - Steering Wheel Angle and/or Front Toe Adjustment . Note: Some steering gears do not have anti-rotation flats on the driver's side of the steering gear rack. Note: To service the passenger side inner tie rod, a second person is required to hold the steering gear rack as explained in the procedure. Tighten 106–126 Nm (78–93 lb ft) Special Tools J-34028 - Inner Tie Rod Wrench For equivalent regional tools, refer to Special Tools .

Procedure

- To change the driver's side steering linkage inner tie rod, turn the steering wheel to expose the first two inches of steering gear rack. Hold the rack with a wrench across the two recesses in the rack sides. Care must be taken to avoid any marks or damage on the teeth or on the back of the rack.
- Use the J-34028 - Inner Tie Rod Wrench in order to remove and install the steering linkage inner tie rod.
- After installing the steering linkage inner tie rod, measure and adjust the front toe. Refer to Wheel Alignment - Steering Wheel Angle and/or Front Toe Adjustment .

106–126 Nm (78–93 lb ft)

Special Tools

J-34028 - Inner Tie Rod Wrench

Steering Linkage Inner Tie Rod Inspection (Article 13468)

Special Tools

J-8001 - Dial Indicator Set

For equivalent regional tools, refer to Special Tools .

- Turn the ignition key to the ON position with the engine OFF.
- With the aid of an assistant, turn the steering wheel to the full stop position and hold the steering wheel in that position until the test is complete. The tie rod being tested should be inside the steering gear housing seated against the steering stop.
- Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
- If there is not a good location for the J-8001 - Dial Indicator pointer at the steering gear housing, install a large worm gear hose clamp to the steering gear housing over the larger steering gear boot clamp and align the clamp so that the screw can be a location for the J-8001 - Dial Indicator pointer.
- Install the J-8001 - Dial Indicator between the inner tie rod (2) and the steering gear housing or the worm gear clamp in such a way as to measure the lash between the inner tie rod and the steering gear housing. [Click for full-size image](#)
- Grasping the tire at the 3 o'clock (2) and 9 o'clock (1) positions, gently push in on one side of the tire in order to remove any lash. [Click for full-size image](#)
- Zero the J-8001 - Dial Indicator .
- On the same side of the tire previously pushed in, gently pull out and measure the lash.
- Record the measurement seen on the J-8001 - Dial Indicator .
- If the measured value exceeds 0.5 mm (0.02 in), replace the inner tie rod. Refer to Steering Linkage Inner Tie Rod Replacement .
- Repeat the procedure for the other side.

Steering Linkage Outer Tie Rod Inspection (Article 13473)

Special Tools

J-8001 - Dial Indicator Set

For equivalent regional tools, refer to Special Tools .

- Inspect the outer tie rod end seal. If the outer tie rod end seal is torn, replace the outer tie rod end.

Refer to Steering Linkage Outer Tie Rod Replacement .

- Raise the side of the vehicle being inspected with a floor jack while maintaining contact between the opposite wheel and the shop floor. Support the lower control arm with a floor jack stand as far outboard as possible and remove the floor jack. Refer to Lifting and Jacking the Vehicle .

- Install the J-8001 - Dial Indicator between the outer tie rod end and the steering knuckle as shown in the graphic. Note that the tire and wheel assembly is shown removed only for clarification of the J-8001 - Dial Indicator position. [Click for full-size image](#)

- Grasping the tire at the 3 o'clock (2) and 9 o'clock (1) positions, gently push in on one side of the tire to remove any lash. [Click for full-size image](#)

- Zero the J-8001 - Dial Indicator .

- On the same side of the tire previously pushed inwards, gently pull outwards and measure the lash.

- Record the measurement seen on the J-8001 - Dial Indicator .

- If the measured value exceeds 0.5 mm (0.02 in) then replace the outer tie rod. Refer to Steering Linkage Outer Tie Rod Replacement .

- Repeat the procedure for the other side.