



Workshop Manual Amarok 2011 ➤

Running gear, axles, steering

Edition 01.2013



List of Workshop Manual Repair Groups

Repair Group

- 00 - Technical data
- 40 - Front suspension
- 42 - Rear suspension
- 44 - Wheels, tyres, vehicle geometry
- 48 - Steering



Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.



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00 – Technical data

1 Evaluating accident vehicles

(VRL005375; Edition 01.2013)

⇒ **"1.1 Checklist for evaluating running gear on accident vehicles", page 1**

1.1 Checklist for evaluating running gear on accident vehicles

Damage to running gear may go unnoticed during repairs to load-bearing and suspension parts of accident vehicles. Under certain circumstances, this undiscovered damage could lead to serious consequential damage during later vehicle operation. Therefore, the following parts of accident vehicles must be examined in the manner and order described independent of wheel alignment which may have to be performed. If no deviations from specifications are measured during wheel alignment, there are no deformations of the running gear.

Visual and functional examination of steering system

- ◆ Visual examination for deformation and cracks
- ◆ Examination for play in track rod joints and steering rack
- ◆ Visual examination for tears in boots
- ◆ Examine electrical and hydraulic lines and hoses for chafing, cuts and kinks.
- ◆ Check hydraulic lines, threaded connections and steering rack for leaks.
- ◆ Check steering rack and lines for secure seating.
- ◆ Check for flawless function from lock to lock by moving the steering from stop to stop. In the process, the steering wheel must turn with a constant force without resistance.

Visual inspection and functional check of running gear

- Adhere to the sequence of the following inspection steps!
- ◆ Check all components shown in the assembly overviews for deformation, cracks and other damage.
- ◆ Renew damaged parts.
- ◆ Align wheels on a Volkswagen AG-approved wheel alignment stand.

Visual and functional check of wheels and tyres

- ◆ Check for true running and imbalance ⇒ **page 86**.
- ◆ Check tyres for cuts and impact damage in tread and on flanks. ⇒ **page 86**
- ◆ Check tyre inflation pressure; see tyre inflation pressure sticker in fuel tank flap or ⇒ Maintenance ; Booklet ; Checking tyres: Condition, profile, inflation pressure, depth of tread

If rim of wheel and/or tyre is damaged, renew tyre. This also applies if the circumstances of the accident and the damage to the vehicle indicate possible damage which is not visible.

A further factor in the decision is the age of the tyre. Tyres should not be older than 6 years.



If in doubt, the following applies:

- Whenever a safety risk cannot be excluded, the tyre(s) must be renewed.

Entire vehicle

Check other vehicle systems as well, for example:

- ◆ Brake system including ABS
- ◆ Visual and functional examination of exhaust system and passenger protection

Specifications for testing and adjusting can be found in the respective workshop manual in ELSA.

The accident vehicle check described here applies to the running gear. This makes no claim to completeness for the overall vehicle.

Electronic vehicle systems

Safety-relevant systems such as ABS/EDL; airbags; electronically regulated suspension systems; electromechanical or electrohydraulic steering and other driver assist systems must be read with the ⇒ Vehicle diagnostic tester for possibly stored fault messages. If faults are saved in the event memories of the systems mentioned above, repair the faults according to the instructions in workshop manuals in ELSA. Following repairs, read event memories of the affected systems again to ensure that complete function has been restored.





2 General information

⇒ **"2.1 Tyre types", page 3**

2.1 Tyre types

Information concerning wheels, tyres and snow chains can be found in ⇒ **Wheels and Tyres Guide; Rep. gr. 44** and in ⇒ **Wheels and Tyres Guide - General Information; Rep. gr. 44** .





3 Repair instructions

⇒ [“3.1 Steering rack”, page 4](#)

⇒ [“3.2 Gaskets and seals”, page 4](#)

⇒ [“3.3 Nuts and bolts”, page 5](#)

⇒ [“3.4 Electrical components”, page 5](#)

⇒ [“3.5 Raising wheel suspension to unladen position”, page 6](#)

3.1 Steering rack

To achieve the desired results when performing repairs on the steering rack it is important to work with the greatest possible care and cleanliness, and to use proper tools in good condition. Also note the basic rules on safety when performing repair procedures.

A number of general notes on the individual repair procedures, which were otherwise repeated in the relevant sections of the manual, are summarised here. They apply for this particular workshop manual.

For a description of the design and function of the “APA” steering system, see ⇒ Self-study programme No. 399 ; Electromechanical Steering with Parallel-axis Drive .

For a description of the design and function of the electromechanical power-assisted steering system, see ⇒ Self-study programme No. 317 ; Electromechanical Power-assisted Steering with Double Pinion .

- ◆ Thoroughly clean all unions and the adjacent areas before disconnecting.
- ◆ When installing the steering rack, make sure that dowel sleeves between bracket and steering rack are seated correctly.
- ◆ Place removed parts on a clean surface and cover them to prevent them from getting dirty. Use sheeting and paper for this purpose. Use only lint-free cloths.
- ◆ Fit only clean parts; remove new parts from their packaging only immediately prior to fitting.
- ◆ Use only the grease and sealants with specified part numbers.
- ◆ If repairs cannot be carried out immediately, carefully cover or seal open components.

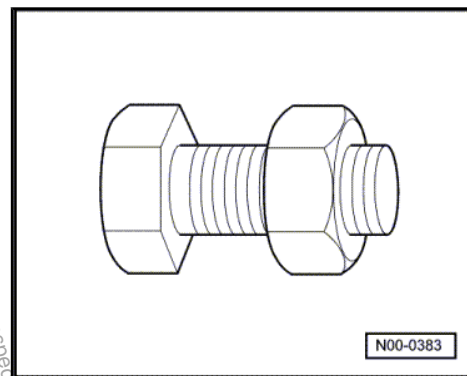
3.2 Gaskets and seals

- ◆ Always renew oil seals and seals.
- ◆ After removing all seals, inspect the contact faces on housings and shafts for burrs and damage and remove all which are found.
- ◆ Completely remove all residue from liquid sealants from the sealing surfaces, making sure that no residual sealant gets into the steering rack housing.



3.3 Nuts and bolts

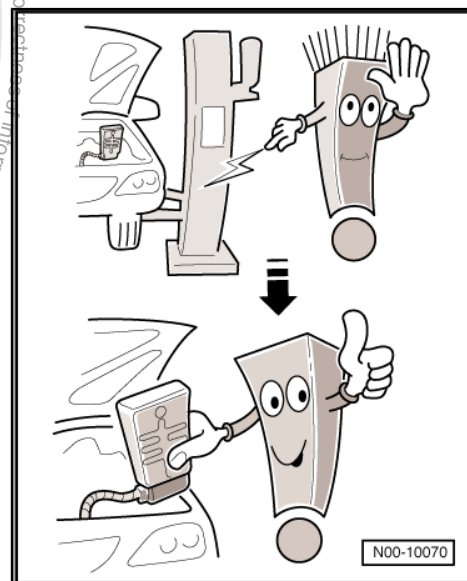
- ◆ Loosen and tighten bolts and securing nuts for covers and housings diagonally.
- ◆ Avoid canting particularly sensitive parts such as servo motor with control unit. Loosen and tighten them diagonally in stages.
- ◆ Specified torques given are for unlubricated nuts, bolts and screws.
- ◆ Always renew self-locking nuts and bolts.



3.4 Electrical components

At some point, you have probably received an electric shock when touching a metal object. This is due to the electrostatic charge accumulated by the human body. This charge can cause malfunctions if you touch the electric steering rack and steering column components.

- Before working on electrical components, touch an earthed object, such as a water pipe or a lifting platform. Do not directly touch connector contacts.





3.5 Raising wheel suspension to unladen position

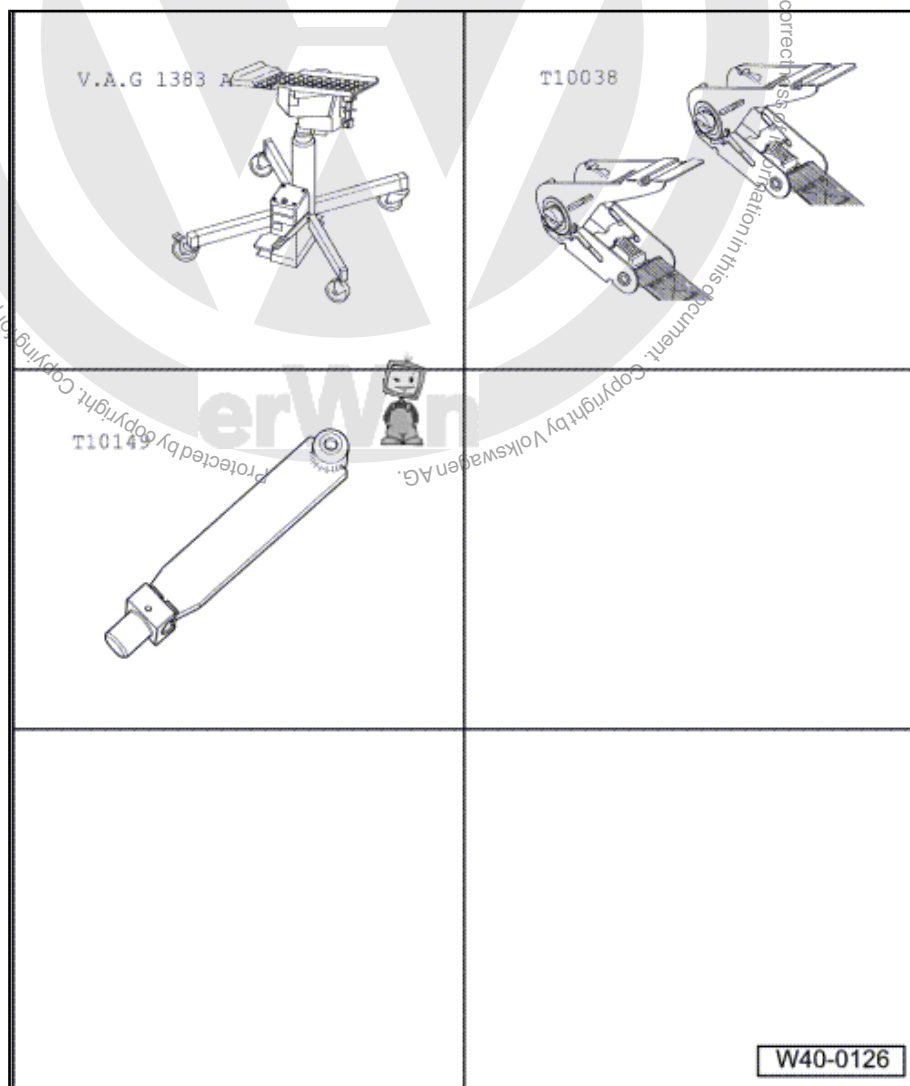
⇒ "3.5.1 Raising front wheel suspension to unladen position", page 6

⇒ "3.5.2 Raising rear wheel suspension to unladen position", page 9

3.5.1 Raising front wheel suspension to unladen position

Special tools and workshop equipment required

- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Tensioning strap - T10038-
- ◆ Support - T10149-





Caution

All bolts on running gear components with bonded rubber bushes may be tightened only when the component is in the unladen position (normal position) or the vehicle is standing on its wheels and is unladen.

Bonded rubber bushes can be twisted only to a limited extent.

Axle components with bonded rubber bushes must therefore be brought to a position equivalent to the unladen (normal) position before being tightened.

The bonded rubber bushes are otherwise constantly tensioned and have a shorter service life.

To simulate this position on the lifting platform, raise the respective wheel suspension with the engine and gearbox jack - V.A.G 1383 A- and support - T10149- .

Before the axle on one side is raised, both sides of the vehicle must be strapped to the lifting platform arms with tensioning straps - T10038- → Maintenance ; Booklet ; Descriptions of work; Raising the vehicle .



WARNING

If the vehicle is not strapped down, it may slip off the lifting platform!

- Remove respective wheel.
- Turn wheel hub until one of the wheel bolt holes is at the top.
- Attach support - T10149- to wheel hub using wheel bolt.



Respective nuts and bolts may be tightened only when dimension -a- between the centre of wheel hub and edge of wheel housing has been attained.

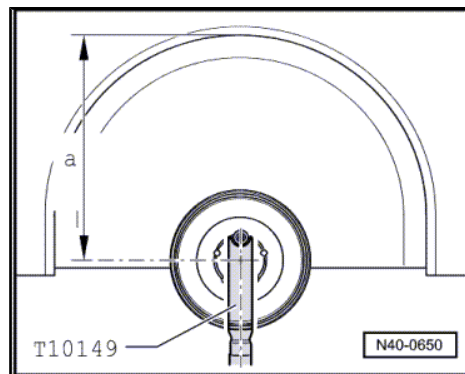
- Raise wheel bearing housing using engine and gearbox jack - V.A.G 1383 A- until dimension -a- is attained.

The dimension -a- depends on the ride height of the installed running gear:

Running gear	Ride height -a- in mm
Without wheel house trim	525 ± 17 mm
With wheel house trim	518 ± 17 mm

**WARNING**

- ◆ *Do not lift or lower vehicle while engine and gearbox jack - V.A.G 1383 A- is under vehicle.*
- ◆ *Do not leave engine and gearbox jack - V.A.G 1383 A- under vehicle longer than necessary.*



- Tighten respective nuts and bolts.
- Lower wheel bearing housing.
- Pull engine and gearbox jack - V.A.G 1383 A- out from under vehicle.
- Detach support - T10149- .

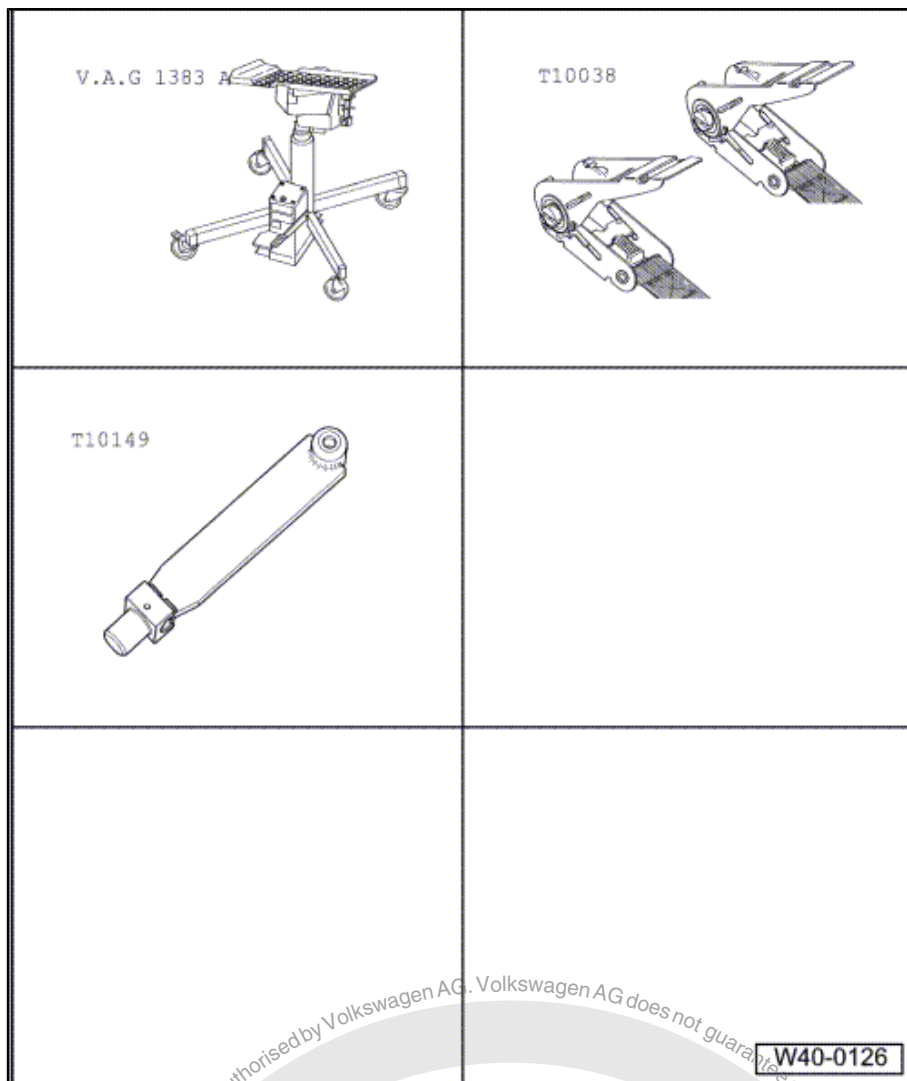




3.5.2 Raising rear wheel suspension to unladen position

Special tools and workshop equipment required

- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Tensioning strap - T10038-
- ◆ Support - T10149-



Caution

All bolts on running gear components with bonded rubber bushes may be tightened only when the component is in the unladen position (normal position) or the vehicle is standing on its wheels and is unladen.

Bonded rubber bushes can be twisted only to a limited extent.

Axle components with bonded rubber bushes must therefore be brought to a position equivalent to the unladen (normal) position before being tightened.

Otherwise, the bonded rubber bush would be subject to torsion loading, shortening its service life.

To simulate this position on the lifting platform, raise the axle on one side using the engine and gearbox jack - V.A.G 1383 A- and support - T10149- .

Before the axle on one side is raised, both sides of the vehicle must be strapped to the lifting platform arms with tensioning





straps - T10038- ➔ Maintenance ; Booklet ; Descriptions of work;
Raising the vehicle .



WARNING

If the vehicle is not strapped down, there is a danger that the vehicle will slip off the lifting platform!

- Remove respective wheel.
- Turn wheel hub until one of the wheel bolt holes is at the top.
- Attach support - T10149- to wheel hub using wheel bolt.

Respective nuts and bolts may be tightened only when dimension -a- between the centre of wheel hub and edge of wheel housing has been attained.

- Raise wheel bearing housing using engine and gearbox jack - V.A.G 1383 A- until dimension -a- is attained.

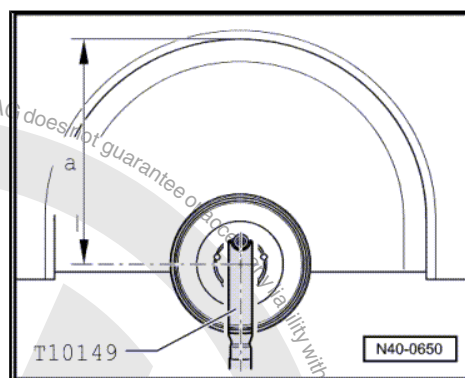
The dimension -a- depends on the ride height of the installed running gear:

Running gear	Ride height -a- in mm
Without wheel house trim	585 ± 17 mm
With wheel house trim	578 ± 17 mm



WARNING

- ◆ *Never raise or lower the vehicle while the engine and gearbox jack is positioned beneath the vehicle.*
- ◆ *Do not leave engine and gearbox jack - V.A.G 1383 A- under vehicle longer than necessary.*



- Tighten respective nuts and bolts.
- Lower wheel bearing housing.
- Pull engine and gearbox jack - V.A.G 1383 A- out from under vehicle.
- Detach support - T10149- .



40 – Front suspension

1 Front axle

⇒ ["1.1 Overview - front axle", page 11](#)

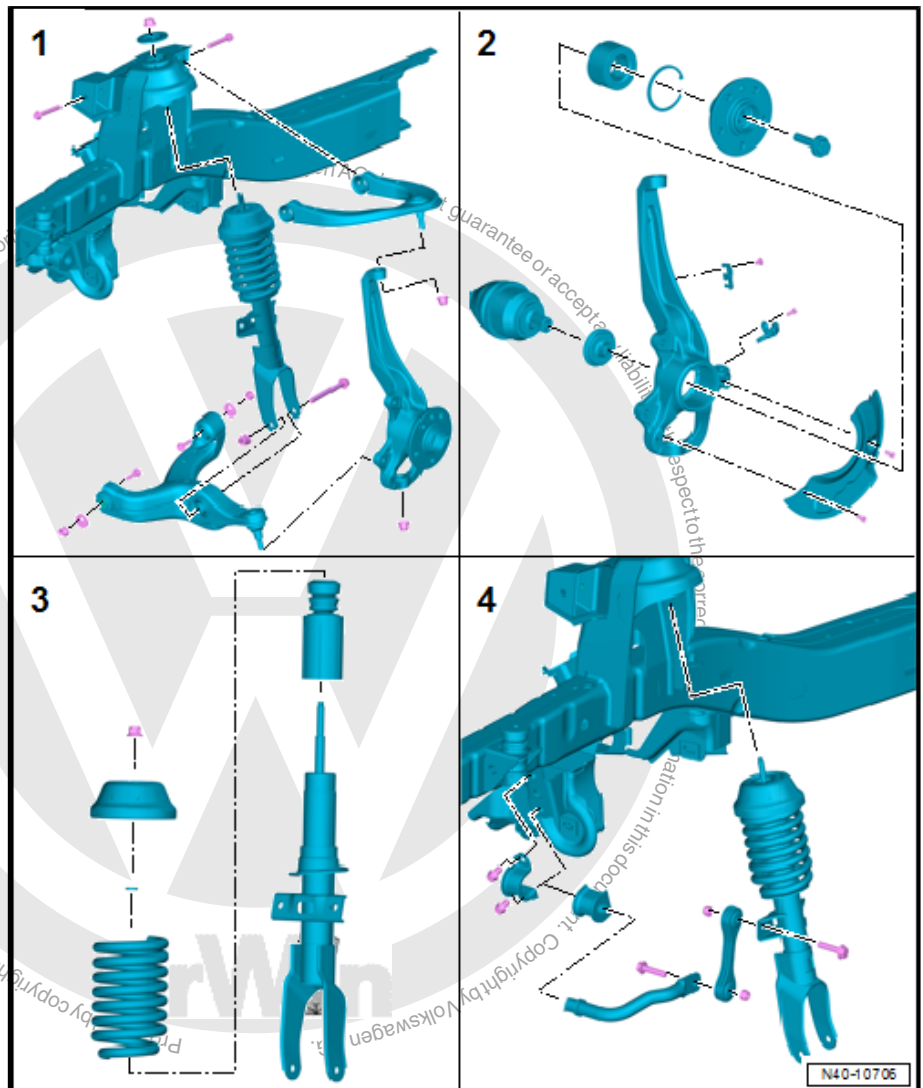
1.1 Overview - front axle

1 -
⇒ ["4.1 Assembly overview - suspension strut, upper suspension link", page 24](#)

2 -
⇒ ["3.1 Assembly overview - wheel bearing assembly", page 16](#)

3 -
⇒ ["4.2 Assembly overview - suspension strut", page 26](#)

4 -
⇒ ["2.1 Assembly overview - subframe", page 12](#)





2 Subframe

⇒ "2.1 Assembly overview - subframe", page 12

⇒ "2.2 Removing and installing anti-roll bar", page 12

⇒ "2.3 Renewing anti-roll bar bushes", page 13

⇒ "2.4 Removing and installing coupling rod", page 15

2.1 Assembly overview - subframe

1 - Ladder frame

2 - Suspension strut

3 - Nut

- ☐ Always renew after removing
- ☐ 110 Nm

4 - Bolt

5 - Coupling rod

- ☐ Connects anti-roll bar to trailing arm and wheel bearing housing
- ☐ Removing and installing ⇒ [page 15](#)

6 - Anti-roll bar

- ☐ Removing and installing ⇒ [page 12](#)

7 - Multi-point socket head bolt

- ☐ Always renew after removing

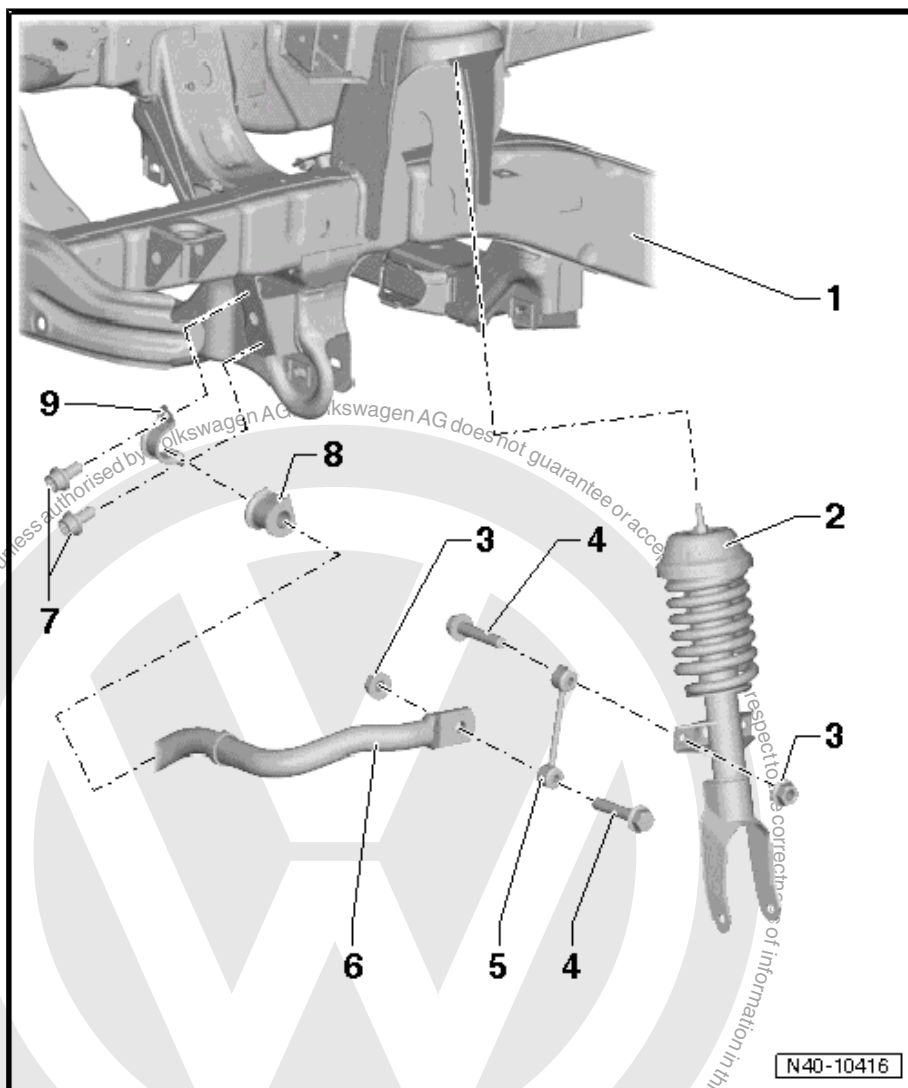
Tighten new bolts only if the vehicle is standing on its wheels and is unladen or if the vehicle is raised and is in the unladen position (normal position) . ⇒ [page 6](#)

- ☐ 110 Nm

8 - Rubber mounting

- ☐ Always replace on both sides
- ☐ Allocation ⇒ Electronic parts catalogue "ETKA"
- ☐ Removing and installing ⇒ [page 13](#)

9 - Clamp

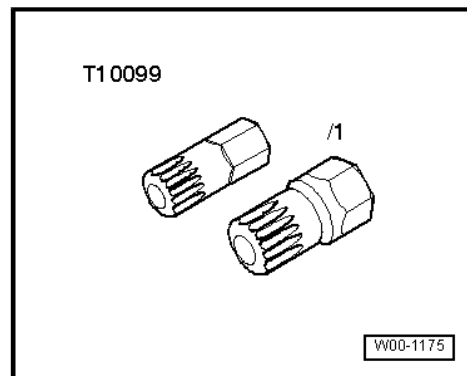


2.2 Removing and installing anti-roll bar

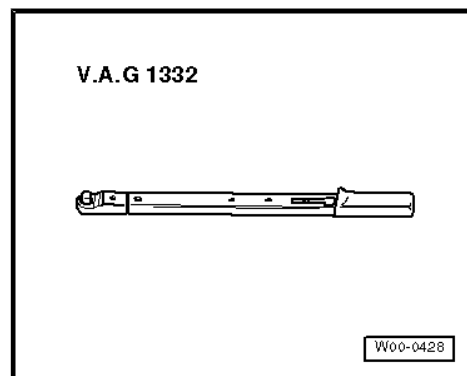
Special tools and workshop equipment required



◆ Bits - T10099-



◆ Torque wrench - V.A.G 1332-



Removing



Note

The following procedure is for the left side of the vehicle. The procedure for the right side of the vehicle is identical.

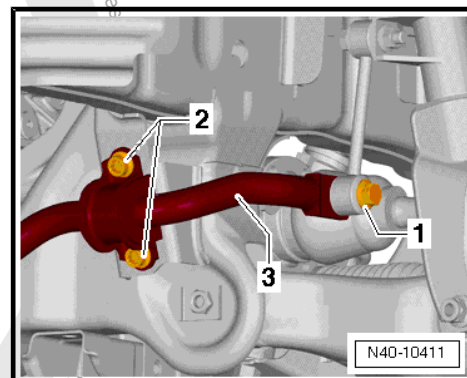
- Unscrew bolt -1- and pull out of anti-roll bar -3-.
- Unscrew and remove bolts -2- with bit - T10099/1- .
- Remove anti-roll bar -3- to side.

Installing

Install in reverse order. Note the following points:

Specified torques

- ◆ ⇒ ["2.1 Assembly overview - subframe", page 12](#)

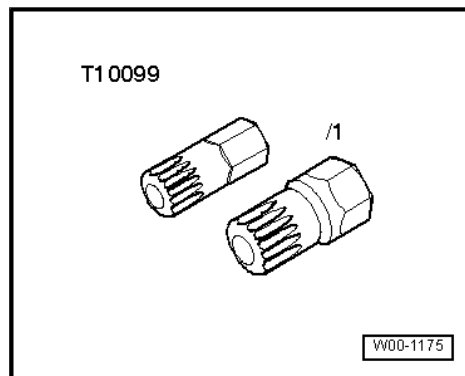


2.3 Renewing anti-roll bar bushes

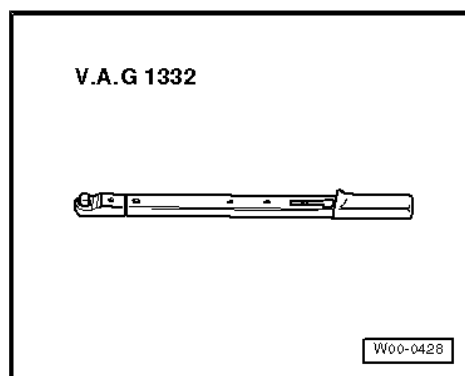
Special tools and workshop equipment required



◆ Bits - T10099-



◆ Torque wrench - V.A.G 1332-



Removing

- Unscrew and remove bolts -2- with bit - T10099/1- .
- Pull anti-roll bar clamp off rubber bush.
- Detach rubber bush from anti-roll bar.

Installing

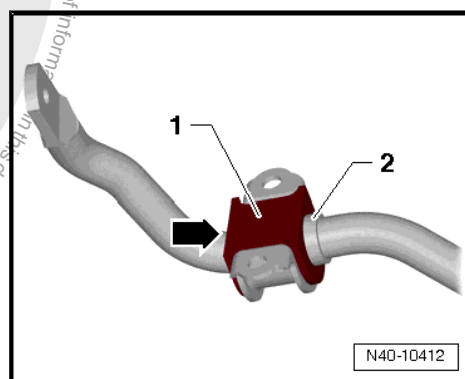
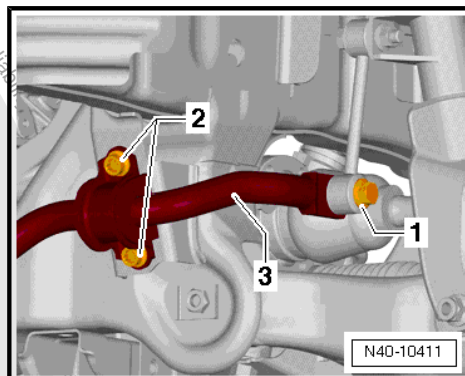
Install in reverse order. Note the following points:

- Insert new rubber bush -1- on anti-roll bar via opening -arrow-.



Note

- ◆ Ensure that the outer edge of rubber bush -1- lies against stop -2-.
- ◆ Depending on version, the stop -2- can be located on the left or on the right of rubber bush.
- ◆ Tighten bolted connections to the anti-roll bar only if the vehicle is standing on its wheels and is unladen or if the vehicle is raised and is in the unladen position (normal position)
⇒ [page 6](#) .



Specified torques

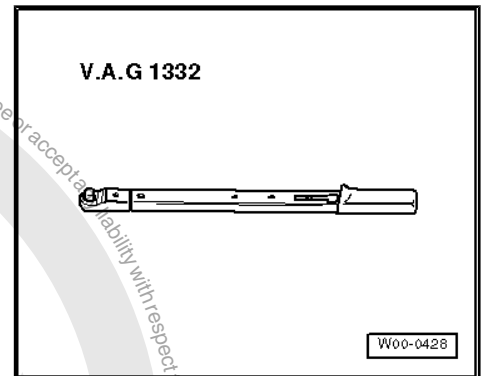
- ◆ ⇒ ["2.1 Assembly overview - subframe", page 12](#)



2.4 Removing and installing coupling rod

Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1332-



Removing

- Remove bolts -arrows-.
- Remove coupling rod -1-.

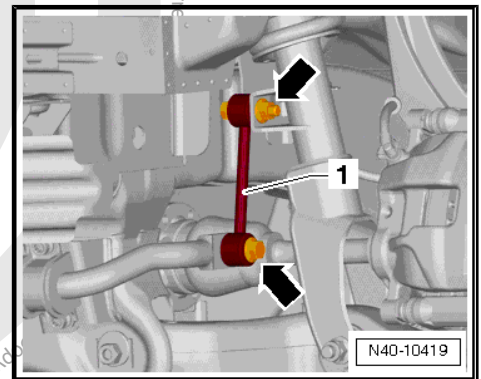
Installing

Install in reverse order. Note the following points:



Note

Tighten bolted connections to coupling rod only if the vehicle is standing on its wheels and is unladen or if the vehicle is raised and is in the unladen position (normal position) ⇒ [page 6](#).



Specified torques

- ◆ ⇒ [“2.1 Assembly overview - subframe”, page 12](#)



3 Wheel bearing

⇒ ["3.1 Assembly overview - wheel bearing assembly", page 16](#)

⇒ ["3.2 Removing and installing wheel bearing housing", page 17](#)

⇒ ["3.3 Removing and installing wheel bearing", page 20](#)

3.1 Assembly overview - wheel bearing assembly

1 - Wheel bearing

- ☐ Black sensor ring faces inside of vehicle
- ☐ Grey slide ring faces outside of vehicle

2 - Retaining ring

- ☐ Ensure proper seating.

3 - Wheel hub

4 - Bolt

- ☐ Always renew after removing
- ☐ 150 Nm +180°

5 - Bolt

- ☐ 9.5 Nm

6 - Bracket

7 - Bolt

- ☐ 8 Nm

8 - Front left speed sensor - G47- / front right speed sensor - G45-

- ☐ Before inserting speed sensor, clean inner surface of fitting hole and coat it with lubricating paste ⇒ Electronic Parts Catalogue (ET-KA).

9 - Splash plate

10 - Bolt

- ☐ 9.5 Nm

11 - Wheel bearing housing

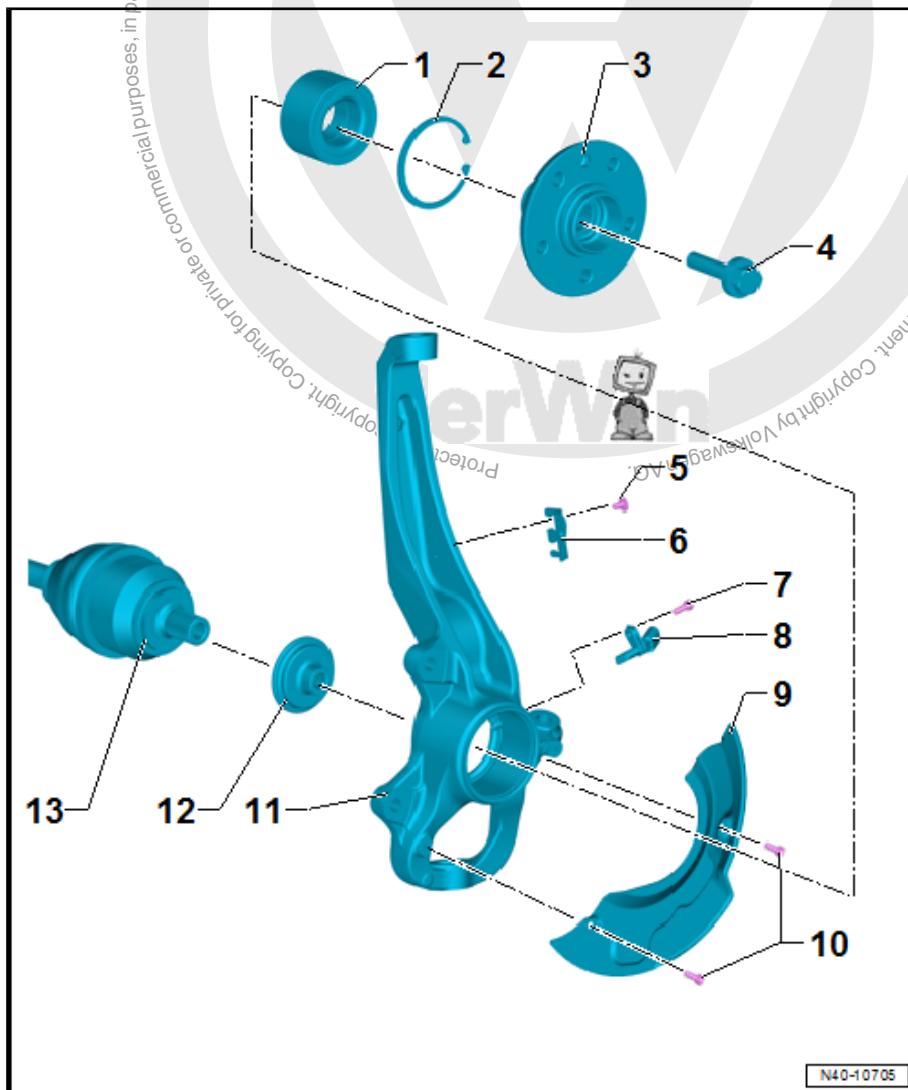
- ☐ Tapered hole must be free of oil and grease.
- ☐ If necessary, clean with a dry cloth but do not use cleaning solutions.
- ☐ Removing and installing ⇒ [page 17](#).

12 - Tensioning disc

- ☐ Rear-wheel drive vehicles only

13 - Drive shaft

- ☐ Four-wheel drive vehicles only
- ☐ Removing and installing ⇒ [page 45](#).

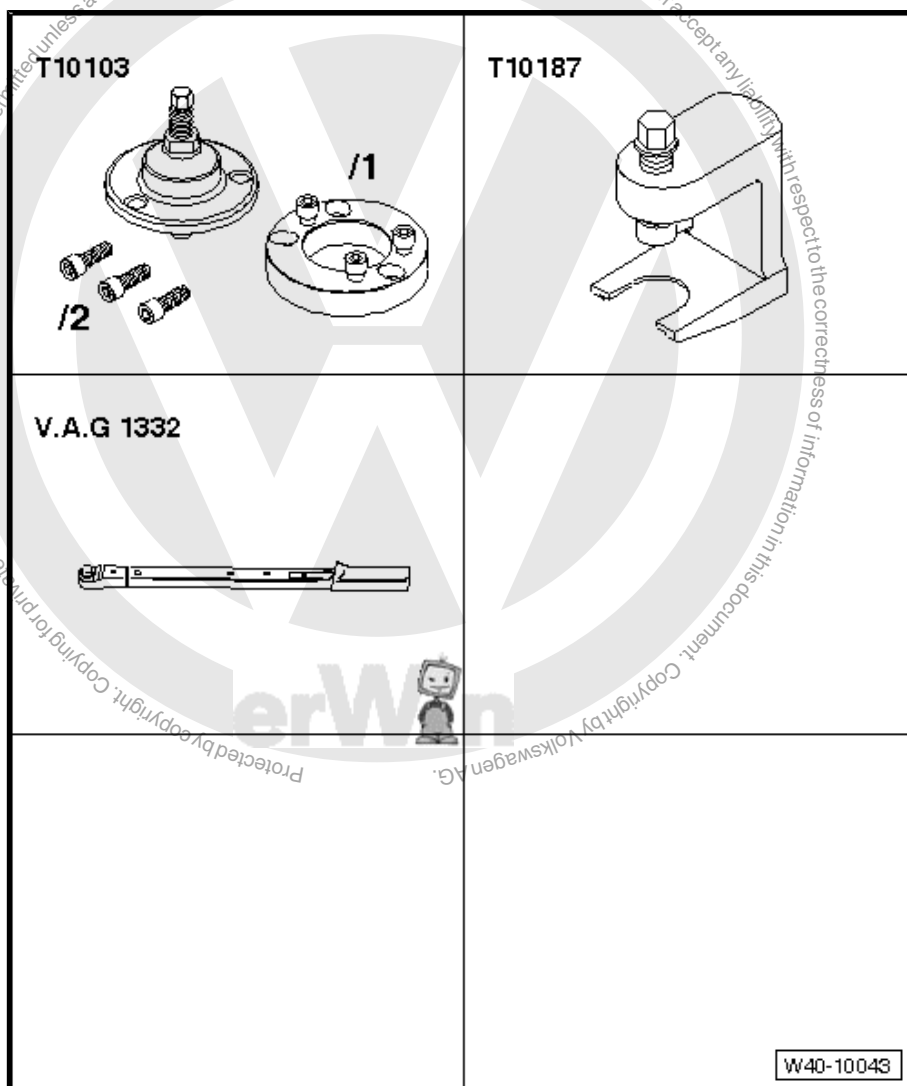




3.2 Removing and installing wheel bearing housing

Special tools and workshop equipment required

- ◆ Remover - T10103-
- ◆ Ball joint puller - T10187-
- ◆ Torque wrench - V.A.G 1332-



Removing

- Lift vehicle far enough to take weight off front axle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising the vehicle .

Vehicles with four-wheel drive

- Loosen drive shaft bolt.



Note

- ◆ Do not move vehicle with loosened bolt. Moving vehicle could cause damage to wheel bearing.
- ◆ If vehicle is to be moved with drive shaft removed, an outer joint must be installed and tightened to 150 Nm.

Continuation for all vehicles

- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Remove wheel.



- Loosen nut on track rod ball joint but do not remove completely.



Caution

Leave nut screwed on a few turns to protect thread on pin.

- Push track rod off wheel bearing housing and remove nut.

1 - Ball joint puller - T10187-

Vehicles with four-wheel drive

- Unscrew and remove drive shaft bolt.

- Press out drive shaft.

1 - Adapter - T10103/1-

2 - Remover - T10103-

- When removing, make sure joints have adequate clearance.

Continuation for all vehicles

- Remove nut -1- for coupling rod and pull bolt out of suspension strut.
- Remove bolted joint -2-.
- Remove brake caliper and tie to body using wire ⇒ Brake systems; Rep. gr. 46 ; Front brake; Removing and installing brake pads .
- Remove ABS speed sensor ⇒ Brake systems; Rep. gr. 45 ; Sensors; Removing and installing speed sensor .
- Remove brake disc.
- Remove cover plate.
- Remove brake line bracket from wheel bearing housing.
- Slacken off nut on tapered pin (but do not remove yet).

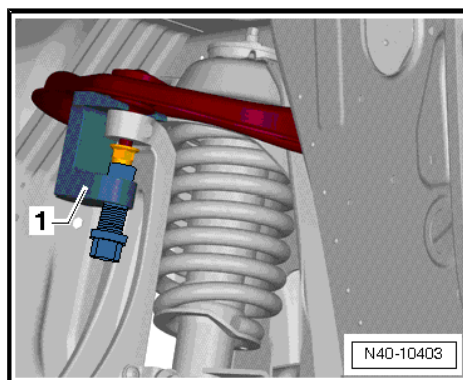
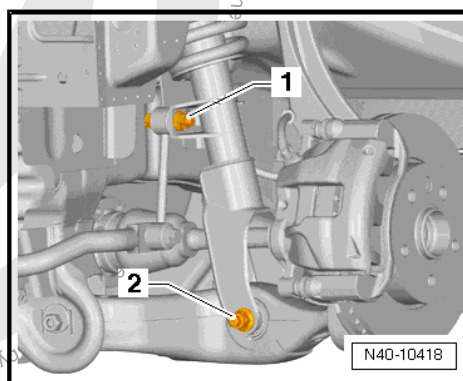
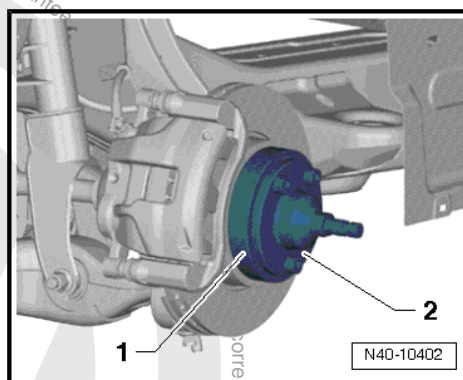
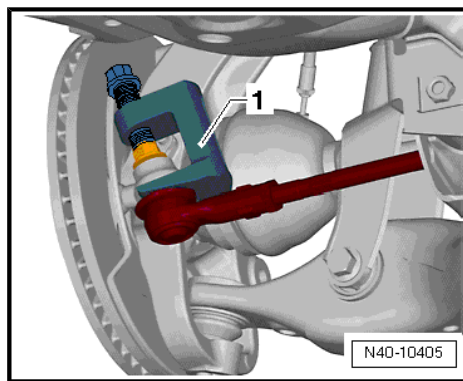


Caution

Leave nut screwed on a few turns to protect thread on pin.

- Press out upper suspension link and unscrew nut.

1 - Ball joint puller - T10187-





- Slacken off nut on tapered pin (but do not remove yet).



Caution

Leave nut screwed on a few turns to protect thread on pin.

- Press out lower suspension link.
- 1 - Ball joint puller - T10187-
- Unscrew nut and remove wheel bearing housing.

Installing

Install in reverse order. Note the following points:



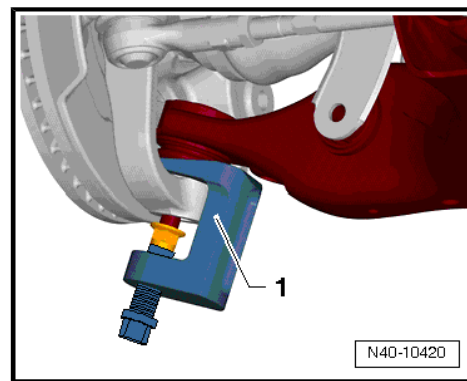
Caution

- ◆ *Bonded rubber bushes can be twisted only to a limited extent.*
- ◆ *Therefore, tighten bolted connections on components having bonded rubber mountings only if the vehicle is standing on its wheels and is unladen or if the vehicle is raised and is in the unladen position (normal position) ⇒ [page 6](#).*

- Install wheel and tighten bolts or nuts ⇒ [page 71](#).

Specified torques

- ◆ ⇒ [“4.1 Assembly overview - suspension strut, upper suspension link”, page 24](#)
- ◆ ⇒ [“3.1 Assembly overview - wheel bearing assembly”, page 16](#)



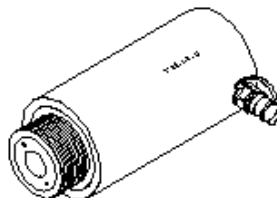


3.3 Removing and installing wheel bearing

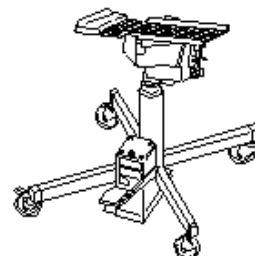
Special tools and workshop equipment required

- ◆ Hydraulic press - 6178-
- ◆ Engine and gearbox jack - 1383A-
- ◆ Splitter - Kukko 17-2-
- ◆ Assembly tool - T10205-
- ◆ Foot pump - 6179-
- ◆ Drift sleeve - 30-100-
- ◆ Thrust washer - VW 511-

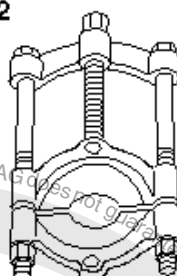
VAS 6178



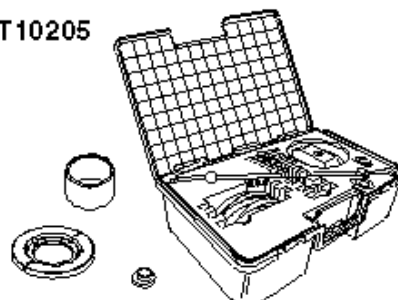
V.A.G 1383 A



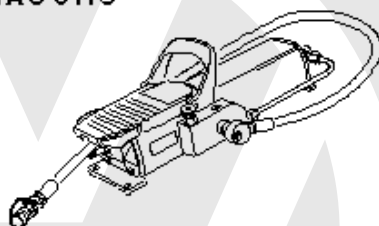
Kukko 17-2



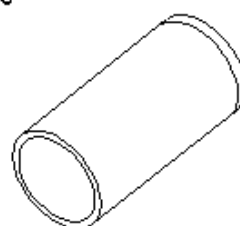
T10205



VAS 6179

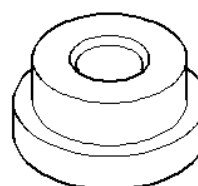


30-100



W40-10062

VW 511



VW00-0243



Note

- ◆ *When doing this work, always make sure that the tools and components are in the correct position and, if necessary, use a second mechanic.*
- ◆ *Place engine and gearbox jack - V.A.G 1383 A- below wheel bearing housing throughout the entire process (to prevent accidents caused by falling parts).*

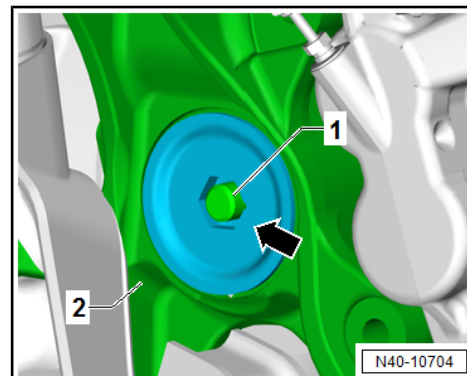
Removing

- Remove bolt -1- and remove tensioning disc -arrow- from wheel bearing housing -2-.

Vehicles with four-wheel drive

- Remove drive shaft ➔ [page 45](#)

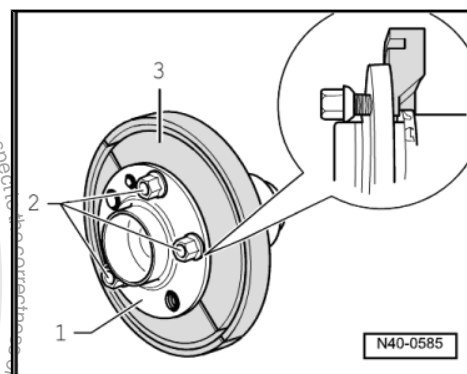
Continuation for all vehicles



- Attach gripping pieces - T10205/17 - -3- to wheel hub -1- with wheel bolts -2- as shown in illustration.

Note

Wheel bolts -2- must not protrude from backs of gripping pieces -3-.

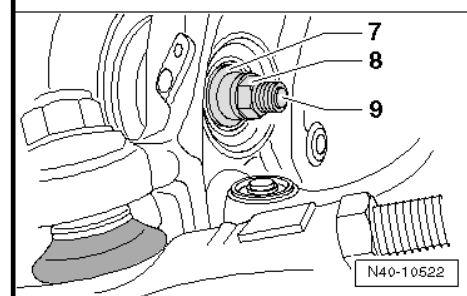
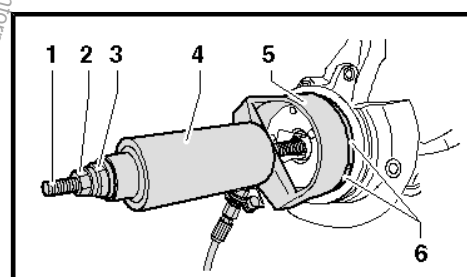


- Mount the tools as shown in illustration.

- ◆ 1 - Threaded rod M20 - T10205/8-1
- ◆ 2 - Threaded nut M20 - T10205/8-2
- ◆ 3 - Press head T10205/13
- ◆ 4 - Hydraulic cylinder VAS 6178
- ◆ 5 - Bell T10205/2
- ◆ 6 - Gripping pieces T10205/17
- ◆ 7 - Press tool T10205/3
- ◆ 8 - Nut M20 - T10205/8-2
- ◆ 9 - Threaded rod M20 - T10205/8-1

- Pull hub unit out of wheel bearing housing while holding tool assembly in place.

- Remove retaining ring from wheel bearing.





- Mount the tools as shown in illustration.
- ◆ 1 - Threaded rod M20 T10205/8-1
- ◆ 2 - Threaded nut M20 T10205/8-2
- ◆ 3 - Hydraulic cylinder VAS 6178
- ◆ 4 - Support T10205/4
- ◆ 5 - Bell T10205/5
- ◆ 6 - Thrust washer VW 511
- ◆ 7 - Nut M20 T10205/8-2
- ◆ 8 - Threaded rod M20 - T10205/8-1
- Hold appliance firmly and pull out wheel bearing.
- Fit component and tools as shown in illustration.



Note

Fitting position: Chamfer on plates faces towards inner bearing race -arrow-.

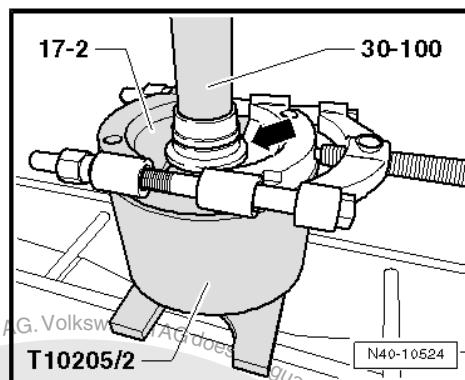
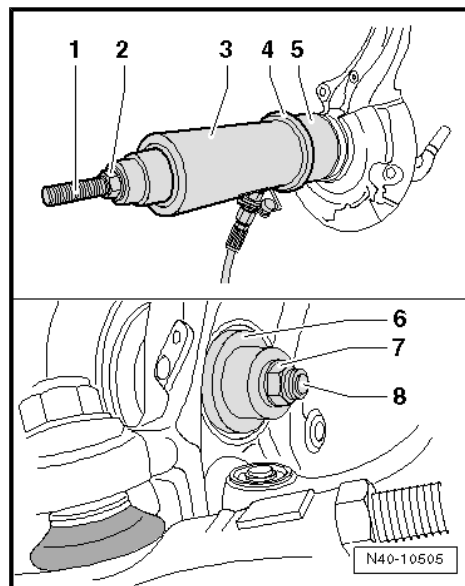
- Pull inner bearing race off hub, using -Kukko 17-2 splitter- to do so.

Installing



Note

Keep wheel bearing holes free of filings and other contamination. It is not permissible to oil them additionally before pressing them in.





- Mount the tools as shown in illustration.

- ◆ 1 - Threaded rod M20 - T10205/8-1
- ◆ 2 - Threaded nut M20 - T10205/8-2
- ◆ 3 - Press head T10205/13
- ◆ 4 - Hydraulic cylinder VAS 6178
- ◆ 5 - Support T10205/4
- ◆ 6 - Wheel bearing
- ◆ 7 - Press tool T10205/6
- ◆ 8 - Nut M20 - T10205/8-2
- ◆ 9 - Threaded rod M20 - T10205/8-1

- Press in wheel bearing to stop. When doing this, support wheel bearing housing on shoulder and hold assembly device.



Note

Observe mounting direction for wheel bearings. Insert multi-pole ring side - ABS in direction of axle shaft.

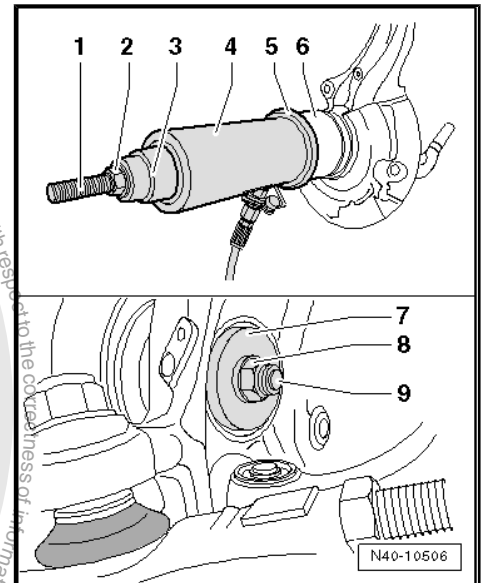
- Fit retaining ring with opening facing downwards.
- Press in hub as far as it will go, using the same arrangement of tools. When doing this, support inner wheel bearing race.
- Fit tensioning disc.

Vehicles with four-wheel drive

- Install drive shaft ⇒ [page 45](#) .

Specified torques

- ◆ ⇒ [“3.1 Assembly overview - wheel bearing assembly”, page 16](#)





4 Suspension strut, upper suspension link

⇒ [“4.1 Assembly overview - suspension strut, upper suspension link”, page 24](#)

⇒ [“4.2 Assembly overview - suspension strut”, page 26](#)

⇒ [“4.3 Removing and installing suspension strut”, page 27](#)

⇒ [“4.4 Removing and installing upper links”, page 29](#)

⇒ [“4.5 Renewing bushes for upper suspension link”, page 30](#)

⇒ [“4.6 Repairing front suspension strut”, page 33](#)

⇒ [“4.7 Removing and installing suspension strut mounting”, page 35](#)

4.1 Assembly overview - suspension strut, upper suspension link



Note

- ◆ *Loose bolted connection in the suspension strut may result in the piston rod or the lower nut “filing” an elongated hole into the suspension turret or the suspension strut mounting.*
- ◆ *In this case, deburr the elongated hole in the suspension turret and apply corrosion protection.*
- ◆ *Renew worn parts.*
- ◆ *If present, remove adhesive residues from the shock absorber thread.*
- ◆ *Install optimised parts ⇒ Electronic Parts Catalogue “ETKA”.*
- ◆ *If damaged, the new nut ⇒ [Item 6 \(page 26\)](#) must be bonded in with locking fluid ⇒ Electronic Parts Catalogue “ETKA”.*



WARNING



1 - Bolt

- ☐ Always renew after removing
- ☐ 50 Nm +90°

2 - Nut

- ☐ Always renew after removing
- ☐ 25 Nm +45°

3 - Stop shell

4 - Bolt

- ☐ Always renew after removing
- ☐ 50 Nm +90°

5 - Upper suspension link

- ☐ Tapered pin must be free of oil and grease.
- ☐ If necessary, clean with a dry cloth but do not use cleaning solutions.
- ☐ Removing and installing ⇒ [page 29](#)

6 - Nut

- ☐ Always renew after removing
- ☐ 30 Nm +90°

7 - Wheel bearing housing

- ☐ Tapered hole must be free of oil and grease.
- ☐ If necessary, clean with a dry cloth but do not use cleaning solutions.

8 - Nut

- ☐ Always renew after removing
- ☐ 60 Nm +90°

9 - Suspension strut

- ☐ Removing and installing ⇒ [page 27](#)

10 - Bolt

11 - Nut

- ☐ Always renew after removing
- ☐ 110 Nm +180°

12 - Eccentric washer

13 - Lower suspension link

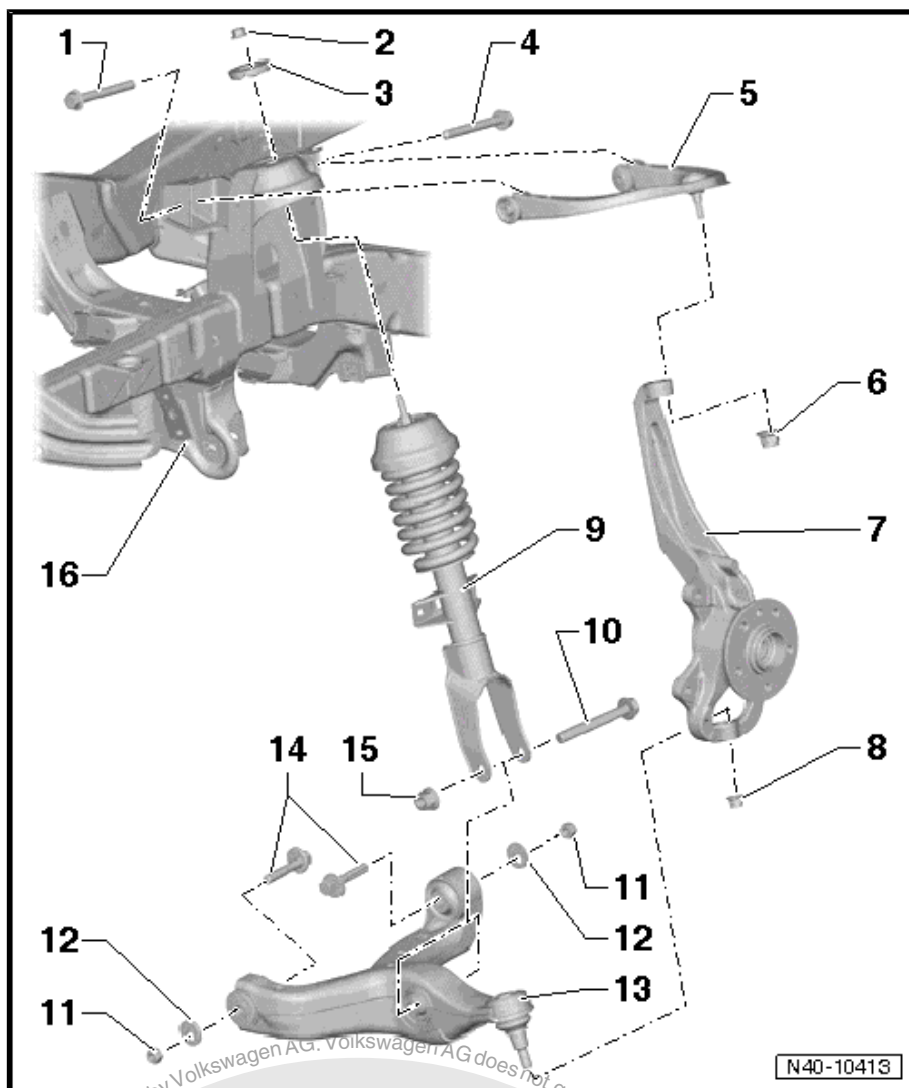
- ☐ Tapered pin must be free of oil and grease.
- ☐ If necessary, clean with a dry cloth but do not use cleaning solutions.
- ☐ Removing and installing ⇒ [page 37](#)
- ☐ Checking swivel joint ⇒ [page 41](#)

14 - Eccentric bolt

- ☐ Always renew after removing

15 - Nut

- ☐ Always renew after removing





□ 110 Nm +180°

16 - Ladder frame

4.2 Assembly overview - suspension strut



Note

- ◆ Loose bolted connection in the suspension strut may result in the piston rod or the lower nut "filing" an elongated hole into the suspension turret or the suspension strut mounting.
- ◆ In this case, deburr the elongated hole in the suspension turret and apply corrosion protection.
- ◆ Renew worn parts.
- ◆ If present, remove adhesive residues from the shock absorber thread.
- ◆ Install optimised parts ⇒ Electronic Parts Catalogue "ETKA".
- ◆ If damaged, the new nut ⇒ [Item 6 \(page 26\)](#) must be bonded in with locking fluid ⇒ Electronic Parts Catalogue "ETKA".

1 - Bump stop

2 - Shock absorber

- Allocation ⇒ Electronic parts catalogue "ETKA"

3 - Coil spring

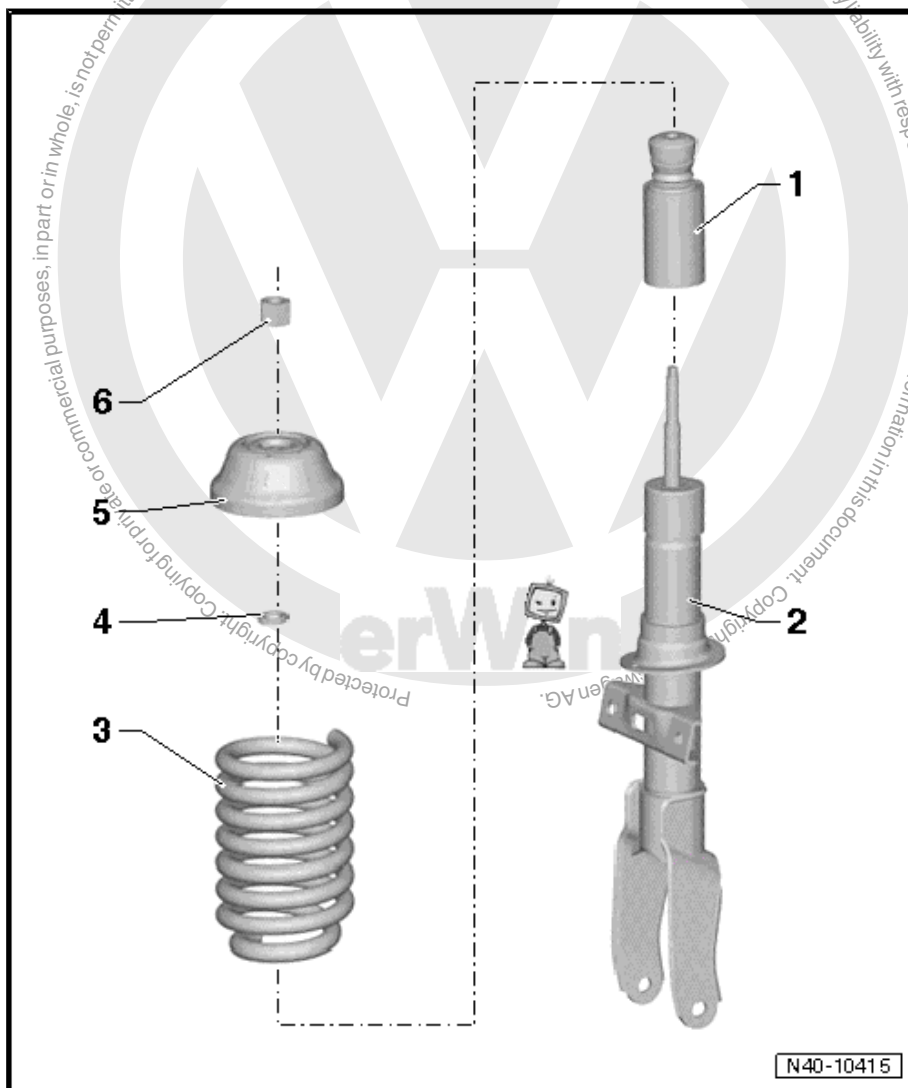
- Surface of coil must not be damaged.
- Observe colour coding
- Allocation ⇒ Electronic parts catalogue "ETKA"

4 - Washer

5 - Suspension strut mounting

6 - Nut

- Always renew after removing
- 25 Nm +45°

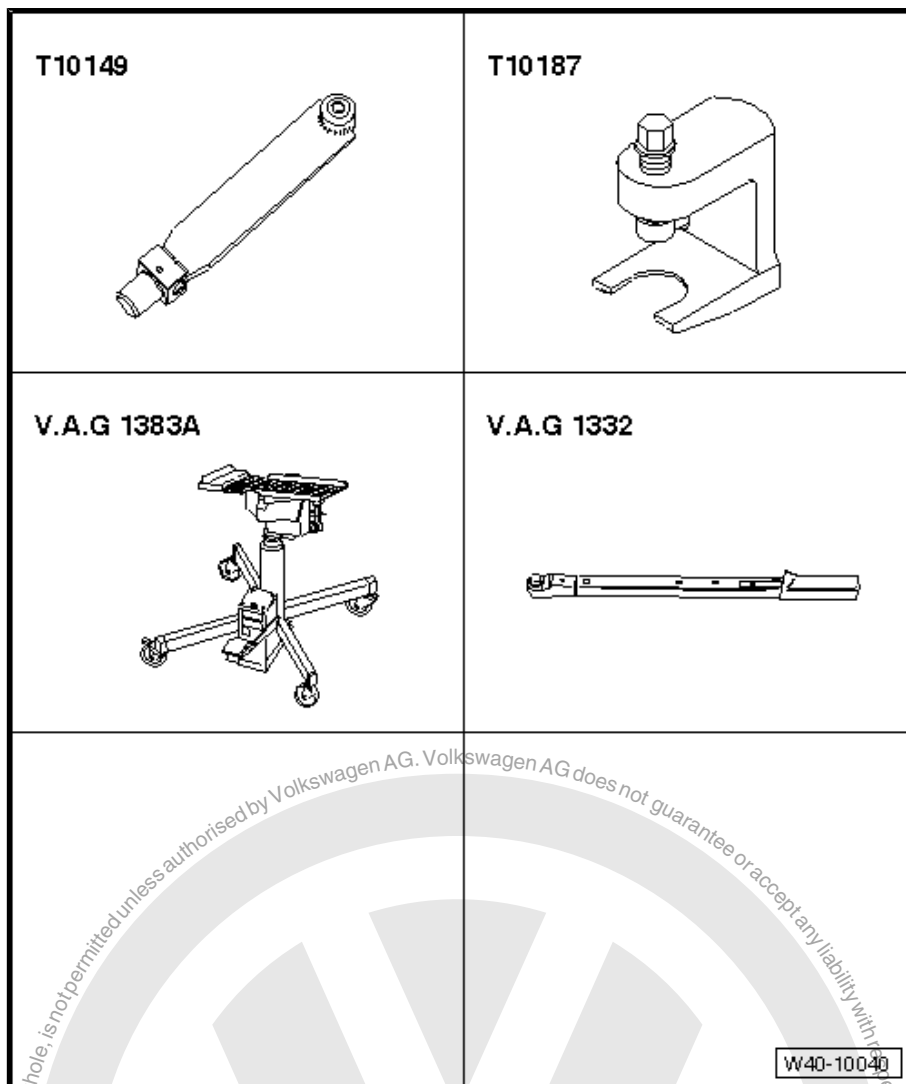




4.3 Removing and installing suspension strut

Special tools and workshop equipment required

- ◆ Support - T10149-
- ◆ Ball joint puller - T10187-
- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Torque wrench - V.A.G 1332-
- ◆ Assembly tool - T50042-
- ◆ Assembly tool - T50042/1-



Removing

- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Remove wheel.
- Remove drive shaft ⇒ [page 45](#)

To remove left suspension strut

- Remove bracket for engine control unit ⇒ Rep. gr. 23 .

To remove right suspension strut

- Remove air filter ⇒ Rep. gr. 23



Continuation for both sides



Note

- ◆ *When the upper nut is loosened, the piston rod must be secured against turning.*
- ◆ *Otherwise the lower nut can loosen, which will result in substantial noise generation.*
- ◆ *Therefore, always use assembly tool - T50042- .*
- Unbolt suspension strut from frame using assembly tool - T50042- and remove.

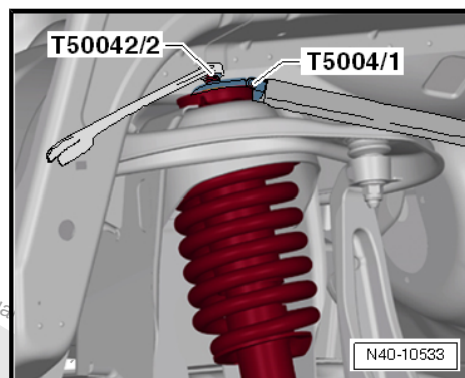
Installing

Install in reverse order. Note the following points:



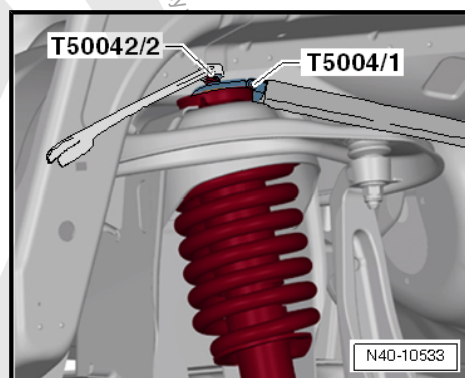
Note

- ◆ *When the upper nut is tightened, the piston rod must be secured against turning.*
- ◆ *Otherwise the lower nut can loosen, which will result in substantial noise generation.*
- ◆ *Therefore, always use assembly tool - T50042- .*
- Secure suspension strut to frame using assembly tool - T50042- .



Caution

- ◆ *Bonded rubber bushes can be twisted only to a limited extent.*
- ◆ *Therefore, tighten bolted connections on components having bonded rubber mountings only if the vehicle is standing on its wheels and is unladen or if the vehicle is raised and is in the unladen position (normal position)*
⇒ [page 6](#)



- Install wheel and tighten bolts or nuts ⇒ [page 71](#) .

Specified torques

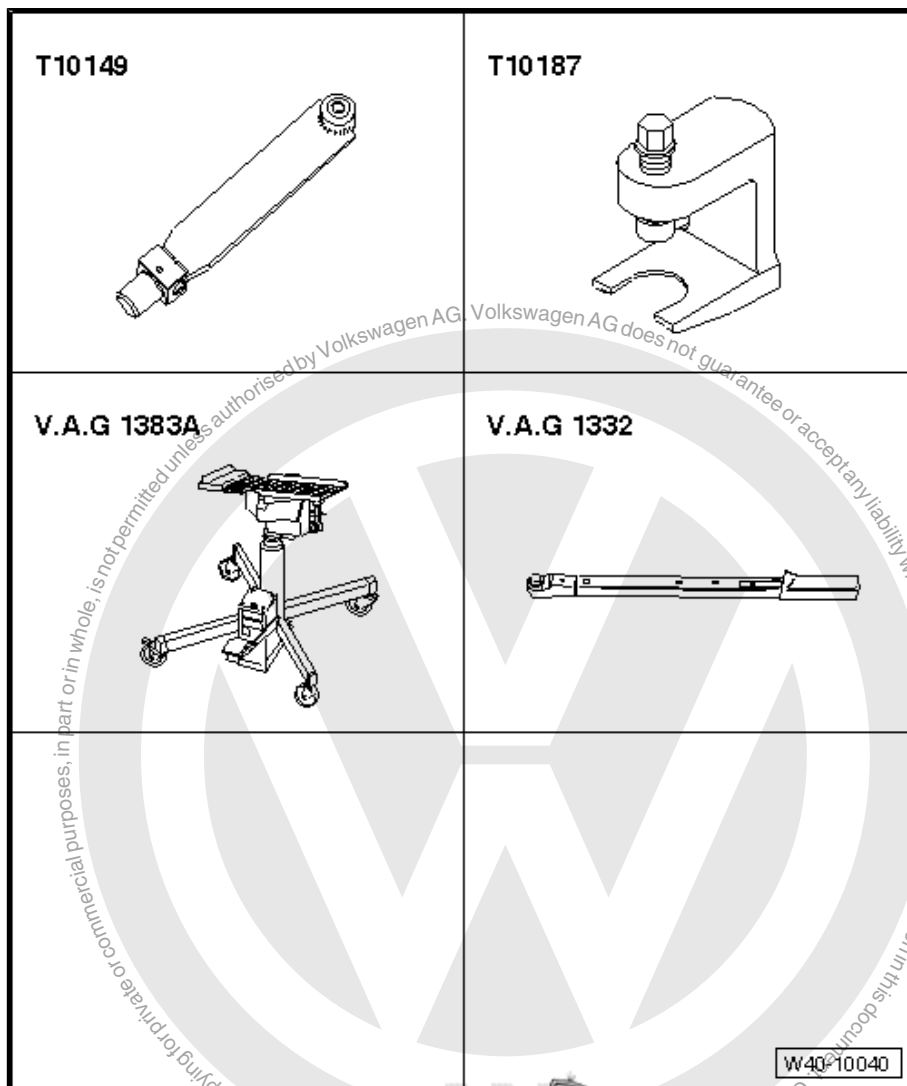
- ◆ ⇒ [“4.2 Assembly overview - suspension strut”, page 26](#)
- ◆ ⇒ [“4.1 Assembly overview - suspension strut, upper suspension link”, page 24](#)
- ◆ ⇒ [“3.1 Assembly overview - wheel bearing assembly”, page 16](#)



4.4 Removing and installing upper links

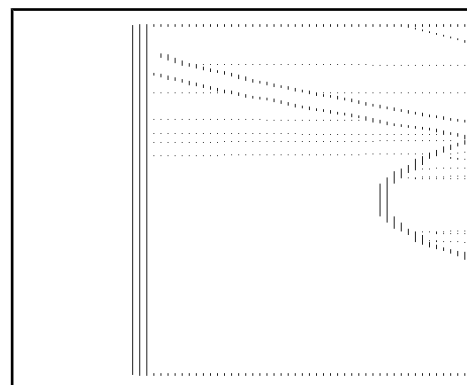
Special tools and workshop equipment required

- ◆ Support - T10149-
- ◆ Ball joint puller - T10187-
- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Torque wrench - V.A.G 1332-



Removing

- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Remove wheel.
- Attach support - T10149- with a wheel bolt -A-.





- Slacken off nut on tapered pin (but do not remove yet).

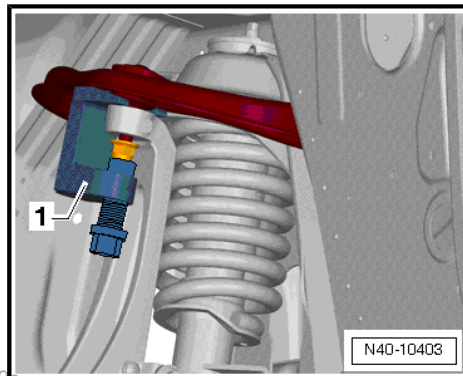


Caution

Leave nut screwed on a few turns to protect thread on pin.

- Press out upper suspension link and unscrew nut.

1 - Ball joint puller - T10187-



- Remove bolts -arrows- and remove upper suspension link.

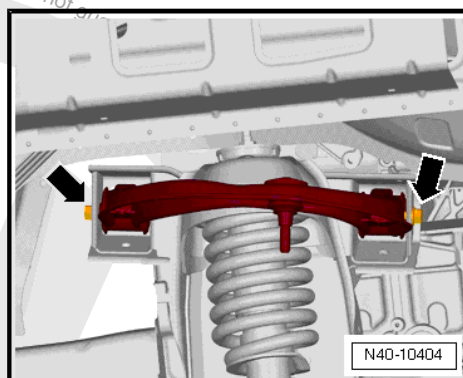
Installing

Install in reverse order. Note the following points:



Caution

- ◆ *Bonded rubber bushes can be twisted only to a limited extent.*
- ◆ *Therefore, tighten bolted connections on components having bonded rubber mountings only if the vehicle is standing on its wheels and is unladen or if the vehicle is raised and is in the unladen position (normal position) ⇒ [page 6](#).*



- Install wheel and tighten bolts or nuts ⇒ [page 71](#).

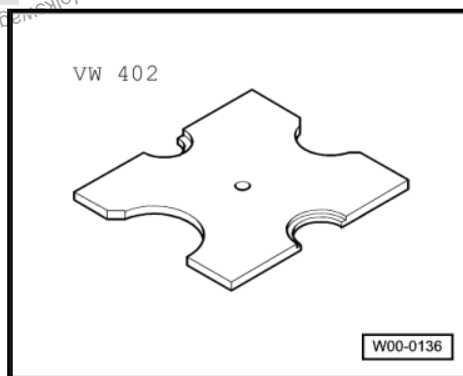
Specified torques

- ◆ ⇒ ["4.1 Assembly overview - suspension strut, upper suspension link", page 24](#)

4.5 Renewing bushes for upper suspension link

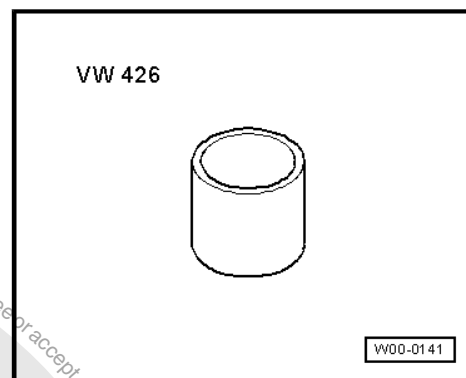
Special tools and workshop equipment required

- ◆ Thrust plate - VW 402-

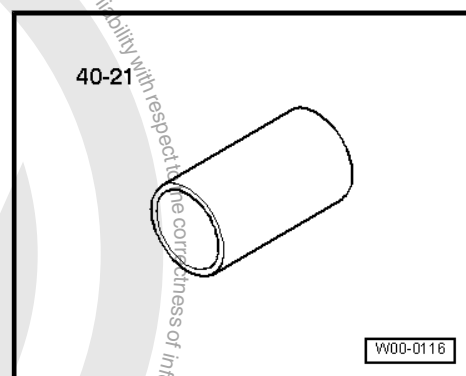




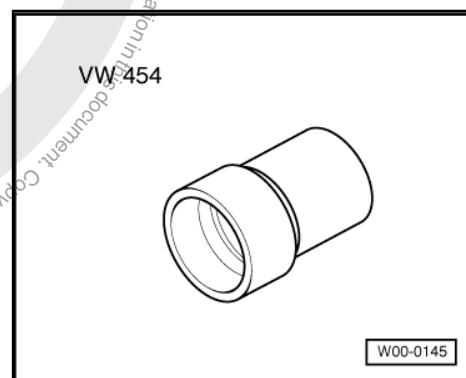
◆ -- Tube - VW 426-



◆ Drift sleeve - 40 - 21-



◆ Thrust piece - VW 454-



◆ Removal wedge - 3409-

◆ Chisel

◆ Metal saw



Note

When doing this work, always make sure that the tools and components are in the correct position and, if necessary, use a second mechanic.

Removing

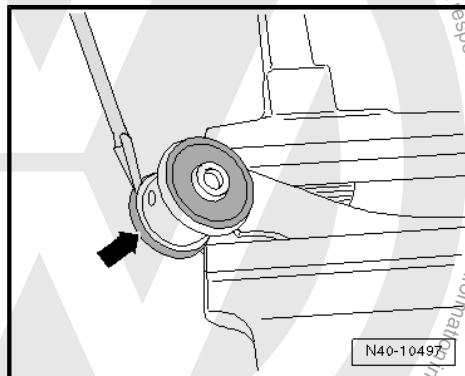
- Remove upper suspension link. ⇒ [page 29](#)
- Clamp upper suspension link in a vice.



Note

Always use suitably padded jaws in order to avoid damage to the component.

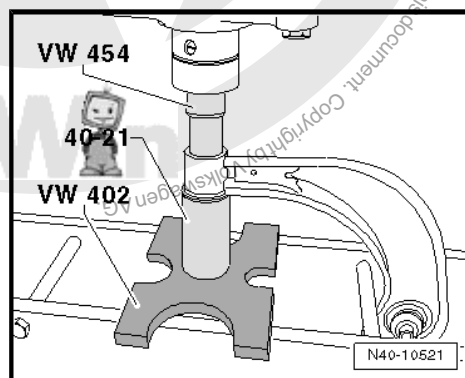
- Use a chisel to bend metal collar up 3 mm. Then, saw off the metal collar.
- Place component and tools in position as shown in illustration.



- Press out bush together with tube - VW 426 - .

Installing

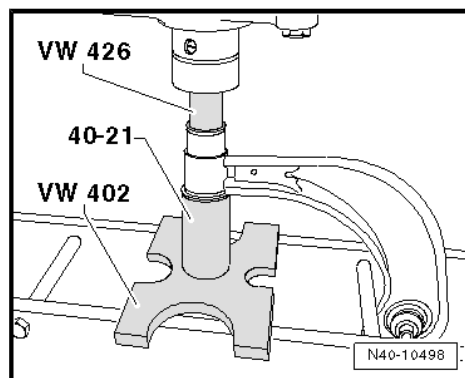
- Place component and tools in position as shown in illustration.
- Use removal wedge - 3409- to push rubber lip into the suspension link.



- Press bush in flush.
- Install upper suspension link. ➔ [page 29](#)

Specified torques

- ♦ ➔ [“4.1 Assembly overview - suspension strut, upper suspension link”, page 24](#)





4.6 Repairing front suspension strut

Special tools and workshop equipment required

- ◆ Shock absorber set - T10001-
- ◆ Torque wrench - V.A.G 1332-
- ◆ Spring compressor - VAS 6046-
- ◆ Spring retainer - VAS 6046/3-

T10001 	V.A.G 1332 
VAS 6046 	
	W40-10041

— Remove coil spring strut ⇒ [page 27](#) .



Removing coil spring

- Tension coil spring until upper suspension strut mounting is free.
- Unscrew hexagon nut from piston rod.
- Remove individual parts of strut and coil spring using spring tensioner - VAS 6046- and spring retainers - VAS 6046/3- .

1 - Commercially available ratchet handle

2 - -T10001/14-

3 - -T10001/11-

4 - -T10001/3-

5 - -VAS 6046-

6 - -VAS 6046/3-



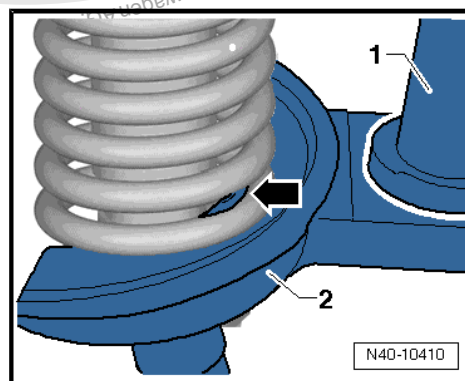
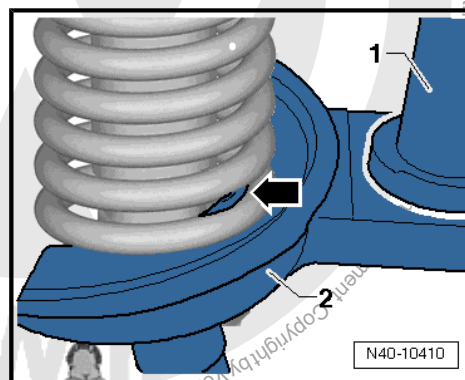
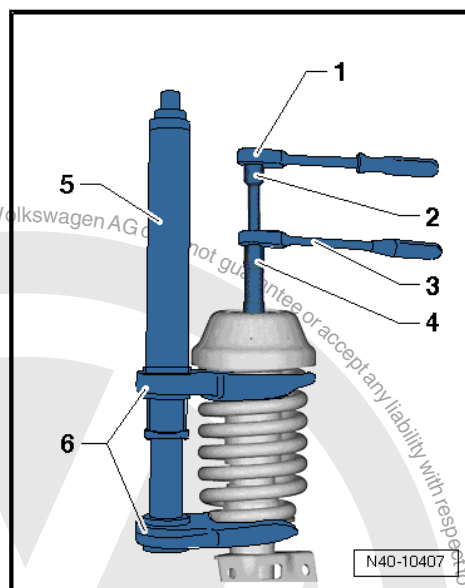
WARNING

First compress spring far enough to ensure that upper spring plate is free.

- Ensure that coil spring is correctly seated in spring retainer - VAS 6046/3- -arrow-.

Installing coil spring

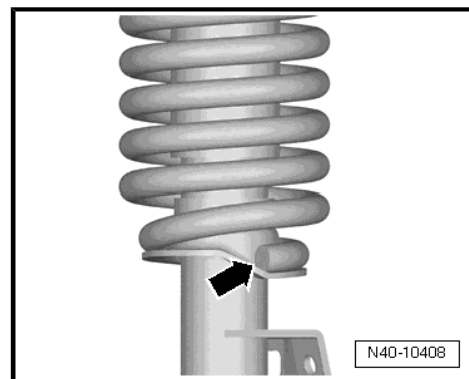
- Set bottom of coil spring on spring retainer - VAS 6046/3- .
- Ensure that coil spring is correctly seated in spring retainer - VAS 6046/3- -arrow-.
- Clamp coil spring.





- Fit coil spring with suspension strut tensioner - V.A.G 1752- onto bottom spring plate.

The end of the coil spring must lie against the stop -arrow-.



- Position disc and suspension strut mounting on spring.

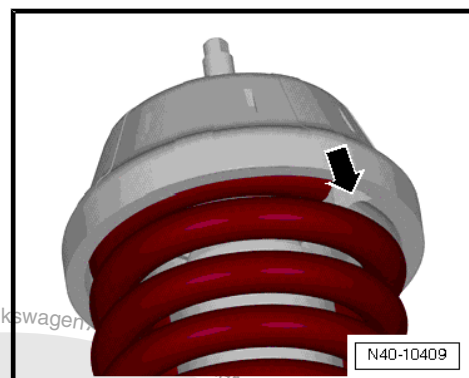
End of coil spring must lie against stop of suspension strut mounting -arrow-.

- Tighten new hexagon nut on piston rod.



Note

Nut must be screwed on in tensioned state. The mounting sequence must be complied with.



- Relieve tension on spring compressor - VAS 6046- and remove from coil spring.
- Install suspension strut ⇒ [page 27](#) .

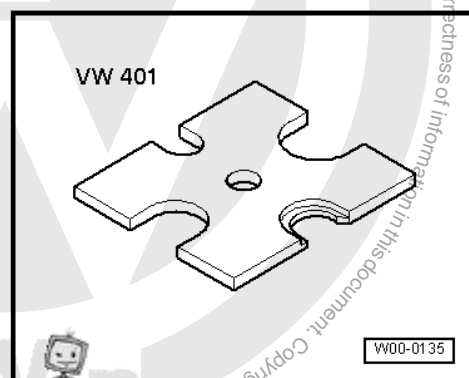
Specified torques

- ◆ ⇒ ["4.1 Assembly overview - suspension strut, upper suspension link", page 24](#)

4.7 Removing and installing suspension strut mounting

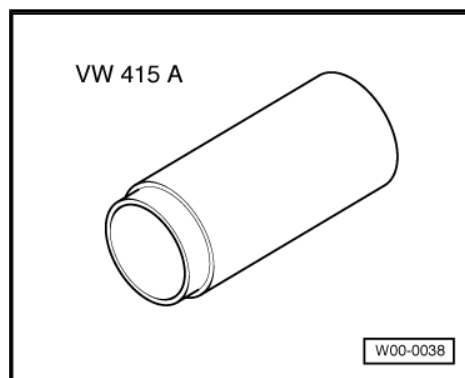
Special tools and workshop equipment required

- ◆ Thrust plate - VW 401-

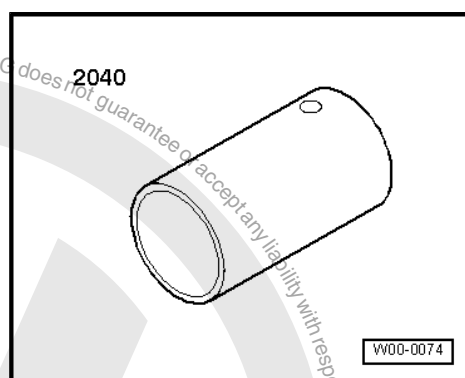




◆ Tube - VW 415 A-



◆ Tube - 2040-



Removing

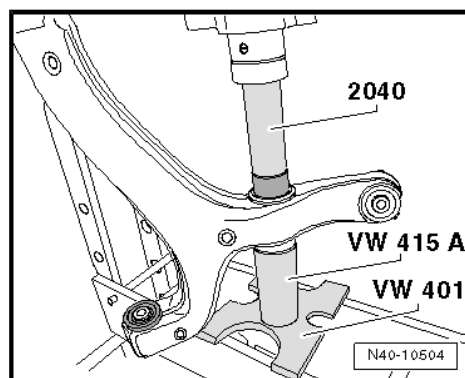
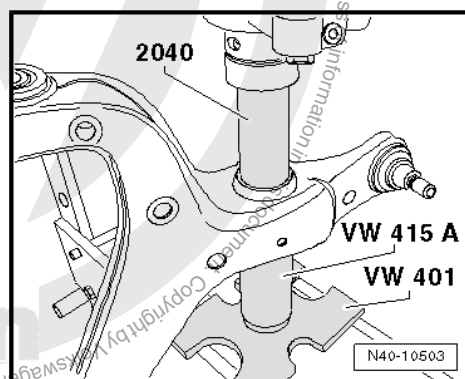
- Remove lower suspension link ⇒ [page 37](#) .
- Place component and tools in position as shown in illustration.
- Press out suspension strut mounting downwards with tube - 2040- .

Installing

- Fit mounting from above and press in flush, together with tube - 2040- .
- Install lower suspension link ⇒ [page 37](#) .

Specified torques

- ◆ ⇒ [“4.1 Assembly overview - suspension strut, upper suspension link”, page 24](#)





5 Lower suspension link, swivel joint

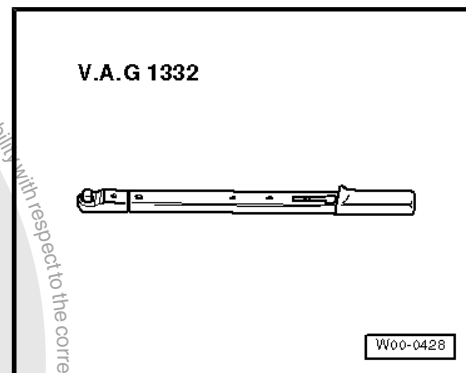
⇒ ["5.1 Removing and installing lower suspension link", page 37](#)

⇒ ["5.2 Renewing bonded rubber bush for lower suspension link", page 39](#)

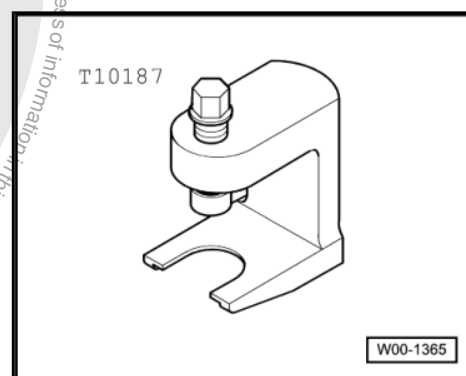
⇒ ["5.3 Checking swivel joint", page 41](#)

5.1 Removing and installing lower suspension link

◆ Torque wrench - V.A.G 1332-

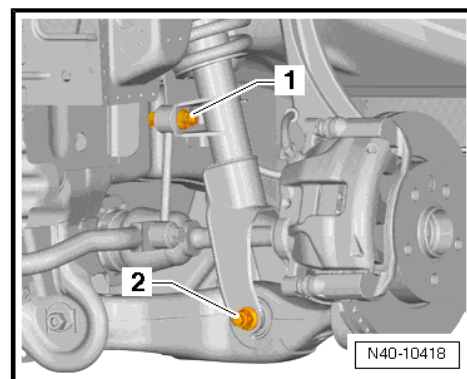


◆ Ball joint puller - T10187-



Removing

- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Remove wheel.
- Remove nut -1- for coupling rod and pull bolt out of suspension strut.
- Remove bolted joint -2-.





- Slacken off nut on tapered pin (but do not remove yet).

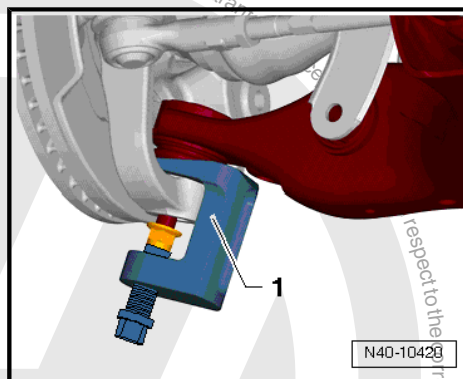


Caution

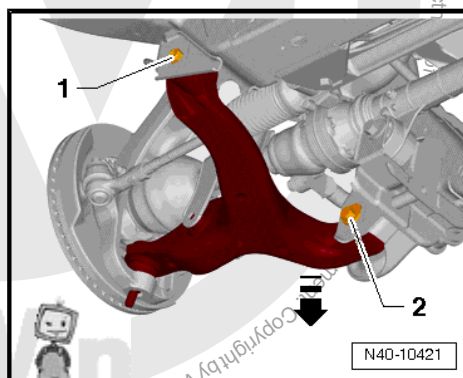
Leave nut screwed on a few turns to protect thread on pin.

- Press out lower suspension link and unscrew nut.

1 - Ball joint puller - T10187-



- Loosen bolted joint -1-.
- Remove bolted joint -2- and move lower suspension link down a little in -direction of arrow-.
- Remove bolt -1-.
- Move lower suspension link down and thread out of wheel bearing housing.



Installing

Install in reverse order. Note the following points:



Caution

- ◆ *Bonded rubber bushes can be twisted only to a limited extent.*
- ◆ *Therefore, tighten bolted connections on components having bonded rubber mountings only if the vehicle is standing on its wheels and is unladen or if the vehicle is raised and is in the unladen position (normal position) ⇒ [page 6](#) .*

- Install wheel and tighten bolts or nuts ⇒ [page 71](#) .
- Do not tighten threaded connection between lower suspension link and ladder frame until during wheel alignment.
- Perform wheel alignment ⇒ [page 77](#) .

Specified torques

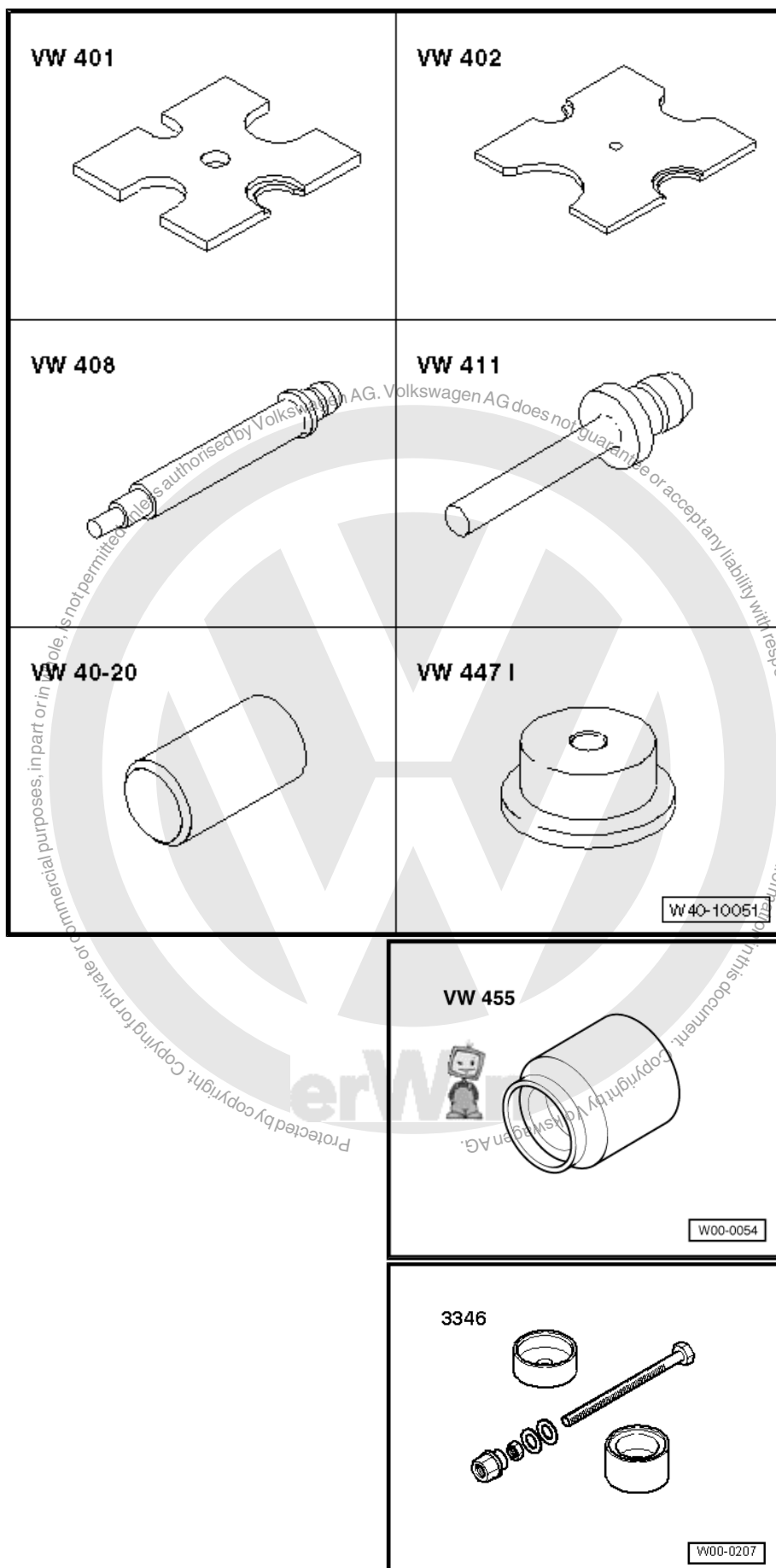
- ◆ ⇒ [“4.1 Assembly overview - suspension strut, upper suspension link”, page 24](#)



5.2 Renewing bonded rubber bush for lower suspension link

Special tools and workshop equipment required

- ◆ Thrust plate - VW 401-
- ◆ Thrust plate - VW402-
- ◆ Press tool - VW 408 -
- ◆ Press tool - VW 411-
- ◆ Tube - VW 40-20-
- ◆ Thrust washer - VW 447 i-
- ◆ Installing sleeve - VW 455-
- ◆ Assembly tool - 3346-
- ◆ Tube - 30-14-
- ◆ Tube - VW 415 A-





Front rubber bush

Removing



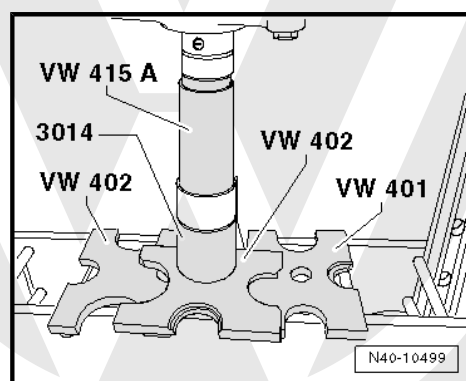
Note

When doing this work, always make sure that the tools and components are in the correct position and, if necessary, use a second mechanic.

- Remove lower suspension link. ➔ [page 37](#)
- Place component and tools in position as shown in illustration.
- Press out bush together with tube -VW 415 A-.

Installing

- Place component and tools in position as shown in illustration.



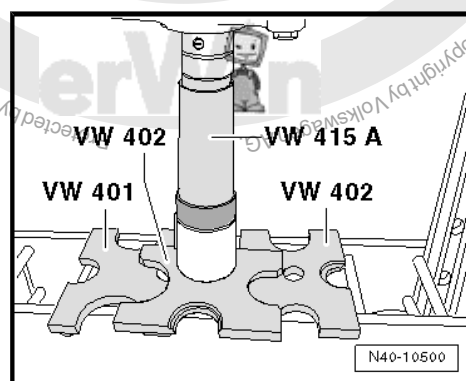
- Push in bush together with -VW 415 A- until it is flush.



Note

In order to achieve more precise flush-mounting at the end of the pressing-in process, the removal tube - 3014- can be used as shown in the preceding illustration.

- Install lower suspension link. ➔ [page 37](#)



Rear rubber bush

Removing

- Remove lower suspension link. ➔ [page 37](#)



Note

♦ *When doing this work, always make sure that the tools and components are in the correct position and, if necessary, use a second mechanic.*

♦ *Remove rubber edge -arrow- before pressing out bush.*

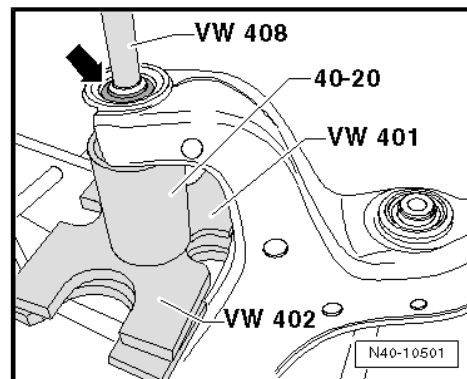
- Place component and tools in position as shown in illustration.



- Use press tool - VW 408- to press out bush.

Installing

- Place component and tools in position as shown in illustration.
- Place bush in assembly tool - 3346/1- .



- Use press tool - VW 410- and thrust washer - VW 447- to force the lower suspension link on over the bush.



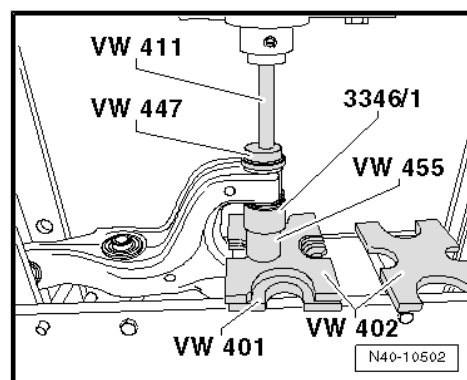
Note

The additional thrust plates -VW 402- are used for height compensation during the pressing-in process so that the suspension link does not become slanted.

- Install lower suspension link. [⇒ page 37](#)

Specified torques

- ♦ [⇒ “4.1 Assembly overview - suspension strut, upper suspension link”, page 24](#)

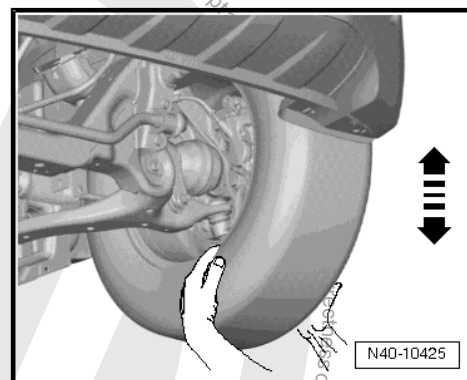


5.3 Checking swivel joint

- The check must be carried out with the vehicle raised.

Checking axial play

- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Firmly pull wheel down in direction of arrow- and press up again.





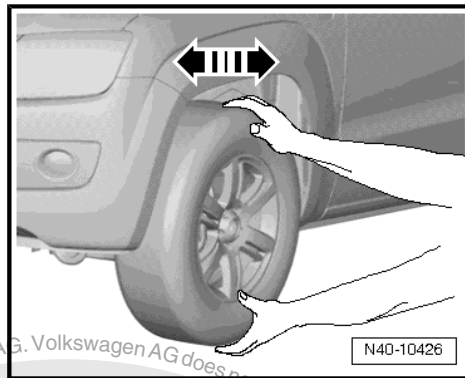
Checking radial play

- Set wheels/steering to straight-ahead position.
- Grip wheel at top and bottom and wobble in -direction of arrow-.
- Turn wheels/steering to left and repeat check.
- Turn wheels/steering to right and repeat check.



Note

- ◆ *There should be no palpable or visible "play" during both tests.*
- ◆ *Take into account possible existing wheel bearing play or "play" in upper suspension strut mounting.*
- ◆ *Other methods of checking are impermissible, as the swivel joint may otherwise be damaged.*





6 Drive shaft

⇒ ["6.1 Assembly overview - drive shaft", page 43](#)

⇒ ["6.2 Removing and installing drive shaft", page 45](#)

⇒ ["6.3 Dismantling and assembling drive shaft", page 48](#)

⇒ ["6.4 Checking outer constant velocity joint", page 51](#)

6.1 Assembly overview - drive shaft

Only vehicles with four-wheel drive

1 - Bolt

- ☐ Always renew after removing
- ☐ 150 Nm +180°

When bolt is loosened or tightened, vehicle must not be standing on its wheels.

2 - Outer constant velocity joint

- ☐ Renew only as complete unit
- ☐ Installing: drive onto shaft as far as stop using a plastic head hammer
- ☐ Removing ⇒ [page 49](#)
- ☐ Checking ⇒ [page 51](#)

3 - Retaining ring

- ☐ Always renew after removing
- ☐ Insert in groove in shaft

4 - Clamp

- ☐ Always renew after removing
- ☐ Tightening ⇒ [page 51](#)

5 - Boot

- ☐ Check for splits and chafing
- ☐ Material: Hytrel (polyester elastomer)

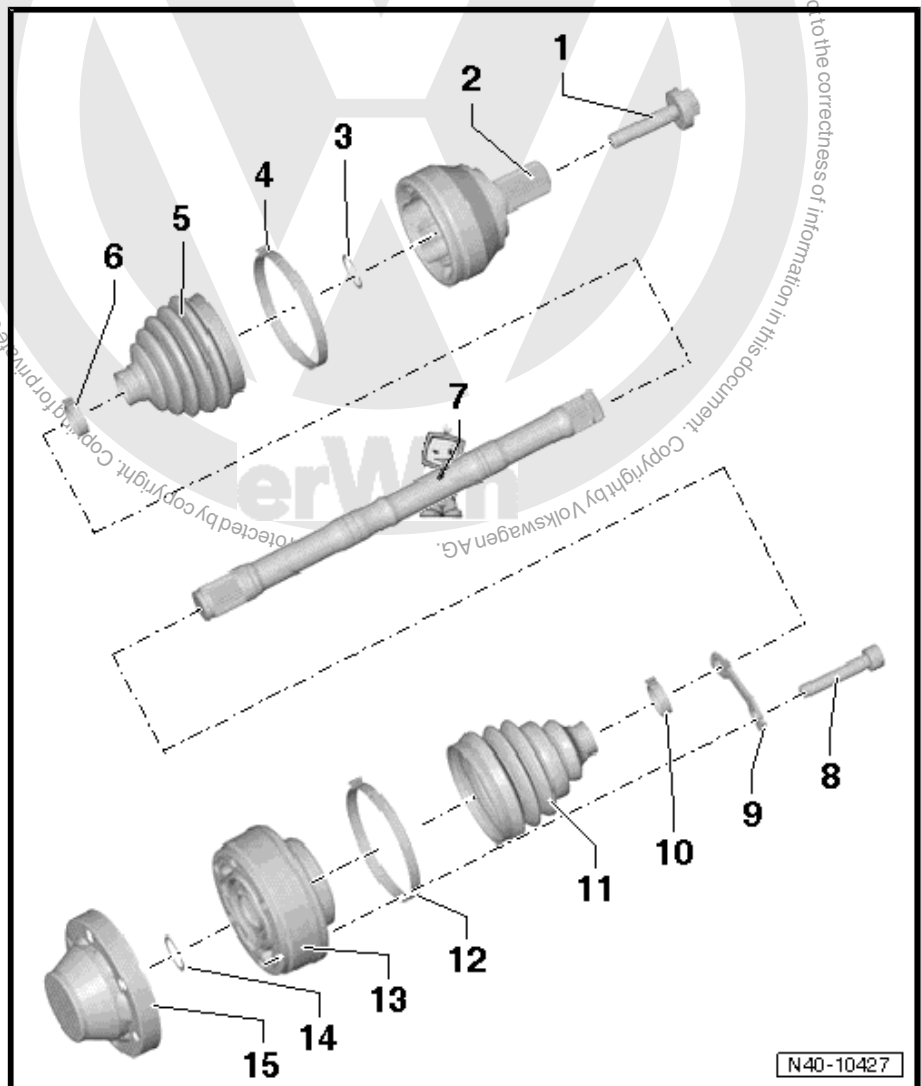
6 - Clamp

- ☐ Always renew after removing
- ☐ Tightening ⇒ [page 51](#)

7 - Drive shaft

8 - Multi-point socket head bolt

- ☐ Always renew after removing
- ☐ Initial torque specification: 10 Nm
- ☐ 50 Nm +90°





9 - Locking plate

10 - Clamp

- ☐ Always renew after removing
- ☐ Tightening ⇒ [page 51](#)

11 - Boot for constant velocity joint

- ☐ Material: Arnitel (polyester elastomer).
- ☐ Without breather hole
- ☐ Check for splits and chafing
- ☐ Drive off constant velocity joint with a drift
- ☐ Before installing to constant velocity joint, coat sealing surface with sealant → Electronic Parts Catalogue (ETKA).

12 - Clamp

- ☐ Always renew after removing
- ☐ Tightening ⇒ [page 51](#)

13 - Inner constant velocity joint

- ☐ Renew only as complete unit
- ☐ Pressing off ⇒ [page 50](#)
- ☐ Pressing on ⇒ [page 50](#)

14 - Retaining ring

- ☐ Remove and install with circlip pliers - VW 161 A-

15 - Cover

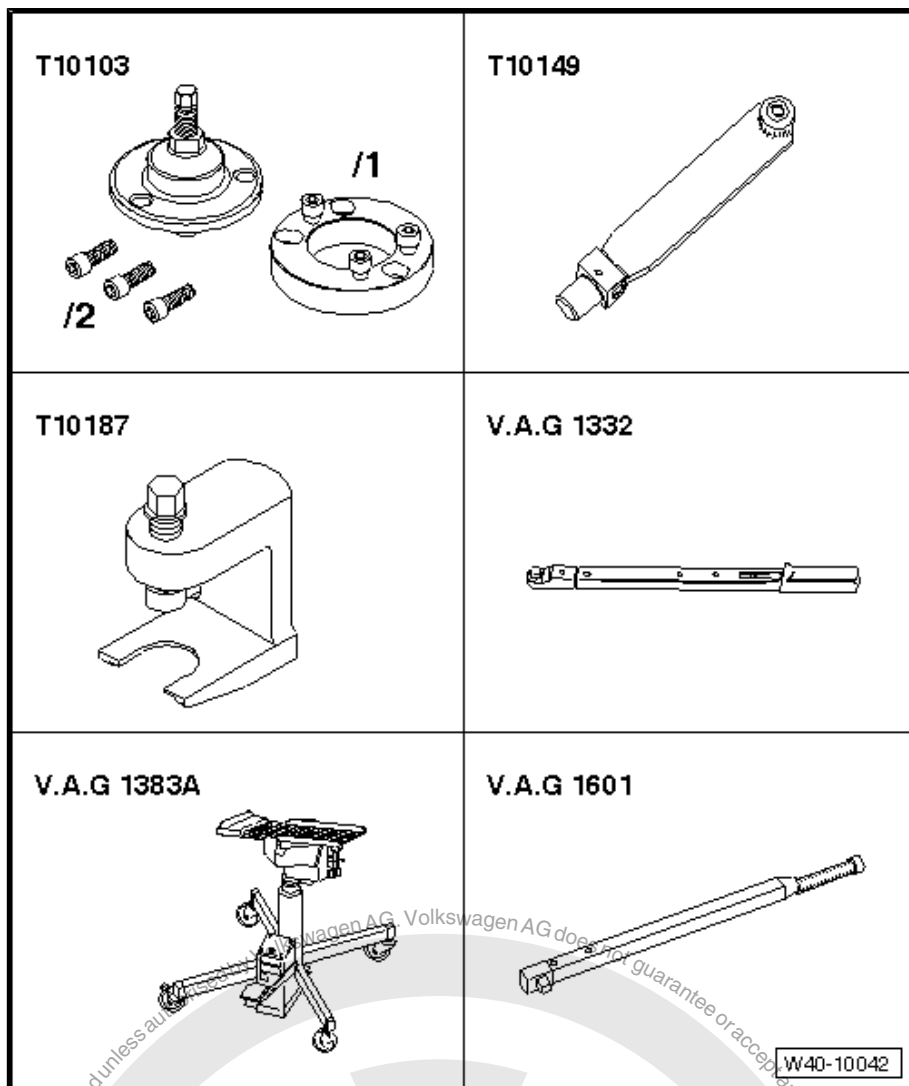
- ☐ Always renew after removing
- ☐ Pressing off ⇒ [page 49](#)



6.2 Removing and installing drive shaft

Special tools and workshop equipment required

- ◆ Remover - T10103-
- ◆ Support - T10149-
- ◆ Ball joint puller - T10187-
- ◆ Torque wrench - V.A.G 1332-
- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Torque wrench - V.A.G 1601-



Removing

- Lift vehicle far enough to take weight off front axle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising the vehicle .
- Loosen drive shaft bolt.



Note

- ◆ *Tighten or loosen bolt only when vehicle is standing on its wheels (danger of accident!).*
- ◆ *Do not move vehicle with loosened bolt. Moving vehicle could cause damage to wheel bearing.*
- ◆ *If vehicle is to be moved with drive shaft removed, an outer joint must be installed and tightened to 150 Nm.*
- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Remove wheel.



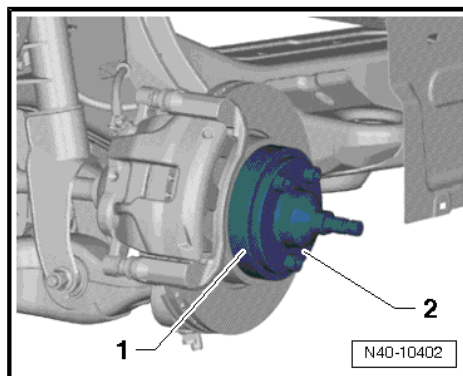
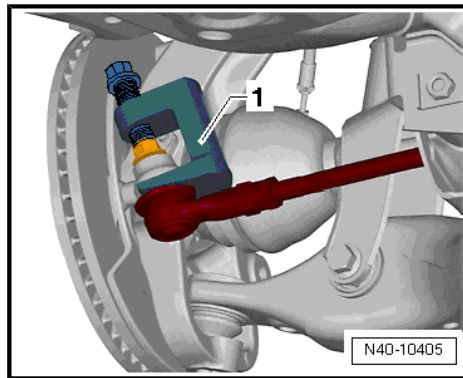
- Loosen nut on track rod ball joint but do not remove completely.



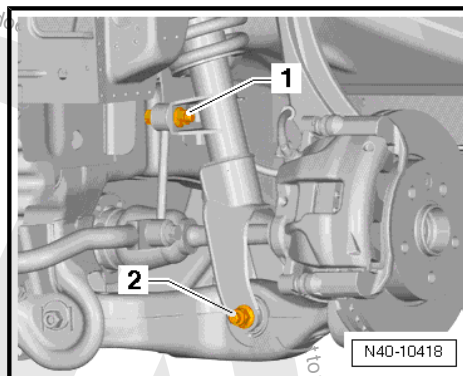
Caution

Leave nut screwed on a few turns to protect thread on pin.

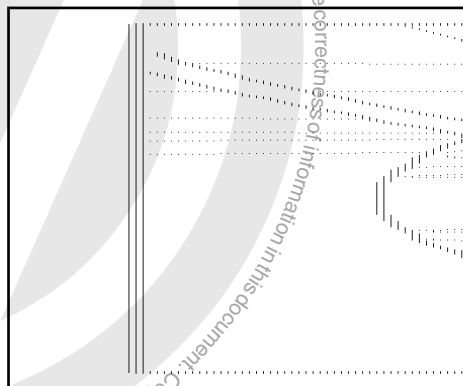
- Push track rod off wheel bearing housing and remove nut.
- 1 - Ball joint puller - T10187-
- Unscrew and remove drive shaft bolt.
- Press out drive shaft.
- 1 - Adapter - T10103/1-
- 2 - Remover - T10103-
- When removing, make sure joints have adequate clearance.
- Pull connector off ABS speed sensor.
- Remove brake line bracket from wheel bearing housing.



- Remove nut -1- for coupling rod and pull bolt out of suspension strut.
- Remove bolted joint -2-.
- Unbolt drive shaft from final drive.
- Turn wheel hub until one of the wheel bolt holes is at the top.



- Attach support - T10149- with a wheel bolt -A-.





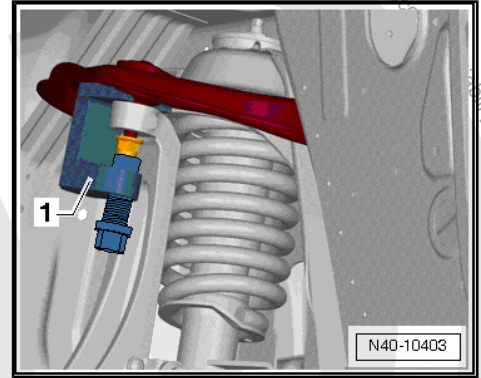
- Slacken off nut on tapered pin (but do not remove yet).



Caution

Leave nut screwed on a few turns to protect thread on pin.

- Press out upper suspension link and unscrew nut.
- 1 - Ball joint puller - T10187-
- Lower wheel bearing housing until drive shaft can be removed.
- Remove drive shaft.



Installing

Install in reverse order. Note the following points:



Note

Tighten bolted connections between lower suspension link and suspension strut only if the vehicle is standing on its wheels and is unladen or if the vehicle is raised and is in the unladen position (normal position) ⇒ [page 6](#).

- Install wheel and tighten bolts or nuts ⇒ [page 71](#).

Specified torques

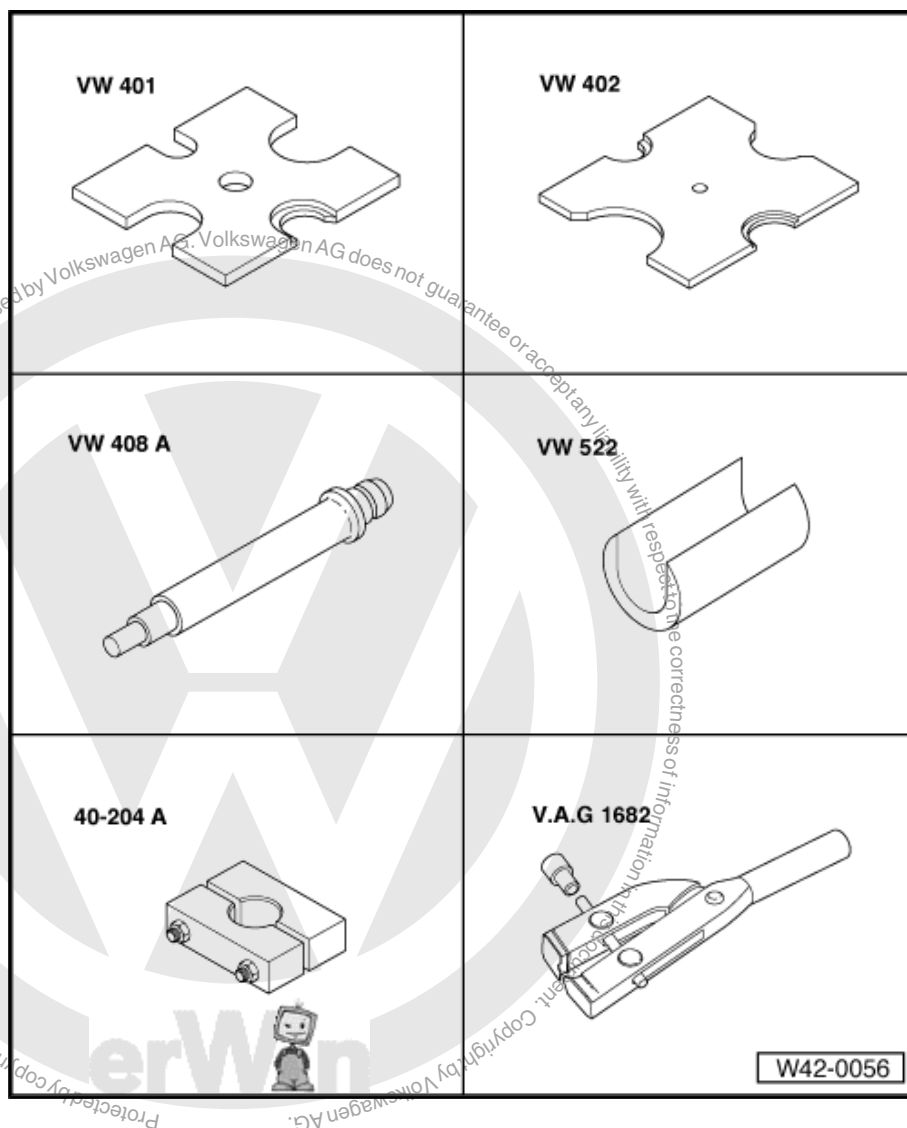
- ◆ ⇒ [“4.1 Assembly overview - suspension strut, upper suspension link”, page 24](#)
- ◆ ⇒ [“3.1 Assembly overview - wheel bearing assembly”, page 16](#)



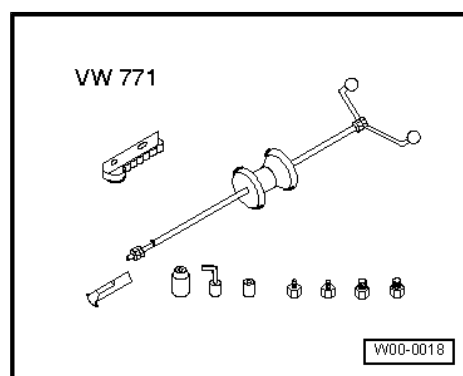
6.3 Dismantling and assembling drive shaft

Special tools and workshop equipment required

- ◆ Thrust plate - VW 401-
- ◆ Thrust plate - VW 402-
- ◆ Press tool - VW 408 A-
- ◆ Support sleeve - VW 522-
- ◆ Tensioner - 40 - 204 A-
- ◆ Special pliers - V.A.G 1682-

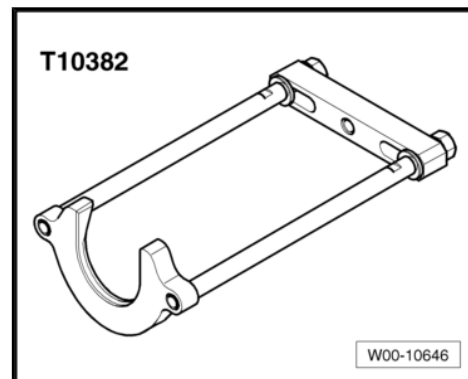


- ◆ Multi-purpose tool - VW 771-





◆ Puller - T10382-



Removing outer constant velocity joint

- Clamp drive shaft in vice using protective jaw covers.
- Fold back boot.
- Set puller - T10382- up so that smooth side of puller plate - T10382/1- points to spindles - T10382/2- .
- Assemble puller - T10382- complete with multi-purpose tool - VW 771- .
- Pull constant velocity joint from drive shaft with puller - T10382- and multi-purpose tool - VW 771- .

1 - Puller plate - T10382/1-

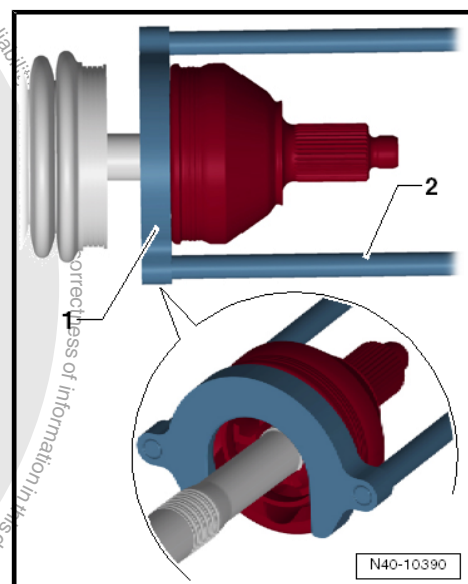
2 - Spindles - T10382/2-

Driving on outer constant velocity joint

Install new retaining ring.

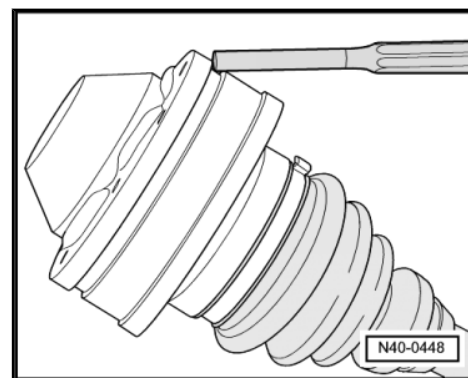
If necessary, push new joint boot onto drive shaft.

Knock onto shaft with plastic hammer until circlip engages.



Driving off cover for inner joint

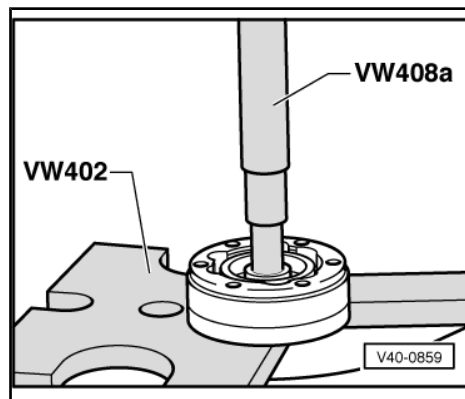
- Remove retaining ring.
- Remove both clamps and slide boot towards outer joint.
- Drive off boot with drift.





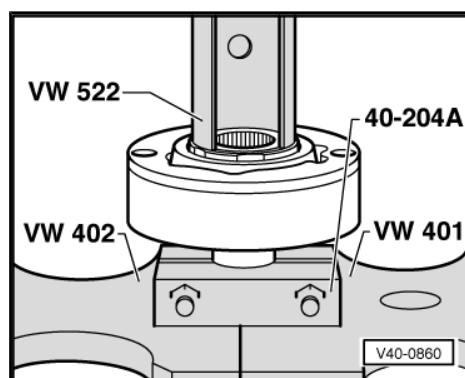
Pressing off inner constant velocity joint

Assembling

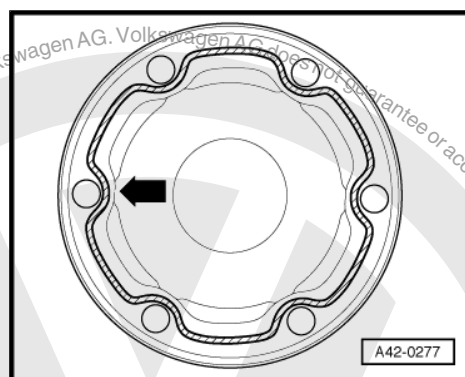


Pressing on inner constant velocity joint

- Press joint on to stop.
- Install retaining ring.



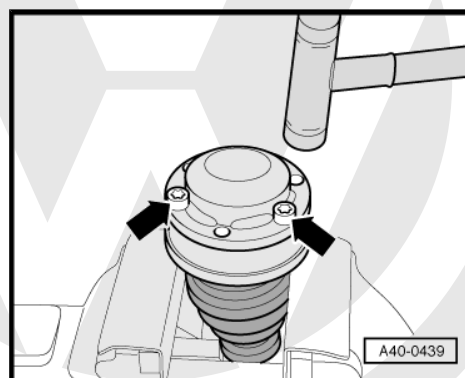
- Coat sealing surface of cover with sealant ⇒ Electronic Parts Catalogue (ETKA) .
- Apply a continuous bead of sealant with a 2 ... Ø 3 mm to clean surface of cover in area of inner holes -arrow-.



- Using bolts -arrows-, align new cover in relation to bolt holes.

The alignment must be very accurate, because no further alignment is possible once the part has been hammered on.

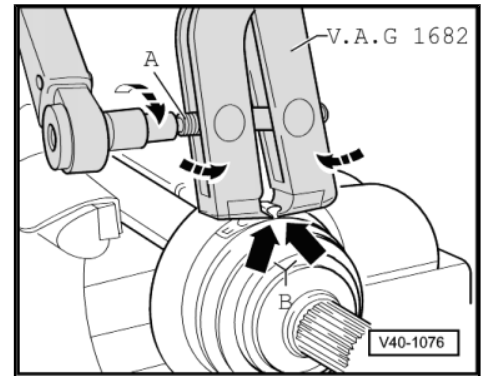
- Drive on cover using a plastic hammer.
- Wipe off surplus sealant.





Tighten clamp on outer joint

- Position clamp tensioner - V.A.G 1682- as shown in diagram. Ensure jaws of tensioner lie in corners -arrows B- of ears on O-type clip.
- Tighten clamp by turning spindle with a torque wrench (do not cant pliers).



Specified torque

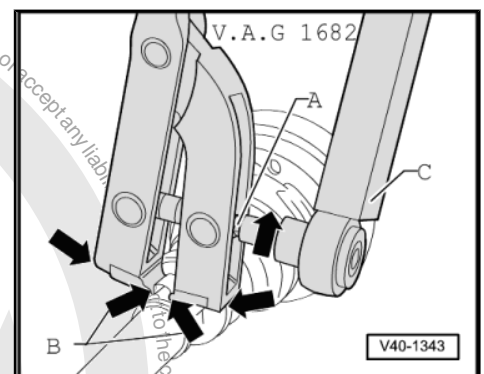
Component	Specified torque
Clamp	25 Nm



Note

- ◆ Due to the hard material of the protective boot (compared to rubber) and the necessity of using a stainless steel clamp, it is only possible to tension the clamp with clamp tensioner - V.A.G 1682-.
- ◆ Use torque wrench -C- with setting range of 5 ... 50 Nm (e.g. torque - V.A.G 1331-).
- ◆ Make sure thread of spindle -A- on pliers moves freely. Lubricate with MoS2 grease if necessary.
- ◆ If the thread is tight (e.g. due to dirt), the required clamping force for the clamp will not be attained although the specified tightening torque is applied.

Tightening clamp on small diameter

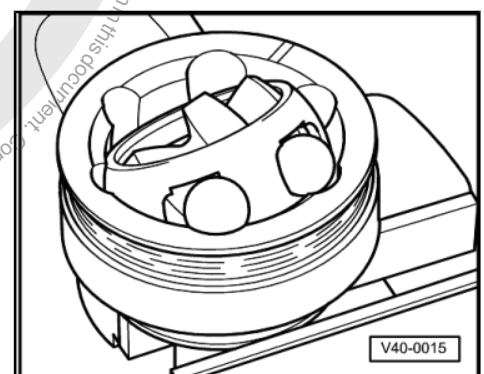


6.4 Checking outer constant velocity joint

The joint is to be dismantled to renew the grease if it is heavily soiled, or to check the running surfaces of the balls for wear and damage.

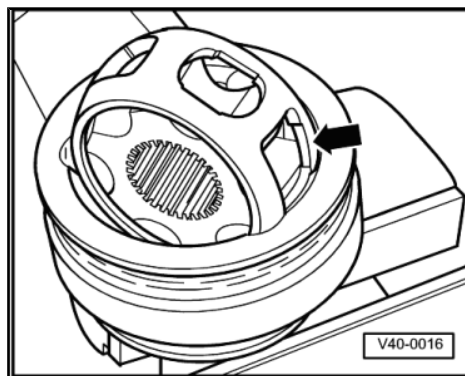
Removing

- Before dismantling, mark position of ball hub in relation to ball cage and joint body with an electric scribe or oil stone.
- Swing ball hub and ball cage.
- Remove balls one at a time.





- Turn cage until the two rectangular windows -arrow- lie on joint body.
- Take out cage with hub.

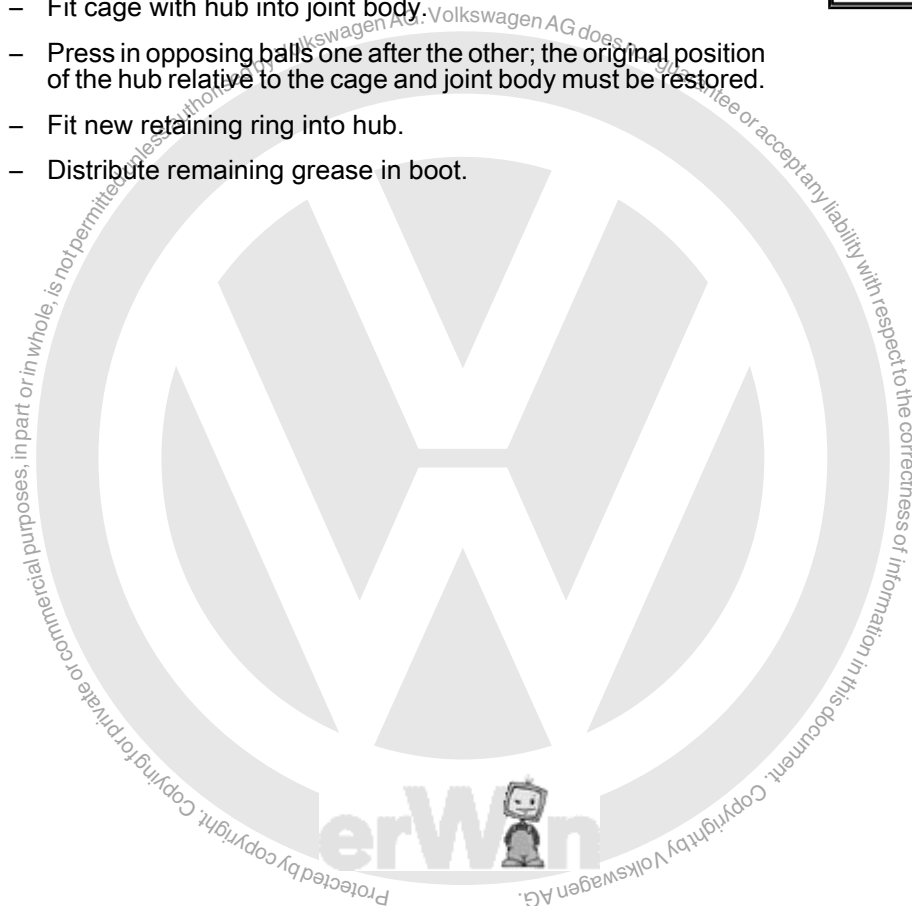
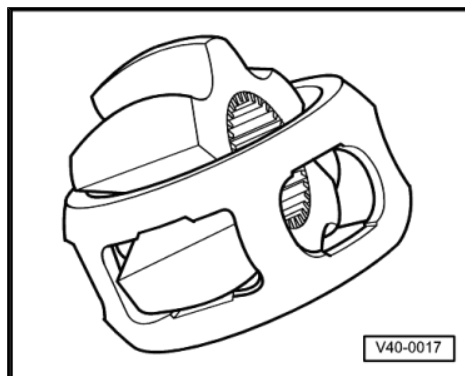


- Swing segment of hub into square cage window.
- Tip hub out of cage.

The six balls for each joint belong to a tolerance group. Check stub axle, hub, cage and balls for small indentations (pitting) and traces of seizing. Too much circumferential backlash in the joint becomes noticeable during load change jolts; in such cases, the joint must be renewed. Smoothing and traces of wear of the balls are no reason to change the joint.

Installing

- Pack half the total quantity of grease into the joint body.
- Fit cage with hub into joint body.
- Press in opposing balls one after the other; the original position of the hub relative to the cage and joint body must be restored.
- Fit new retaining ring into hub.
- Distribute remaining grease in boot.





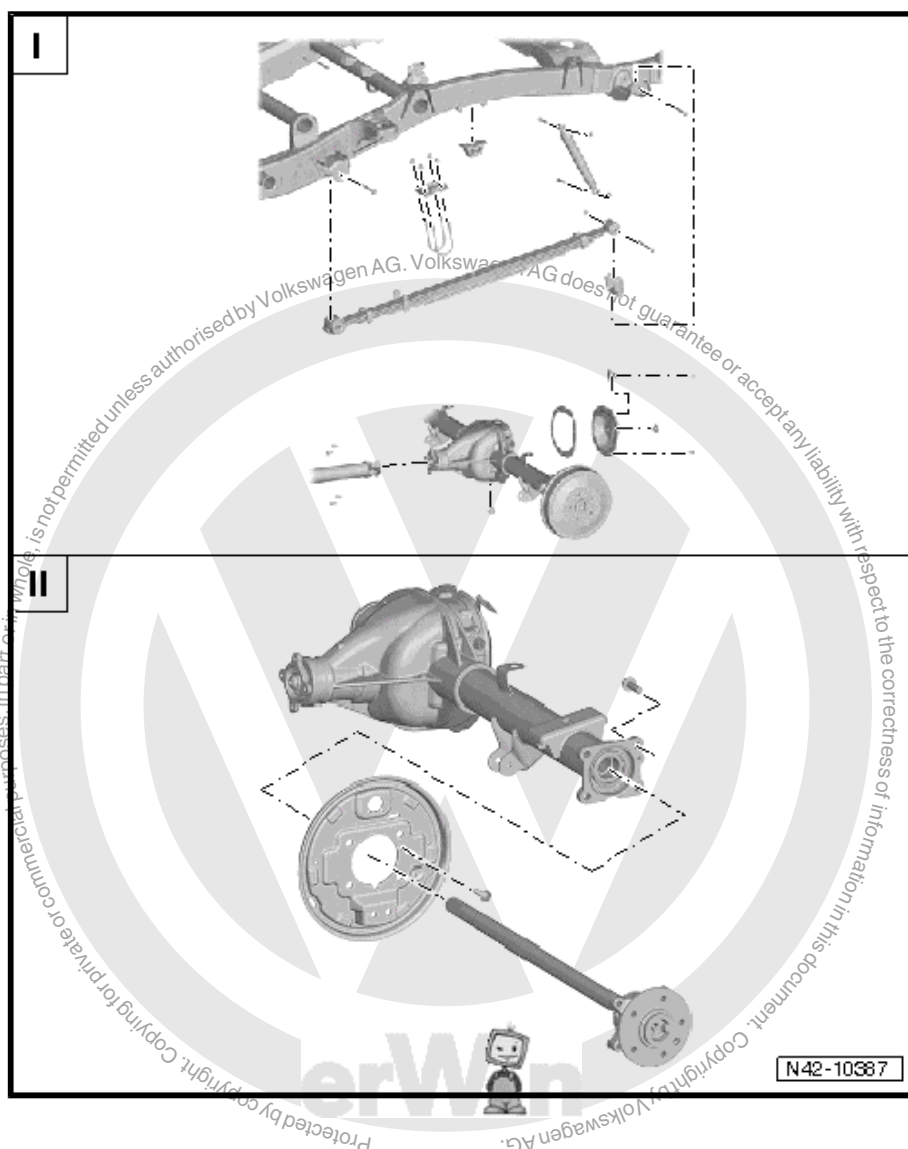
42 – Rear suspension

1 Rear axle

- ⇒ [“1.1 Overview - rear axle”, page 53](#)
- ⇒ [“1.2 Assembly overview - rear axle”, page 54](#)
- ⇒ [“1.3 Assembly overview - rear axle shafts”, page 56](#)
- ⇒ [“1.4 Removing and installing bump stop for leaf spring”, page 57](#)
- ⇒ [“1.5 Removing and installing rear axle”, page 57](#)
- ⇒ [“1.6 Removing and installing leaf spring”, page 60](#)
- ⇒ [“1.7 Renewing rubber bush for leaf spring”, page 64](#)
- ⇒ [“1.8 Removing and installing plastic insert for leaf spring”, page 66](#)
- ⇒ [“1.9 Removing and installing rear axle shaft”, page 66](#)

1.1 Overview - rear axle

- I -
⇒ [“1.2 Assembly overview - rear axle”, page 54](#)
- II -
⇒ [“1.3 Assembly overview - rear axle shafts”, page 56](#)





1.2 Assembly overview - rear axle



Note

- ◆ It is not permitted to carry out welding and straightening operations on load-bearing or wheel-guiding suspension components.
- ◆ Always renew self-locking nuts.
- ◆ Always renew corroded nuts and bolts.
- ◆ Bonded rubber bushes can be twisted only to a limited extent. Therefore, tighten the bolted connections of components with bonded rubber bushes only when the wheel bearing housing is raised to unladen position ⇒ [page 6](#).
- ◆ Always renew bonded rubber bush on both sides of the vehicle.

1 - Bolt

- ☐ Always renew after removing
- ☐ 90 Nm +180°

2 - Nut

- ☐ Always renew after removing
- ☐ 90 Nm +180°

3 - Clamp

4 - Stone deflector

5 - Bolt

6 - Bump stop

- ☐ Removing and installing
⇒ [page 57](#)

7 - Nut

- ☐ Always renew after removing
- ☐ 90 Nm +180°

8 - Shock absorber

- ☐ Allocation ⇒ Electronic Parts Catalogue "ET-KA".
- ☐ Removing and installing
⇒ [page 69](#)

9 - Bolt

10 - Shackle

11 - Bolt

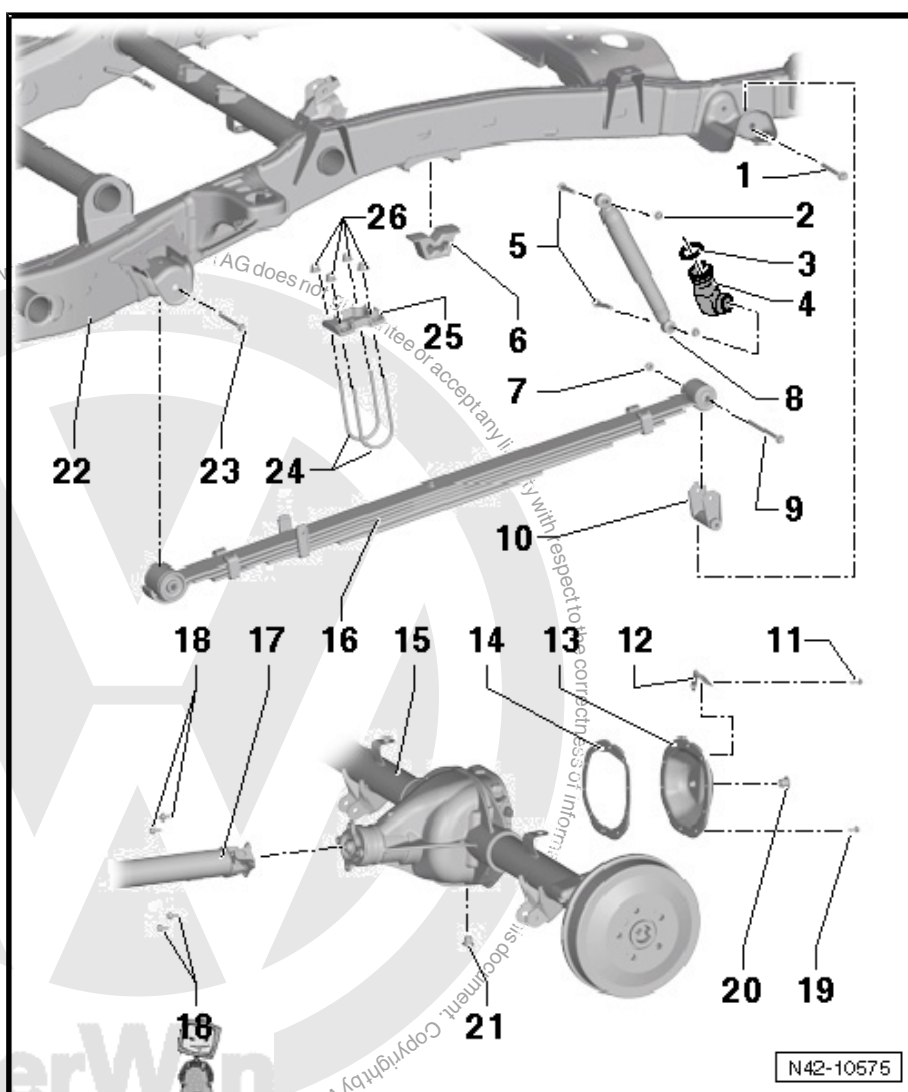
- ☐ Longer than
⇒ [Item 19 \(page 55\)](#)
- ☐ 43 Nm

12 - Spring retainer

13 - Final drive cover

14 - Seal

- ☐ Always renew after removing



**15 - Axle beam**

- ☐ Removing and installing ⇒ [page 57](#) .

16 - Leaf spring

- ☐ Allocation ⇒ Electronic Parts Catalogue "ETKA" .
- ☐ Removing and installing ⇒ [page 60](#) .

17 - Propshaft

- ☐ Before removing, mark position relative to final drive flange.

18 - Bolt

- ☐ Always renew after removing
- ☐ 50 Nm +90°

19 - Bolt

- ☐ Shorter than ⇒ [Item 11 \(page 54\)](#)
- ☐ 43 Nm

20 - Bolt

- ☐ 32 Nm

21 - Oil drain plug

- ☐ Only for final drive with limited-slip differential
- ☐ 32 Nm

22 - Ladder frame**23 - Bolt**

- ☐ Always renew after removing
- ☐ 90 Nm +180°

24 - U bolt

- ☐ Always renew after removing

25 - Saddle plate**26 - Nut**

- ☐ Always renew after removing
- ☐ 150 Nm +180°



1.3 Assembly overview - rear axle shafts

1 - Rear axle

2 - Bolt

- ☐ Always renew after removing
- ☐ 150 Nm +90°

3 - Bolt

- ☐ Always renew after removing
- ☐ Clean locking fluid residue from threaded hole in axle beam



Note

Threaded holes into which self-locking bolts or bolts with locking fluid have been screwed must be cleaned (e.g. using a thread chaser). Otherwise, there is a risk that bolts will shear off when removed once again.

- ☐ 30 Nm

4 - Brake carrier

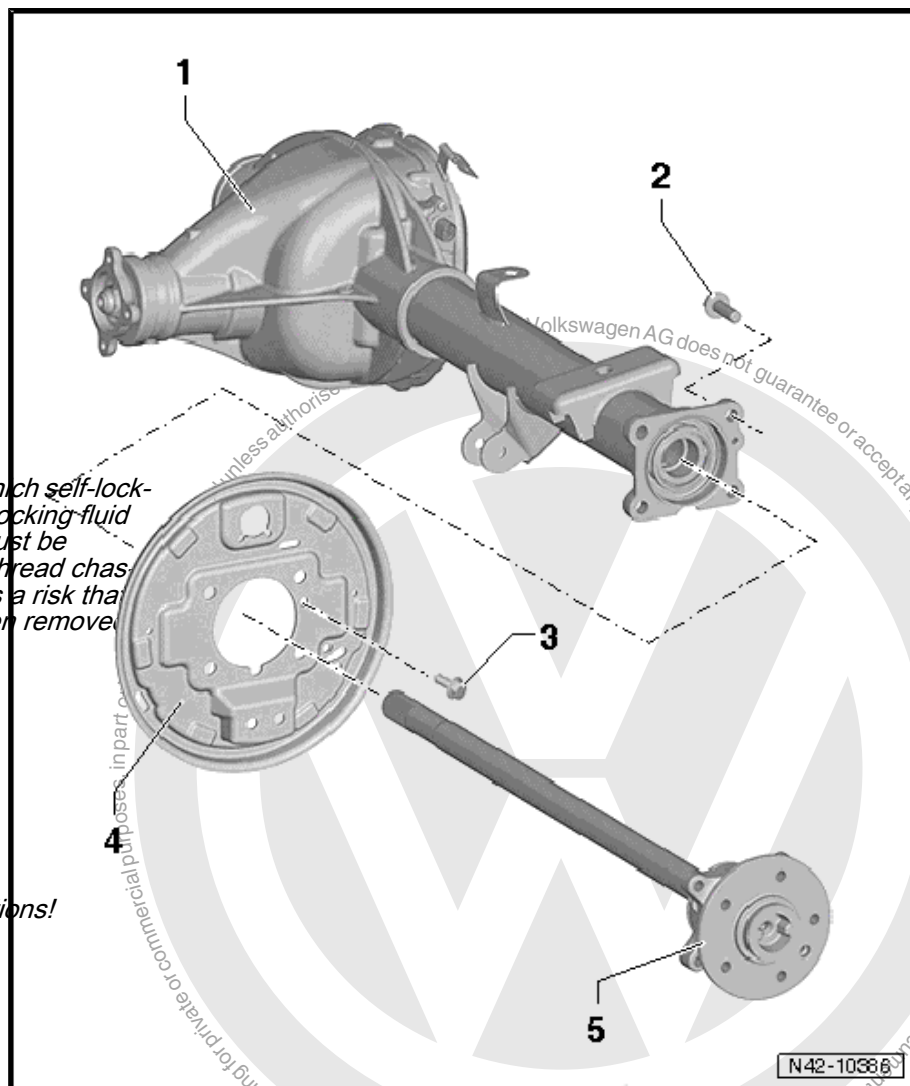
5 - Rear axle shaft



Note

Observe fitting instructions!
⇒ [page 56](#)

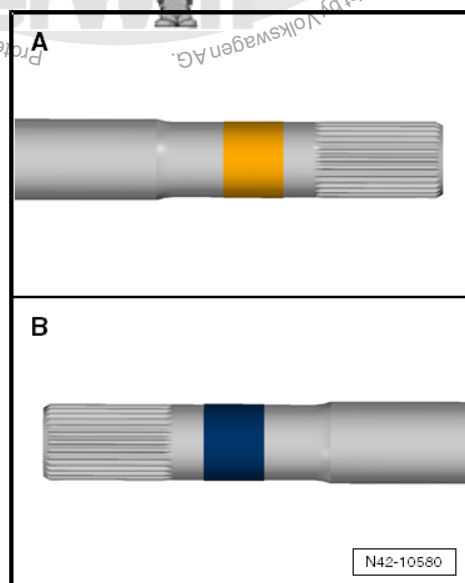
- ☐ With wheel bearing unit and sensor ring for ABS
- ☐ Removing and installing
⇒ [page 66](#)



Allocation of rear axle shafts

The rear axle shafts are colour-coded. Observe proper installation without exception:

- A: yellow marking for left shaft in direction of travel
- B: blue marking for right shaft in direction of travel

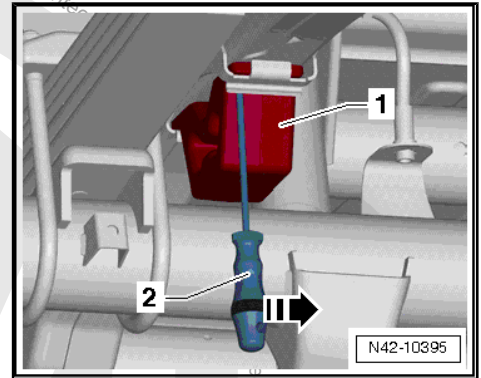




1.4 Removing and installing bump stop for leaf spring

Removing and installing bump stop -1- for leaf spring

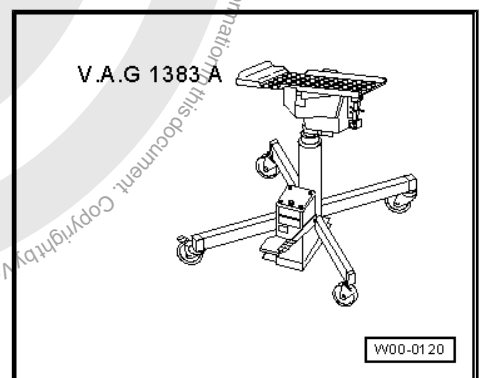
- To remove, position a screwdriver -2- at side between bump stop -1- and support/ladder frame.
- Compress bump stop in -direction of arrow- and remove.
- When installing bump stop, compress it with a screwdriver -2- in -direction of arrow- and insert in support on frame.



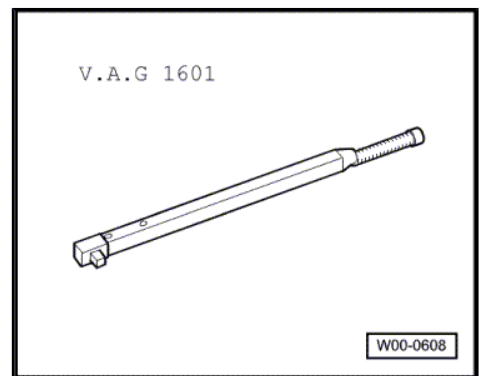
1.5 Removing and installing rear axle

Special tools and workshop equipment required

- ◆ Engine and gearbox jack - V.A.G 1383 A-



- ◆ Torque wrench - V.A.G 1601-



Removing

- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Remove wheels.

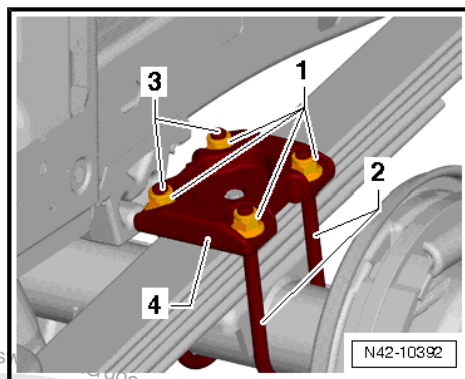


Note

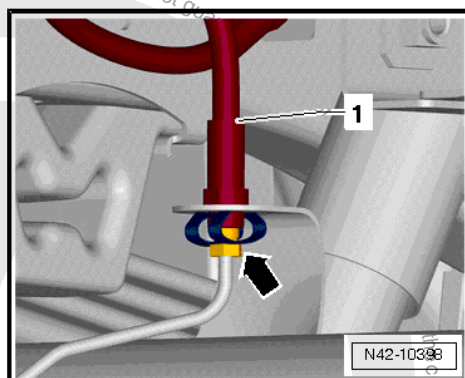
The following procedure is for the left side of the vehicle. The procedure for the right side of the vehicle is identical.



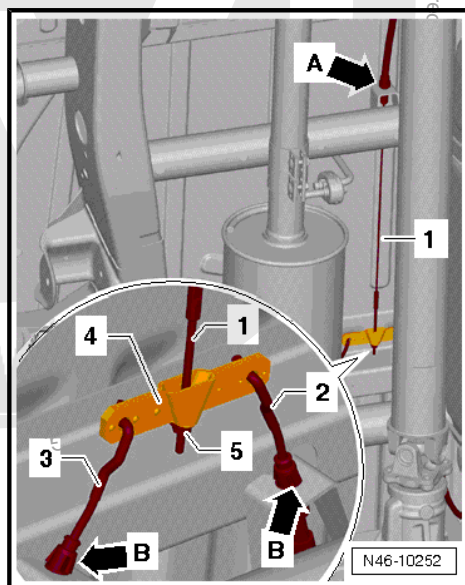
- Loosen nuts -1- approx. 2 turns.



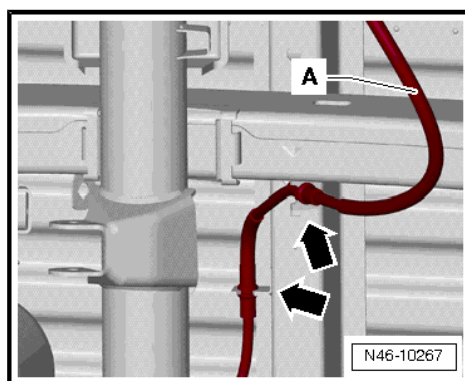
- Disconnect brake hose -1- from brake line -arrow-.



- Unscrew adjustment nut -5- from front handbrake cable -1-.
- Unhook handbrake cable at rear left -2- and right -3- from compensator -4-.
- Press the two locking projections together at control cable support bracket -arrow B- of handbrake cable, e.g. using pliers.
- Remove handbrake cable from control cable support bracket.

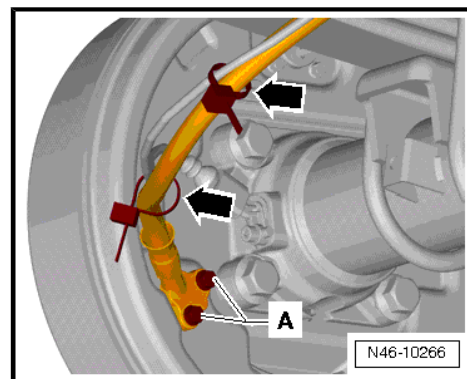


- Pull handbrake cable -A- out of brackets on ladder frame and body -arrows- and remove.

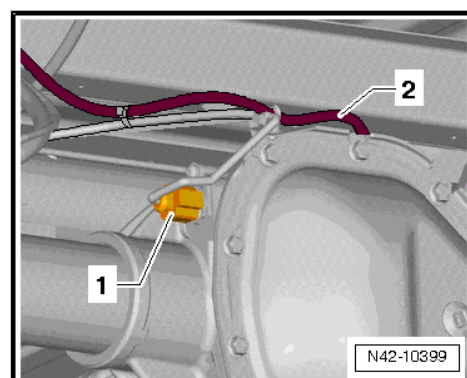




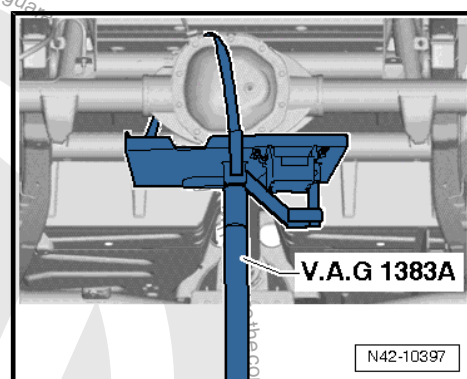
- Remove all cable ties -arrows- for speed sensor wire from handbrake cable.
- Disconnect speed sensor connector for ABS.



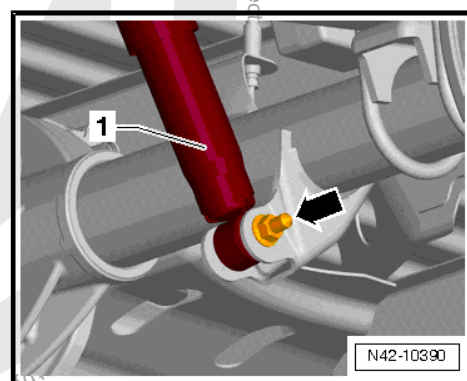
- If present, disconnect connector -1- and pull it off bracket.
- Pull vent pipe -2- off final drive.
- Unbolt propshaft from propshaft flange of final drive.
- Pull propshaft off propshaft flange and secure it.



- Place engine and gearbox jack - V.A.G 1383 A- under axle beam and tie it down with tensioning belt of universal mounting.



- Unfasten bolted joint of shock absorber -1- on rear axle -arrow-.





- Unscrew nuts -1- from U bolts -2- and -3-
Remove U bolts and saddle plate.
- Lower rear axle with engine and gearbox jack - V.A.G 1383 A- .

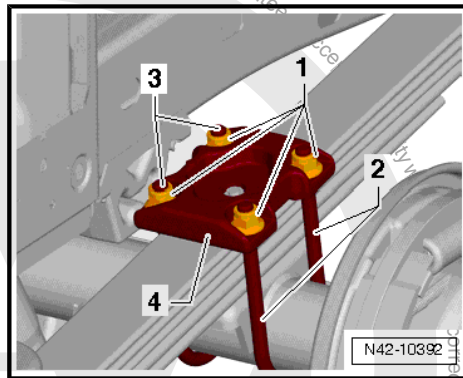
Installing

Install in reverse order. Note the following points:



Caution

- ♦ *Bonded rubber bushes can be twisted only to a limited extent.*
- ♦ *Therefore, tighten bolted connections on components having bonded rubber mountings only if the vehicle is standing on its wheels and is unladen or if the vehicle is raised and is in the unladen position (normal position)*
⇒ [page 6](#) .



Note

- ♦ *Only use new securing bolts and securing nuts.*
 - ♦ *Make sure that guide pin of leaf spring engages in hole in axle beam.*
 - ♦ *Tighten them both uniformly so that the same length of thread protrudes in each case.*
- Mount propshaft on propshaft flange.



Note

Make sure that marks on flange and shaft align.

- Install wheels and tighten bolts or nuts ⇒ [page 71](#) .

Specified torques

- ♦ ⇒ [“1.2 Assembly overview - rear axle”, page 54](#)

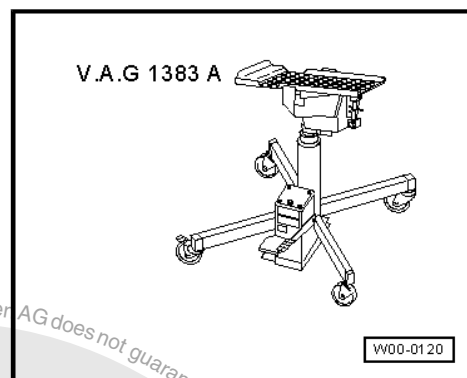
Component	Specified torque
Brake hose to brake line	14 Nm

1.6 Removing and installing leaf spring

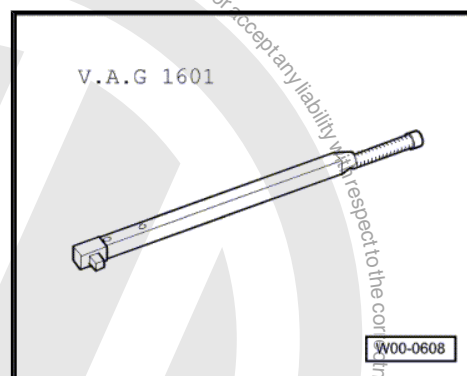
Special tools and workshop equipment required



◆ Engine and gearbox jack - V.A.G 1383 A-

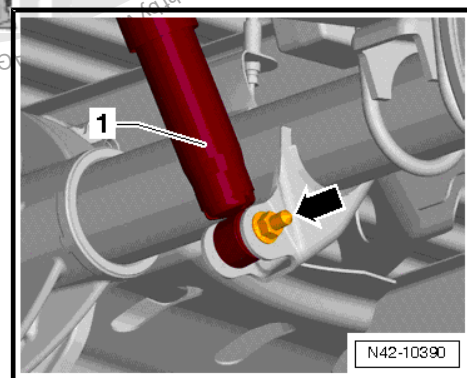


◆ Torque wrench - V.A.G 1601-



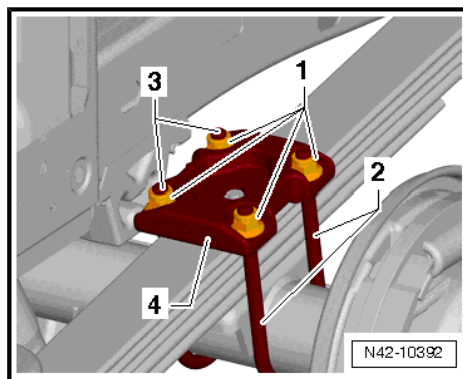
Removing

- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Remove wheel.
- Remove wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 .
- Position engine and gearbox jack - V.A.G 1383 A- beneath axle beam and exert slight counter pressure.
- Unfasten bolted joint of shock absorber -1- on rear axle -arrow-.

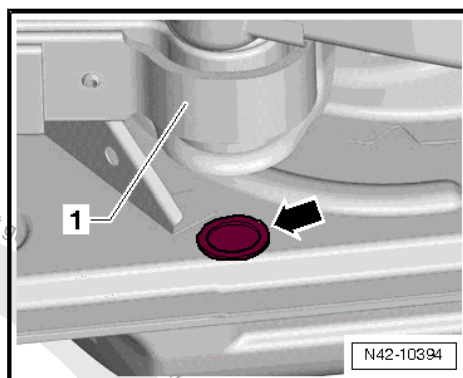




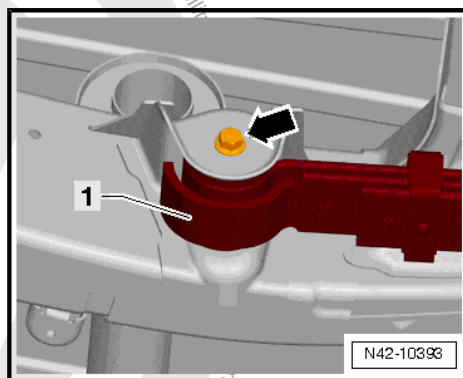
- Unscrew nuts -1- from U bolts -2- and -3-.
- Remove U bolt and saddle plate from leaf spring.



- In order to remove front bolt of leaf spring -1-, it is necessary to remove cover cap -arrow-.



- Unscrew and remove front bolt -arrow- of leaf spring -1-.



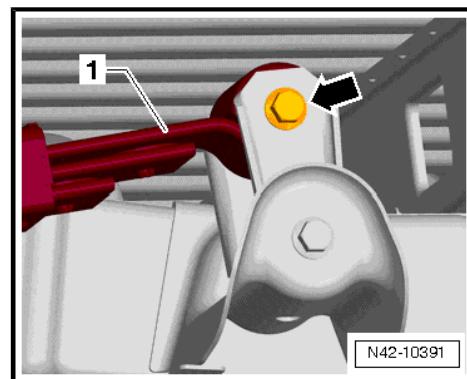


- Unscrew and remove rear bolt -arrow- of leaf spring -1-.
- Lower axle beam to approx. 20 mm.



Note

- ◆ Leaf spring guide pin must slide out of hole in axle beam; lever out if necessary.
 - ◆ Watch out for brake hose. It must not be stretched.
- Remove leaf spring to side.



Installing

Install in reverse order. Note the following points:



Caution

- ◆ Bonded rubber bushes can be twisted only to a limited extent.
- ◆ Therefore, tighten bolted connections on components having bonded rubber mountings only if the vehicle is standing on its wheels and is unladen or if the vehicle is raised and is in the unladen position (normal position) ⇒ [page 6](#).



Note

- ◆ Only use new securing bolts and securing nuts.
 - ◆ Make sure that guide pin of leaf spring engages in hole in axle beam.
 - ◆ Tighten them both uniformly so that the same length of thread protrudes in each case.
- Install wheels and tighten bolts or nuts ⇒ [page 71](#).

Specified torques

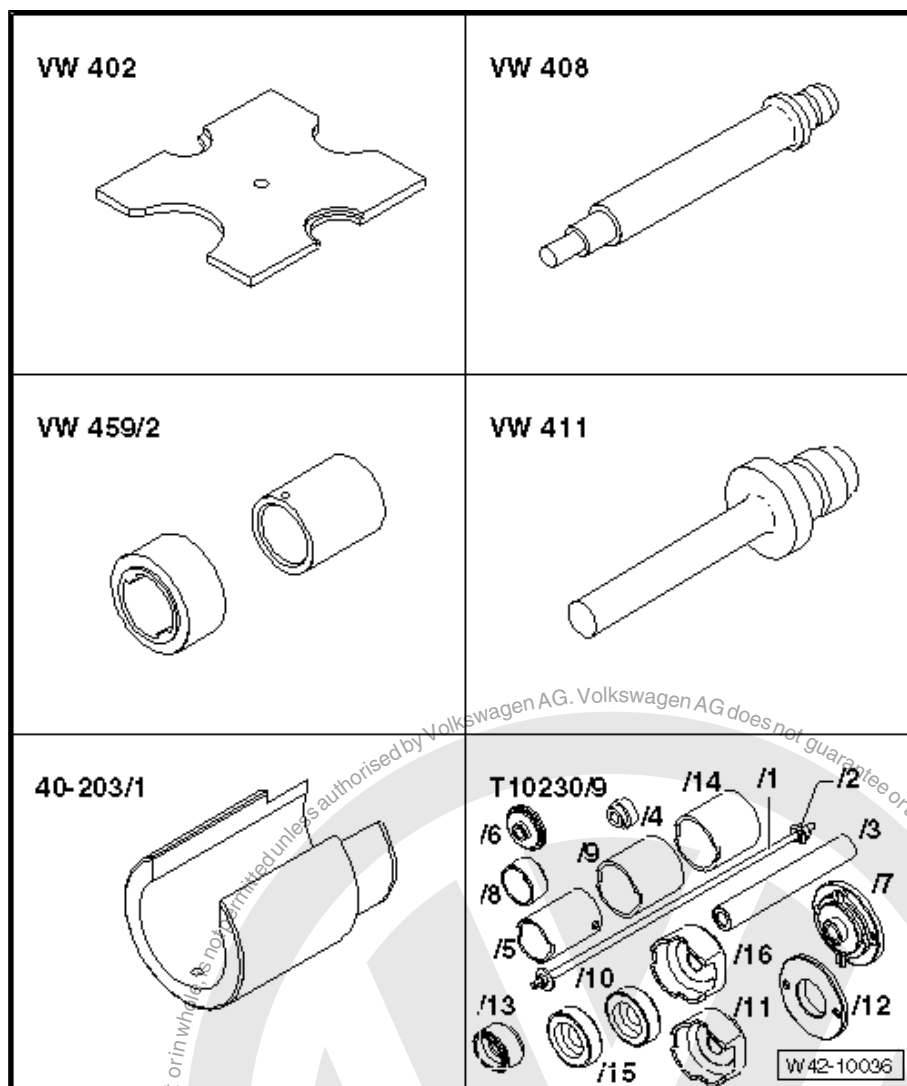
- ◆ ⇒ ["1.2 Assembly overview - rear axle", page 54](#)



1.7 Renewing rubber bush for leaf spring

Special tools and workshop equipment required

- ◆ Thrust plate - VW 402-
- ◆ Press tool - VW 408-
- ◆ Removing and installing tool - VW 459/2-
- ◆ Press tool - VW 411-
- ◆ Tube - 40-203/1-
- ◆ Assembly tool - T10230/9-



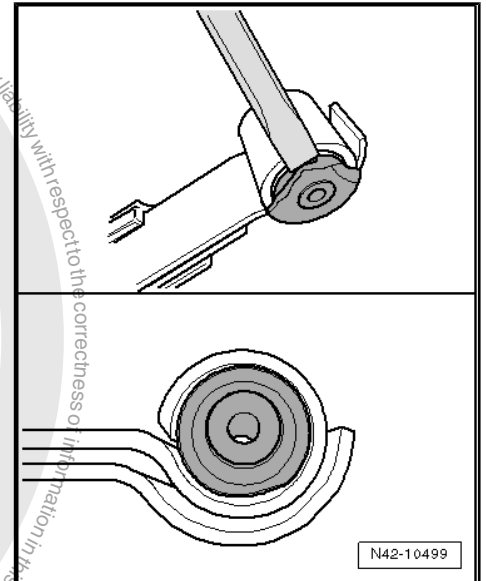
Removing and installing front leaf spring mounts

Removing

- Remove leaf spring ⇒ [page 60](#) .



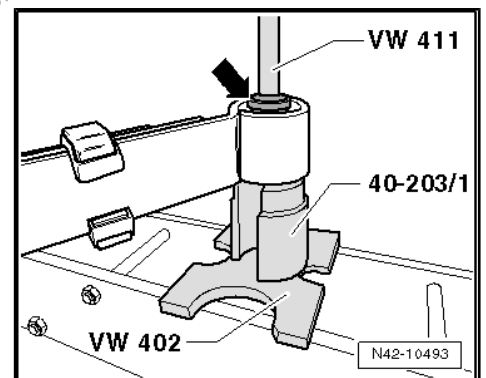
- Use a sharp chisel to remove metal collar from bonded rubber bush in order to support leaf springs.
- Remove rubber edge -arrow- of bush.
- Place component and tools in position as shown in illustration.



- Press out bonded rubber bush.

Installing

- Place component and tools in position as shown in illustration.



- Pressing in bonded rubber bush.

Removing and installing rear leaf spring mounts

Removing

- Remove leaf spring ⇒ [page 60](#) .



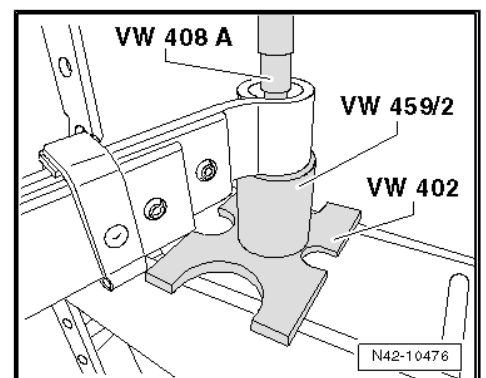
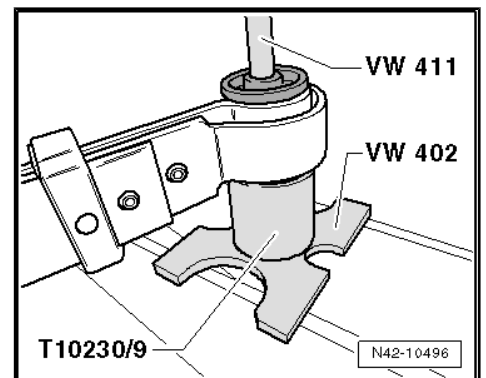
Note

The rear shackle can only be replaced as a complete part.

- Place component and tools in position as shown in illustration.
- Press out bonded rubber bush.

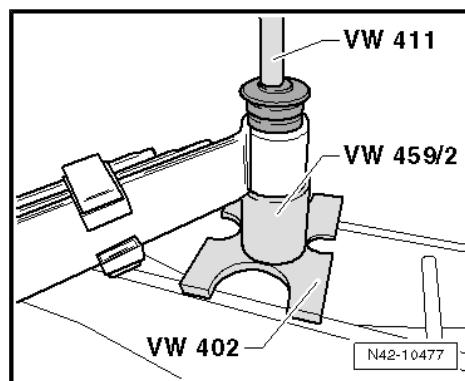
Installing

- Place component and tools in position as shown in illustration.





- Pressing in bonded rubber bush.



1.8 Removing and installing plastic insert for leaf spring

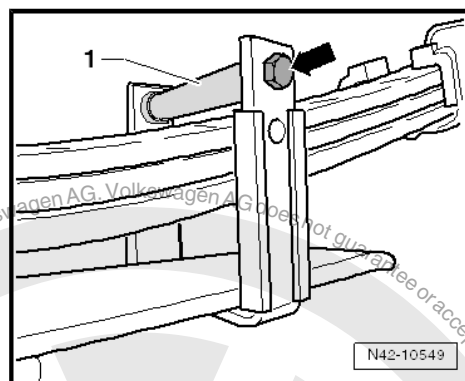
Removing

- Unscrew bolt -arrow- and remove sleeve -1-.



WARNING

Do not damage plastic sleeve.



- Release plastic insert -1- and carefully pull off bracket in -direction of arrow-.

Installing

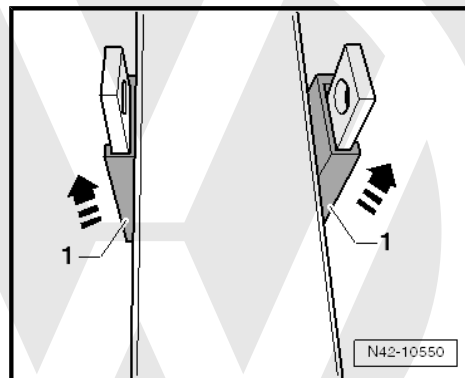
Install in reverse order. Note the following points:



Note

Before installing new insert, remove soiling on guides of bracket.

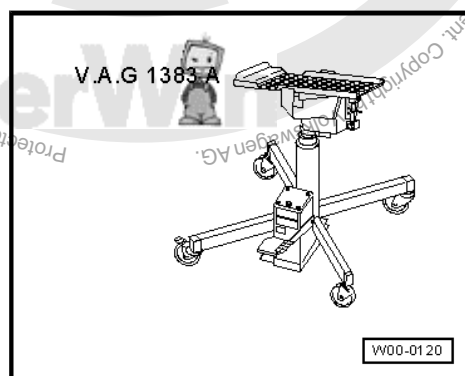
- Slide plastic insert onto bracket, they must audibly and perceptibly engage.



1.9 Removing and installing rear axle shaft

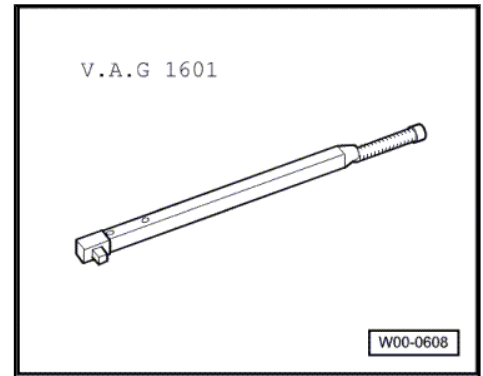
Special tools and workshop equipment required

- ◆ Engine and gearbox jack - V.A.G 1383 A-



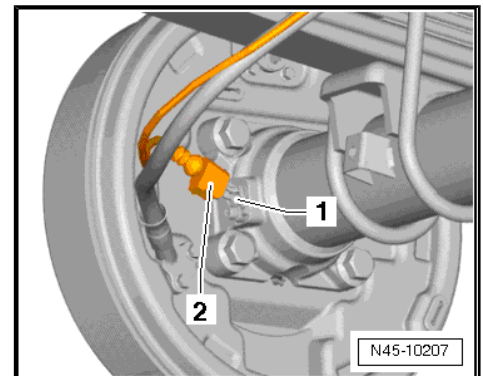


- ◆ Torque wrench - V.A.G 1601-

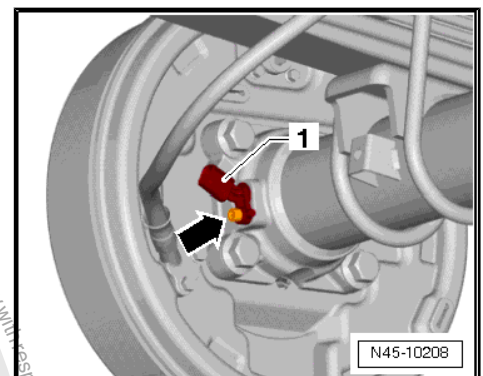


Removing

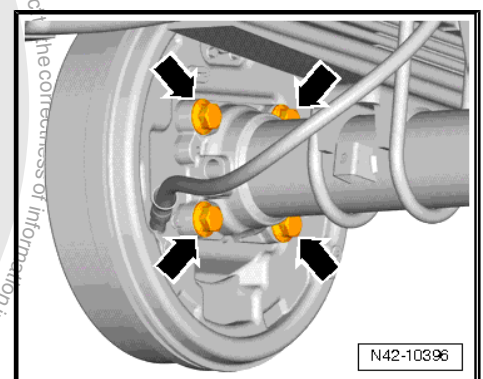
- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Remove wheel.
- Pull connector -2- off speed sensor -1-.



- Remove bolt -arrow-.
- Pull speed sensor out of axle beam.
- Remove brake drum ⇒ Brake systems; Rep. gr. 46 ; Rear brake; Resetting drum brake .



- Remove bolts -arrows-.
- Place a container under area of rear axle shaft to collect oil.





- Screw a bolt -2- approx. 100 mm in length through one of wheel bolt threads in wheel hub -1-.
- Screw in bolt -2- until it makes contact with bolt for brake carrier -arrow-.
- Turn bolt -2- until rear axle shaft can be removed with wheel hub -1-.

Installing

Install in reverse order. Note the following points:



Note

Observe fitting instructions! ⇒ [page 56](#)

Vehicles with drain plate:



Note

Clean drain plate before reinstalling rear axle shaft.

- When installing rear axle shaft, drain plate -arrow- must be guided through brake carrier.

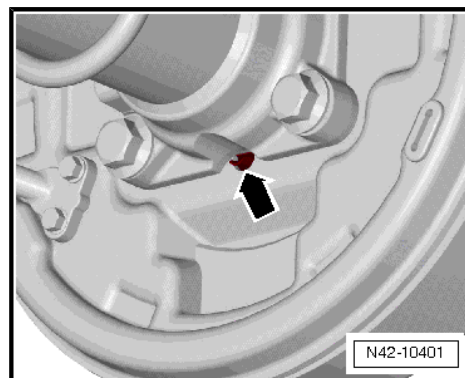
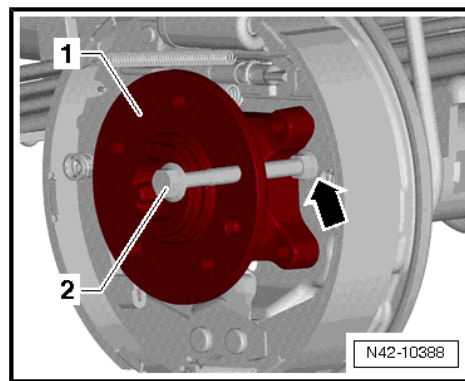
The drain plate faces downwards in this step.

Continuation for all vehicles:

- Install wheel and tighten bolts or nuts ⇒ [page 71](#) .

Specified torques

- ♦ ⇒ ["1.3 Assembly overview - rear axle shafts", page 56](#)





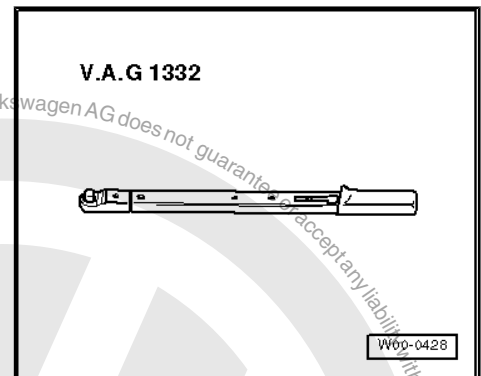
2 Suspension strut, shock absorber, spring

⇒ "2.1 Removing and installing shock absorbers", page 69

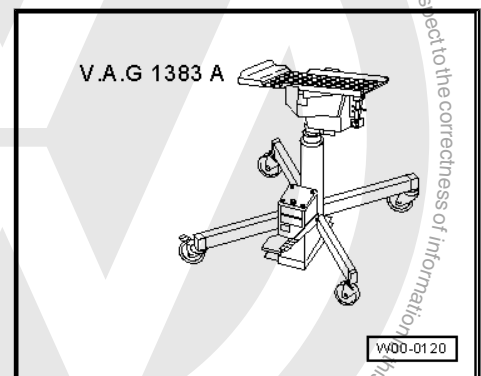
2.1 Removing and installing shock absorbers

Special tools and workshop equipment required

◆ Torque wrench - V.A.G 1332-

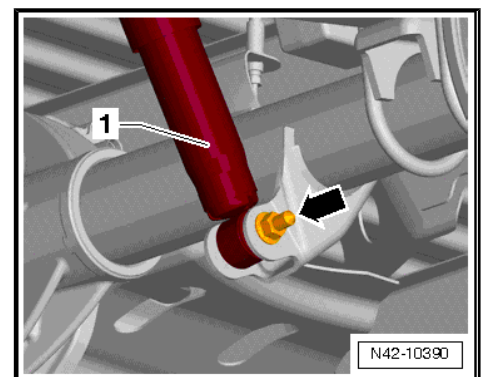


◆ Engine and gearbox jack - V.A.G 1383 A-



Removing

- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Position engine and gearbox jack - V.A.G 1383 A- beneath axle beam and exert slight counter pressure.
- Unfasten lower bolted joint of shock absorber -1- on rear axle -arrow-.





- Unfasten upper bolted joint of shock absorber -1- on ladder frame -arrow-.
- Remove shock absorber.

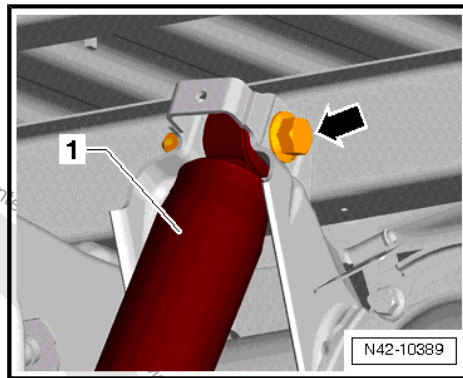
Installing

Install in reverse order. Note the following points:



Caution

- ◆ *Bonded rubber bushes can be twisted only to a limited extent.*
- ◆ *Therefore, tighten bolted connections on components having bonded rubber mountings only if the vehicle is standing on its wheels and is unladen or if the vehicle is raised and is in the unladen position (normal position)*
⇒ [page 6](#) .



Note

- ◆ *If the shock absorbers are renewed, the plastic stone guards on some shock absorbers must be transferred to the new units.*
- ◆ *The plastic stone guard must be renewed if damaged.*

Specified torques

- ◆ ⇒ ["1.2 Assembly overview - rear axle", page 54](#)



44 – Wheels, tyres, vehicle geometry

1 Wheels, tyres

⇒ [“1.1 Torque settings for wheel bolts”, page 71](#)

⇒ [“1.2 Pressing tyre off wheel rim”, page 71](#)

⇒ [“1.3 Removing tyre from wheel”, page 72](#)

⇒ [“1.4 Fitting tyres”, page 73](#)

⇒ [“1.5 Wheel change, protecting wheel centring seat against corrosion”, page 73](#)

⇒ [“1.6 Wheel change, installation requirements”, page 73](#)

⇒ [“1.7 Wheel change, installation instructions for wheel change”, page 75](#)

⇒ [“1.8 Wheel change, wheel installation”, page 76](#)

1.1 Torque settings for wheel bolts

Specified torque

Component	Specified torque
Wheel bolt to wheel hub for all vehicles	180 Nm

- Before fitting wheel, protect wheel centring seat against corrosion ⇒ [page 73](#).

1.2 Pressing tyre off wheel rim

New wheels with a modified contour have been introduced for all vehicles as of model year 2005.

The tyre fitting unit must be furnished with the tyre fitting head designed for these wheels.



WARNING

Otherwise there is a danger of the wheel being damaged.

If the tyre fitting unit has not yet been modified, please contact the manufacture of the unit.

Notes on safety and conditions for removing and fitting tyres (wheels with tyre pressure monitoring)

- It is extremely important to adhere to the instructions and warnings in the following descriptions.
- Check whether the tyre pressure sensor should also be replaced ⇒ Vehicle diagnostic tester.



Note

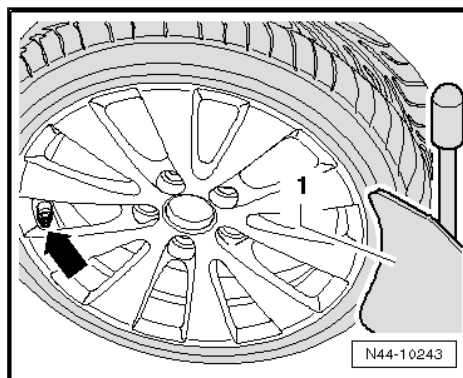
- ◆ *Ensure that the tyre does not contact the tyre pressure sensor during removal or fitting.*
- ◆ *The tyre pressure sensor must not come into contact with water or be blown upon with compressed air when the wheel is cleaned.*



- Remove air from tyre by screwing out the nickel-plate valve element.
- When pressing off a tyre using tyre fitting equipment with a press-off plate, always ensure that the tyre valve/ tyre pressure sensor -arrow- is directly opposite the bead breaker -1-.

The bead breaker must be positioned no more than 2 cm from wheel rim flange.

- Remove balancing weights and dirt from wheel rim.



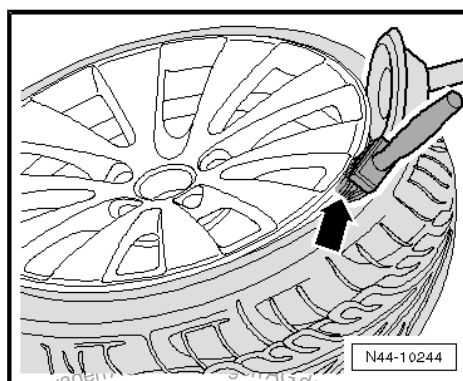
- Press both tyre beads off all round and liberally coat tyre and wheel rim flange with tyre assembly paste -arrow-.



WARNING

Otherwise, there is a risk of damaging the rim.

If the tyre fitting unit has not yet been modified, please contact the manufacture of the unit.



1.3 Removing tyre from wheel

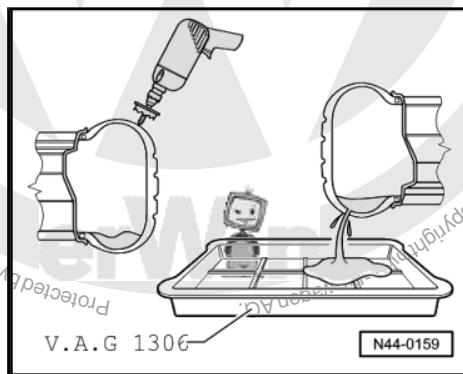
Tyres which have been filled or sealed using tyre sealant must be drained before removal.



Caution

- ◆ *Avoid eye and skin contact with tyre sealant.*
- ◆ *It is a health hazard and may cause eye irritation and allergies.*
- ◆ *During this work, wear protective gloves and safety goggles.*

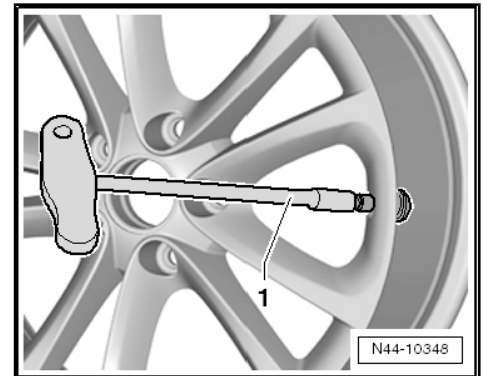
- Place the wheel on an even surface.
- Unscrew and remove the valve insert of tyre valve.
- Use a suitable drill or mill to carefully drill a hole in shoulder area of tyre.
- Hold wheel over a suitable container and drain sealant.
- Remove tyre from wheel.
- Clean wheel rim with, for example, a moist cloth.





1.4 Fitting tyres

- Ensure that the wheel rim is clean.
- Insert new tyre valve with -VAS 6459- -1-.
- Unscrew and remove valve insert.
- Inflate tyre to approx. 3 to 4 bar. The bead of the tyre must slip audibly over the hump of the rim.
- Screw in valve insert.
- Check tyre pressure to make sure prescribed pressure has been reached.
- Balance wheel.



1.5 Wheel change, protecting wheel centring seat against corrosion

Applies to alloy and steel wheels

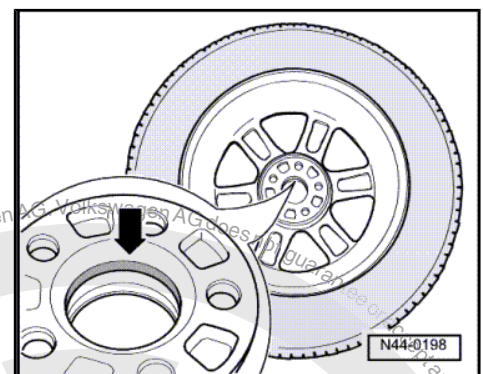
When changing a wheel, wheel centring seat should be waxed using wax spray ⇒ Electronic parts catalogue (ETKA) to prevent corrosion between wheel centring seat and wheel.

- Remove wheel.
- Thoroughly clean wheel centring seat on wheel hub and centring of rim.
- Apply wax to centring area -arrow- with a brush.



WARNING

Wheel bolts, contact surfaces of wheel hub and wheel, brake discs and threads of wheel hub must not be waxed. Never treat wheel securing bolts with lubricant or corrosion protection materials!



- Install wheel and tighten bolts or nuts ⇒ [page 71](#).

1.6 Wheel change, installation requirements

Warming cold tyres to minimum installation temperature



Note

This instruction also applies to ultra-high performance tyres (height/width ratio smaller than/same as 45 % and speed symbol greater than/same as V).



WARNING

The minimum installation temperature of a tyre should be between 15 °C and 30 °C in the core of the tyre.





- To install tyres without damage, it is especially important to warm the upper part of the sidewall and the inside of the upper bead to at least 15 °C.
- This internal temperature is referred to as the core temperature.
- Rubber is a poor conductor of heat. Therefore, a cold tyre must be left in an area with the correct temperature for a sufficiently long period so the inner rubber layers can warm up to at least 15 °C.
- The surface temperature of the tyre during the warming up phase is no indication of its internal temperature.
- To enable cold tyres to absorb heat from the ambient air as quickly as possible, they should not be stacked on top of one another but instead stored individually in order to allow the warm air to "circulate" around them effectively.
- Tyres must never be placed in front of a radiator or hot air blower for warming, since this can very quickly lead to critical surface temperatures.
- Except for warming with warm water or warm air (max. 50 °C), there is no process available for warming tyres without damaging the tyre!
- When cold tyres (below 0 °C) are transferred to a warm environment (above 0 °C), a layer of condensation immediately forms on the surface of the tyre. This layer of condensation indicates that the tyre is intensively absorbing heat from its environment through the process of water vapour in the air condensing out on the tyre surface.
- Once the layer of frost has thawed, condensate water forms. The condensation should be dried with a cloth so that the further warming process is not delayed due to a temperature drop caused by evaporation.

Warming times:

- ◆ Assuming a minimum room temperature of 19 °C and a tyre temperature of 0 °C or more, a tyre should be kept at least at 19 °C for at least 2 hours
- ◆ Assuming a minimum room temperature of 19 °C and a tyre temperature of below 0 °C, a tyre should be kept at least at 19 °C for at least 2.5 hours

Warming recommendations:

- ◆ If possible, tyres should be stored in the workshop 1 day before they are fitted (order preparation).
- ◆ Store on an insulated base, pallet or the like, as high up as possible
- ◆ Position the tyres individually to allow the warm air to "circulate" around them effectively.
- ◆ Wipe off perspiration water.
- ◆ Never heat with a radiator or hot air blower!



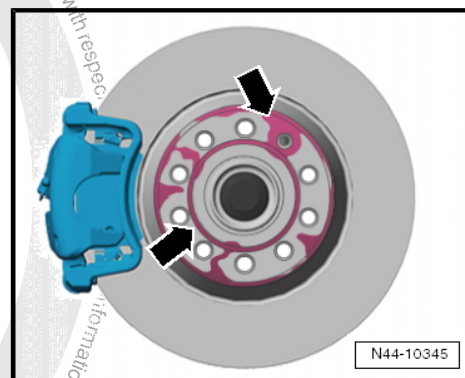
1.7 Wheel change, installation instructions for wheel change



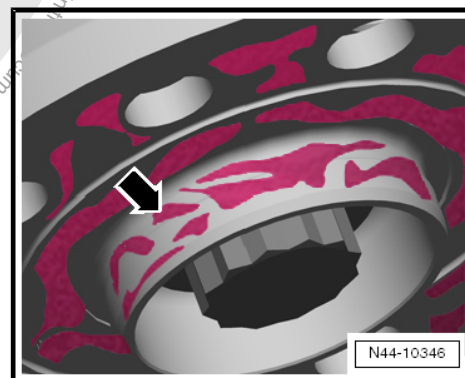
WARNING

Perform the checks and follow the instructions listed below. This is important to ensure that the wheel bolts and the wheels are properly secured.

- Check to ensure that contact surfaces -arrows- on brake disc are free of corrosion and dirt.



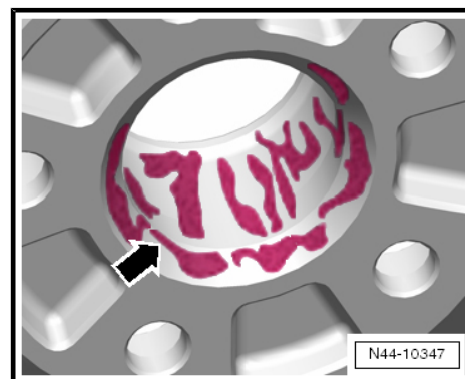
- Check to ensure that contact surface -arrow- on centring seat of brake disc are free of corrosion and dirt.



- Check to ensure that contact surface -arrow- on inner side of wheel (rim) and also centring seat of rim are free of corrosion and dirt.

- The concave seats * in the holes for the wheel bolts and the threads of the wheel bolts must also be free of corrosion and dirt, oil or grease.

* The concave seat is the curved surface of a section of a sphere cut by a plane.





- Check whether the wheel bolts can be easily screwed in by hand. The thread of the wheel bolts must not come into contact with the bore in the brake disc -arrow-.

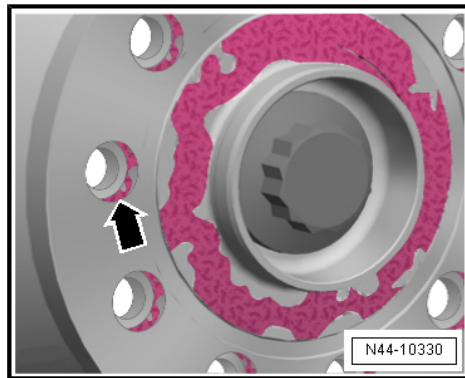
If the thread of the wheel bolt touches the hole -arrow-, turn the brake disc relative to the wheel hub accordingly.

If necessary, remove dirt and corrosion, oil or grease from the contact surfaces, threads in the wheel hub and/or wheel bolts as necessary.



WARNING

Damaged, badly corroded or difficult to remove wheel bolts must be renewed.



1.8 Wheel change, wheel installation

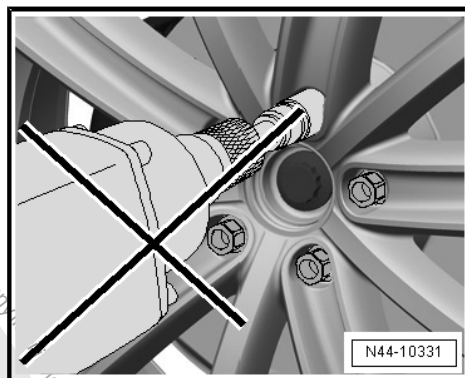
- Preserving wheel centring seat ⇒ [page 73](#) .

- 1 - When fitting the wheel, pull in all wheel bolts uniformly by hand.
- 2 - Tighten bolts diagonally and evenly.
- 3 - Lower vehicle onto the floor and tighten all wheel bolts in diagonal sequence to specified torque, using torque wrench.



WARNING

Do not use an impact screwdriver to screw in the bolts.



Specified torques

- ◆ ⇒ ["1.1 Torque settings for wheel bolts", page 71](#)



2 Wheel alignment

- ⇒ [“2.1 Notes for wheel alignment”, page 77](#)
- ⇒ [“2.2 Necessity of wheel alignment”, page 77](#)
- ⇒ [“2.3 Test prerequisites”, page 78](#)
- ⇒ [“2.4 Test preparations”, page 79](#)
- ⇒ [“2.5 Specified values for wheel alignment”, page 79](#)
- ⇒ [“2.6 Wheel alignment procedure”, page 81](#)
- ⇒ [“2.7 Measuring vehicle longitudinal inclination”, page 82](#)
- ⇒ [“2.8 Adjusting camber and caster at front wheels”, page 83](#)
- ⇒ [“2.9 Adjusting front axle toe”, page 83](#)
- ⇒ [“2.10 Vehicle data sticker”, page 84](#)
- ⇒ [“2.11 Steering angle sender - basic setting”, page 85](#)

2.1 Notes for wheel alignment

Wheel alignment must be performed only using a VW/AUDI-approved wheel alignment unit!

Whenever wheels are aligned, both the front and rear axles must be measured.

Otherwise, the steering rack may not be centred!

All the information required to perform alignment can be found in the wheel alignment computer.

Current data »updates« can be found in Volkswagen ServiceNet.

- ⇒ VW ServiceNet; Systems; Wheel alignment computer software; Beissbarth
- ⇒ VW ServiceNet; Systems; Wheel alignment computer software; Hunter
- ⇒ VW ServiceNet; Systems; Wheel alignment computer software; Corgi
- ⇒ VW ServiceNet; Systems; Wheel alignment computer software; John Bean

2.2 Necessity of wheel alignment

- ◆ The vehicle does not handle properly.
- ◆ Vehicle has been involved in an accident and components have been renewed.
- ◆ Axle components have been removed and reinstalled.
- ◆ Tyres are worn more on one side.

Components have been renewed

Front axle component was renewed.	Alignment necessary	
	Yes	No
Lower suspension link	X	
Wheel bearing housing		X
Track rod/track rod ball joint	X	
Steering rack	X	
Suspension strut		X
Anti-roll bar		X

**Components removed and installed**

Front axle component removed and reinstalled	Alignment necessary	
	Yes	No
Lower suspension link	X	
Wheel bearing housing		X
Track rod/track rod ball joint	X	
Steering rack	X	
Suspension strut		X
Anti-roll bar		X

**Note**

Misalignment of steering wheel following removal and installation of components is permitted within a tolerance of $\pm 1.5^\circ$ without requiring wheel alignment.

Rear axle

All camber and toe values on the rear axle are prescribed by the design. If measured values exceed tolerances, they can only be corrected/restored by replacing defective/damaged components.

2.3 Test prerequisites

- Check suspension, wheel bearing, steering and steering linkage for excessive play and damage.
- Tread depth difference of no more than 2 mm on one axle.
- Tyres inflated to correct pressures.
- Vehicle unladen.
- Fuel tank must be full.
- Spare wheel and vehicle tools are stowed in correct locations.
- Windscreen washer fluid reservoir must be full.
- When checking wheel alignment, ensure that sliding plates and turntables are not touching end stop.

**Note**

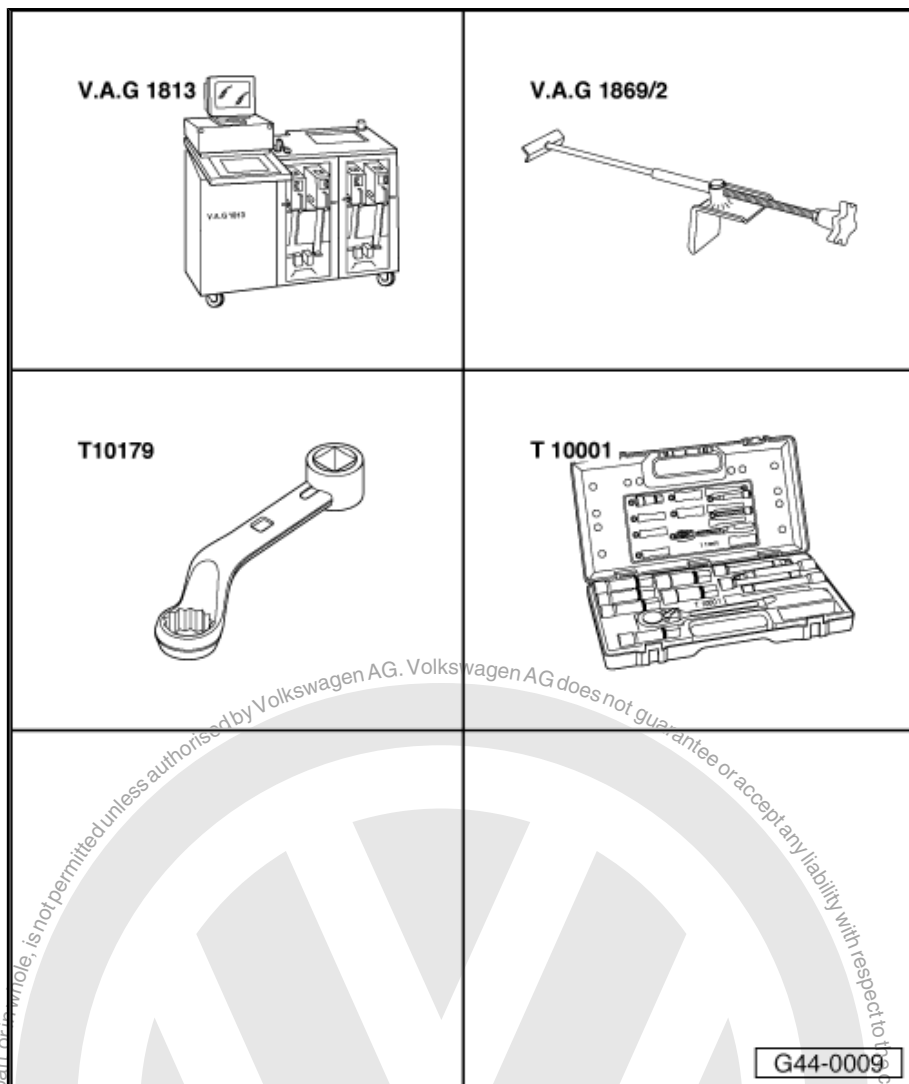
- ◆ *To allow running gear to »fully settle«, wheel alignment should not be checked before the vehicle has completed 1000 to 2000 km.*
- ◆ *When making adjustments, try to adhere to the relevant specifications precisely.*
- ◆ *Refer to the user's manual of the equipment maker for proper attachment and adjustment of the measuring devices.*
- ◆ *Wheel alignment platforms and alignment units and computers should be checked and adjusted as necessary during inspection and maintenance at least once per year!*
- ◆ *Handle these highly sensitive measuring devices carefully and conscientiously.*



2.4 Test preparations

Special tools and workshop equipment required

- ◆ Wheel alignment computer - V.A.G 1813- or VW/Audi-approved wheel alignment units
- ◆ Brake pedal depressor - V.A.G 1869/2-
- ◆ Tool insert - T10179-
- ◆ Shock absorber set - T10001-



The existing lateral run-out of the wheel must be compensated for. Otherwise, the result of the measurement will be incorrect.

If run-out compensation is not performed, it is not possible to adjust toe-in correctly!

Observe information provided by the manufacturer of the wheel alignment unit.

- Carry out wheel runout compensation.
- Apply brake pedal depressor - V.A.G 1869/2- .
- Use brake pedal depressor to depress brake pedal.

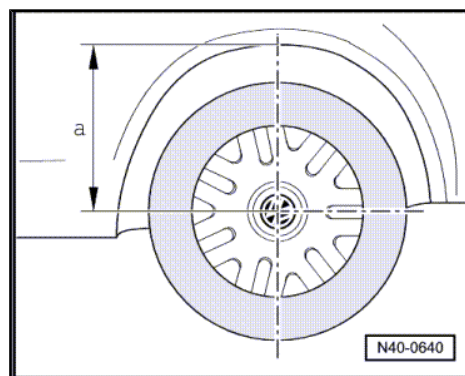
2.5 Specified values for wheel alignment

These specifications apply to all engines.



The ride heights shown in the table refer to dimension -a-.

Front axle



Front axle	Without flared wheel arches	With flared wheel arches
Toe-in per wheel (individual toe)	$+0^{\circ} 5' \pm 5'$	$+0^{\circ} 5' \pm 5'$
Maximum permissible difference between sides	max. 5'	max. 5'
Camber (in straight-ahead position)	$-0^{\circ} 20' \pm 30'$	$-0^{\circ} 20' \pm 30'$
Maximum permissible difference between sides	max. 20'	max. 20'
Caster angle with vehicle at 0° longitudinal angle ¹⁾ .	$+4^{\circ} 50' \pm 60'$	$+4^{\circ} 50' \pm 60'$
Maximum permissible difference between sides	max. 20'	max. 20'
Height at a standstill when fuel tank is 90 % full and a driver's weight of 75 kg.	525 ± 17 mm	518 ± 17 mm

1) Measuring vehicle longitudinal inclination ➔ [page 82](#).

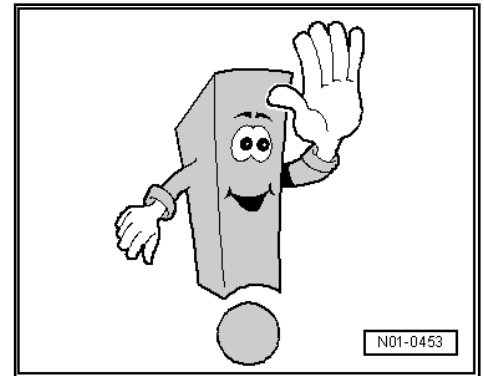
Rear axle	Without flared wheel arches	With flared wheel arches
Toe-in per wheel (individual toe)	$+0^{\circ} 0' \pm 30'$	$+0^{\circ} 0' \pm 30'$
Camber (in straight-ahead position)	$+0^{\circ} 0' \pm 30'$	$+0^{\circ} 0' \pm 30'$
Driving axle angle	$+0^{\circ} 0' \pm 20'$	$+0^{\circ} 0' \pm 20'$
Height at a standstill when fuel tank is 90 % full and a driver's weight of 75 kg.	585 ± 17 mm	578 ± 17 mm



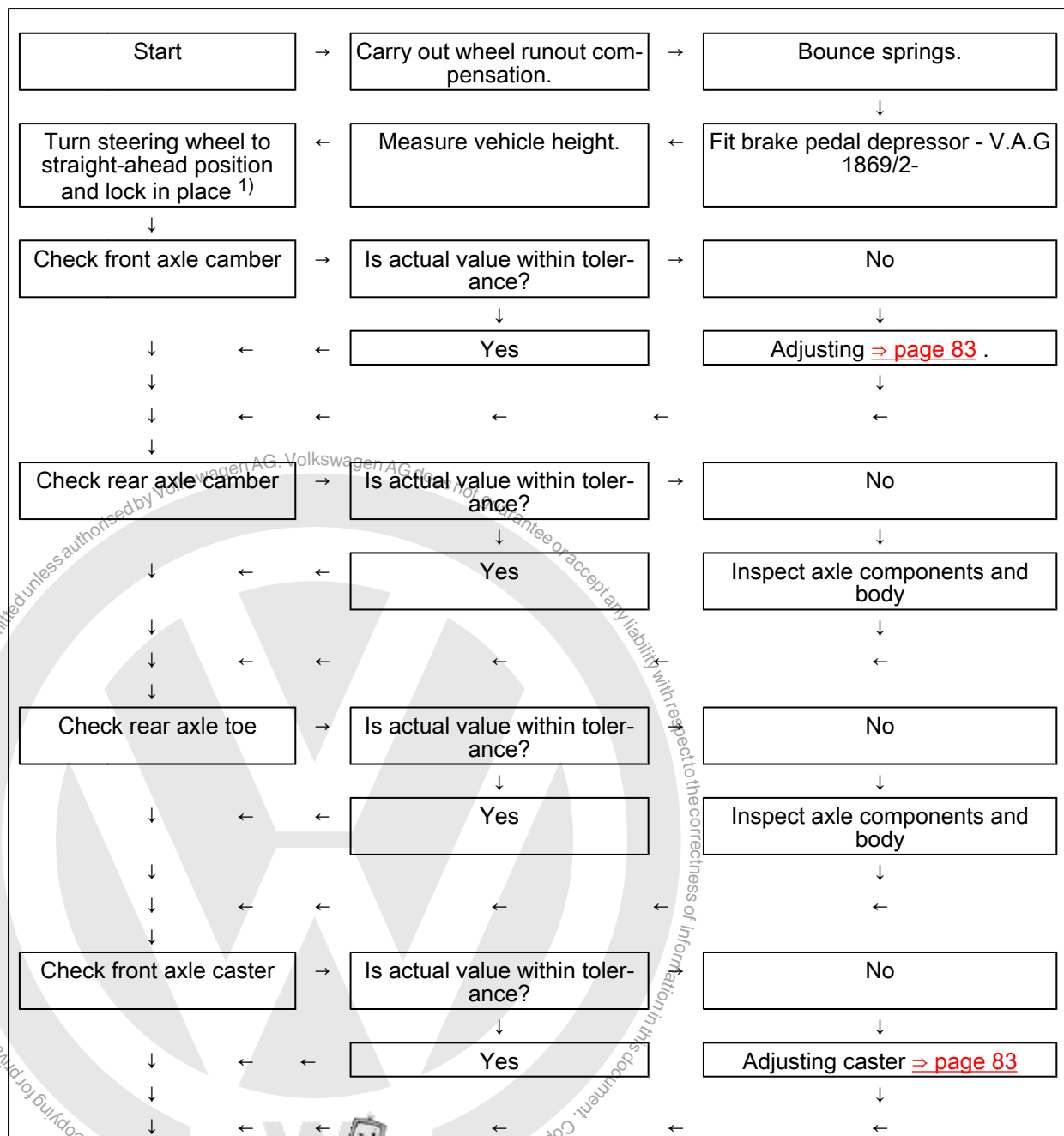
2.6 Wheel alignment procedure

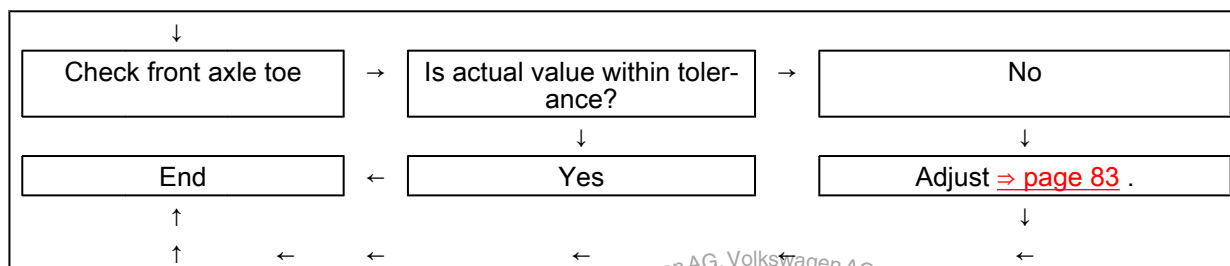
Always adhere to the following procedure!

- Comply with instructions in your wheel alignment unit.



Alignment procedure



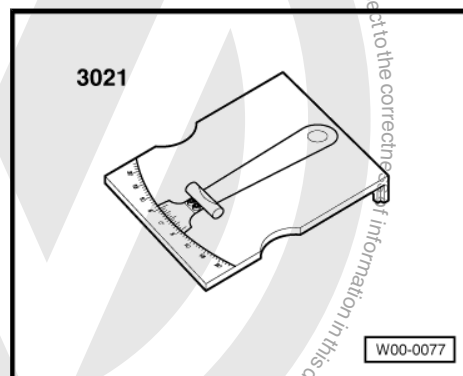


1) If steering wheel is not centred, it must be straightened after wheel alignment is finished. Then carry out basic setting for steering angle sender - G85- using ⇒ Vehicle diagnostic tester.

2.7 Measuring vehicle longitudinal inclination

Special tools and workshop equipment required

- ◆ Protractor - 3021-

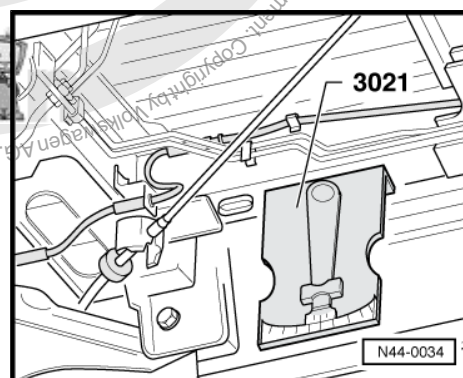


- Measure vehicle longitudinal inclination at longitudinal member.

To calculate the caster at zero vehicle inclination, deduct the measured vehicle inclination value from or add it to the measured caster value.

Example:

Measured vehicle longitudinal inclination	Inclined 0° 40' forwards
Specified caster angle for front axle when vehicle longitudinal inclination is 0°	+ 4° 50' ± 60'
Specified caster angle taking vehicle longitudinal inclination into account	4° 10' ± 60'



- ◆ Vehicle inclining forwards: subtract measured inclined angle from specification of 4° 50'.
- ◆ Vehicle inclining rearwards: add measured inclined angle to specification of 4° 50'.
- ◆ Ensure longitudinal member surface is clean and smooth in area where measurement is to be taken.



2.8 Adjusting camber and caster at front wheels

Required special tools, test and measuring devices as well as auxiliary items

- ◆ Torque wrench - V.A.G 1332/-

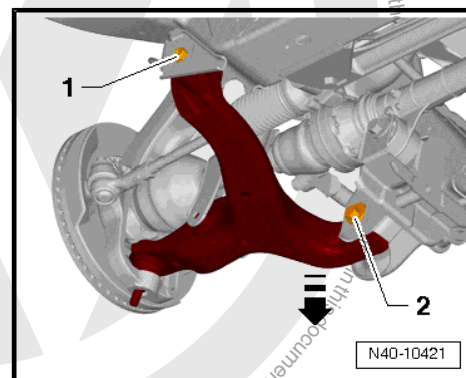
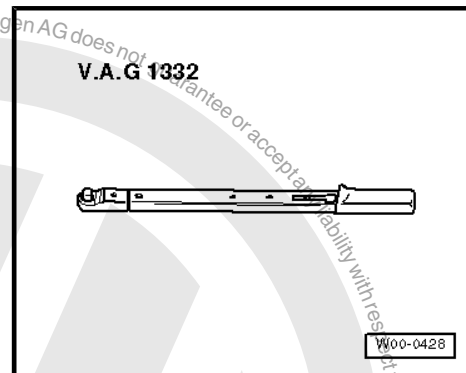
The caster is adjusted on the vehicle using bolt -1-.

The camber is adjusted on the vehicle using bolt -2-.

- Remove bolt -1- and replace with a new eccentric bolt ⇒ Electronic Parts Catalogue “ETKA”, but do not tighten.
- Remove bolt -2- and replace with a new eccentric bolt ⇒ Electronic Parts Catalogue “ETKA”, but do not tighten.
- Set camber and caster values and then tighten bolts -1- and -2- to prescribed torque setting.

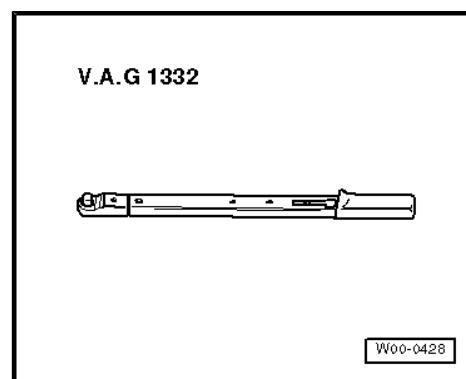
Specified torques

- ◆ ⇒ [“4.1 Assembly overview - suspension strut, upper suspension link”, page 24](#)



2.9 Adjusting front axle toe

Required special tools, test and measuring devices as well as auxiliary items





- ◆ Torque wrench - V.A.G 1332/-
- ◆ Socket - V.A.G 1332/11-

- Loosen lock nut -1- while counterholding on head of track rod -2-.
- Pull spring-type clip off boot.
- Adjust toe by turning left and/or right track rod.

To to this, it is possible to position an open jaw spanner on hexagonal profile of track rod.

After turning track rods, ensure that boots are not twisted.

Twisted boots wear out quickly.

- Tighten lock nut -1- with tool insert AF 24 - V.A.G 1332/11- . Counter hold on track rod ball joint -2-.
- Check toe values again.

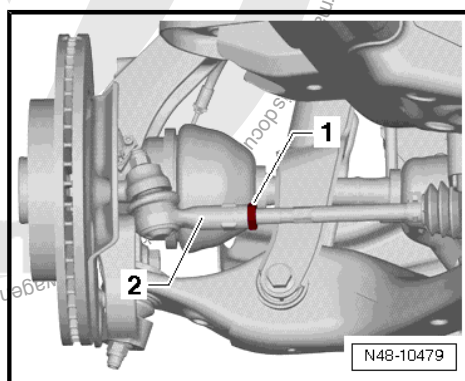
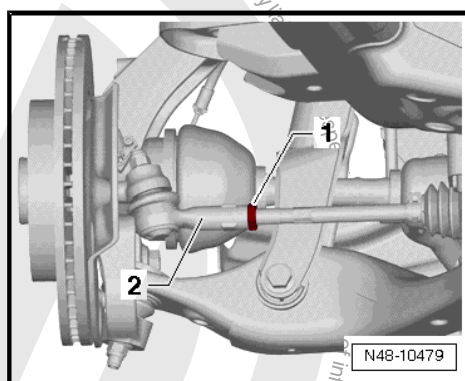
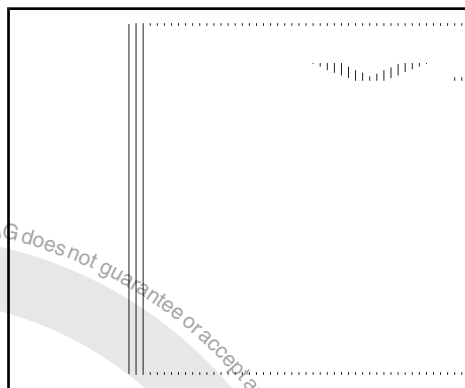
It is possible that the value will change slightly when lock nut is tightened.

However, if the measured toe value lies within the tolerance, the adjustment is correct.

- Fit spring-type clip to boot.

Specified torques

- ◆ ⇒ ["3.3 Repairing steering rack", page 110](#)



2.10 Vehicle data sticker

Explanation of "PR numbers" on vehicle data sticker

Various types of running gear are installed depending on engine and equipment level. These are identified by the PR numbers.

The PR numbers are critical in determining the wheel alignment specifications.

The running gear version fitted in the vehicle is indicated on the vehicle data sticker by the PR number for the front axle.

The vehicle data sticker can be found in the spare wheel well and in the service schedule.



Example of a vehicle data sticker

In this example, the vehicle is equipped with sports running gear G28 -arrow-.

X000 46-6-5083 922	
FAHRZG. - IDENT - NR. VEHICLE - IDENT - NO.	WVWZZZ 3C z BE300204
TYP / TYPE	365 45U
PASSAT Var. HLBMT	
10kW M6A	
MOTORKB. / GETR. KB. ENG. CODE / TRANS. CODE	CFF B LPR
LACKNR. / INNENAUSST. PAINT NO. / INTERIOR	LC9X----- NE
M. - AUSST. / OPTIONS	
BOA C1G GOL HO3 J2D D91 TL4	
- 1AT 1GO 2PP 5RG 5SL	
3FU 3S1 8TC QG1 8AY 8GV	
9VE 12M L12 OYH G28 7MG	
N44-10489	

2.11 Steering angle sender - basic setting

If steering wheel was realigned, basic setting of steering angle sender - G85- must be checked ⇒ Vehicle diagnostic tester!





3 Vibration due to wheels/tyres - causes and rectification

⇒ [“3.1 Causes of vibration”, page 86](#)

⇒ [“3.2 Conducting a road test before balancing wheels”, page 86](#).

⇒ [“3.3 Balancing wheel”, page 87](#)

⇒ [“3.4 Vibration control system”, page 91](#)

⇒ [“3.5 Checking radial and lateral runout of wheels and tyres”, page 91](#)

⇒ [“3.6 Checking radial and lateral run-out on wheel rim”, page 92](#)

⇒ [“3.7 Matching wheels and tyres”, page 93](#)

⇒ [“3.8 Determining flat spots on tyres”, page 94](#)

3.1 Causes of vibration

Vibration can have a number of different causes. Vibration can also be caused by tyre wear. Tyre wear caused by driving is not always evenly spread across the entire running surface of the tyre. This causes slight imbalances which affect the smooth running of a wheel which was previously exactly balanced.

Minor imbalances will not be felt at the steering wheel, but that does not mean that they are not there. They increase wear on the tyre and thus reduce the tyre service life.

Recommendation

To ensure

- optimal safety,
- smoothest possible running and
- even wear

throughout a tyre's service life, we recommend having the wheels and tyres balanced at least twice during the tyre's service life.

3.2 Conducting a road test before balancing wheels

If a customer brings a vehicle to the workshop complaining about “vibration”, a road test is essential prior to balancing the wheels.

- ◆ This will give you information about the nature of the vibration.
- ◆ You will be able to determine the speed range in which vibration occurs.
- Raise the vehicle on a lifting platform immediately after the road test.
- Mark the positions of the tyres on the vehicle.

Tyre position	Marked with ...
Front left tyre	FL
Front right tyre	FR
Rear left tyre	RL
Rear right tyre	RR

- Remove wheels.



- Balance wheels.

3.3 Balancing wheel

Requirements

Before you start balancing the wheels, the following requirements must be met.

- Tyre pressure must be OK.
- The tyre tread must not show one-sided wear and should be at least 4 mm deep.
- The tyre must not show any signs of damage, for example cuts, piercing, foreign bodies, etc.
- The wheel suspension, steering and steering linkage, including the shock absorbers must be in perfect condition.
- You must have conducted a road test.

Balancing wheel, balancing wheel on stationary wheel balancer

- Road test has been carried out ⇒ [page 86](#) .

Clamp wheel into wheel balancing machine



Note

When balancing tyres, please remember that cleanliness is absolutely essential, as is the case in any other repair work you carry out. Only then can you attain a flawless result!

Dirt and rust in the area of the contact surfaces and centre of the wheel distort the result.

- Clean contact surface, centring element and inside of wheel using e.g. pneumatic brush grinding set - VAS 6446- ⇒ Volkswagen ServiceNet; Workshop Equipment, Catalogue before clamping wheel on wheel balancing machine!

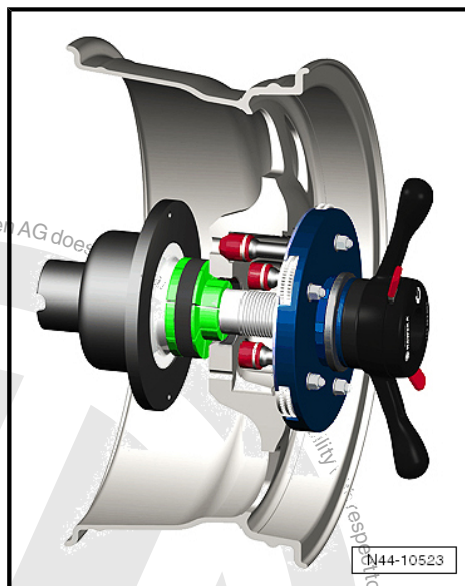


Note

It is very important that the correct tools for centring and clamping the wheels are used on the wheel balancing system. Before commencing any work, find out about the respective centring system for wheel balancing machines ⇒ Volkswagen ServiceNet; Workshop Equipment, Catalogue .

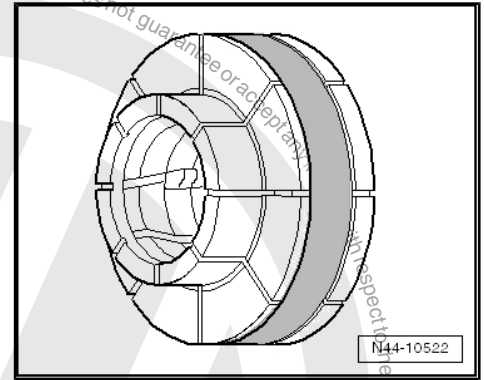


- Attach the wheel (together with tyre) to the wheel balancing machine.



**Note**

- ◆ To clamp the wheel in place, use centring system for wheel balancing machines - VAS 5271- , for example.
- ◆ This ensures that the wheel is 100% centred and that the wheel will be clamped without damage!
- ◆ The wheel cannot be centralised 100% with conical clamping elements on the wheel balancing machine.
- ◆ A deviation of 0.1 mm from the centre results in an imbalance of 10 grams at the wheel/rim.

**Procedure for balancing wheels and tyres**

- Allow the wheel (together with tyre) to rotate on the wheel balancing machine.
- Check that the indicator lines on the sidewalls of the tyre near the wheel rim flange run evenly.
- Check tyre profile with wheel/tyre rotating.

**Note**

If one-sided wear, flat spots from braking or severely washed out spots are apparent, balancing cannot achieve smooth running. In this case, the tyre must be renewed.

- Check true running of the wheel/tyre. If the wheel and tyre do not run true although there are no flat spots, radial or lateral run-out may be the cause.
- Check the wheel for radial or lateral run-out ⇒ [page 91](#) .
- If radial and lateral run-out are within the specified tolerance, balance the wheel and tyre.

**Note**

- ◆ More than 60 grams of weight per tyre should not be used.
- ◆ If more weight is required, you may be able to achieve smoother running by "matching" the tyre and rim. Matching tyres ⇒ [page 93](#) .
- ◆ The wheel balancer display should indicate 0 gram.
- ◆ As an alternative to match mounting, you could use the vibration control system - VAS 6230 A- ⇒ [page 91](#) .
- Bolt wheel onto vehicle.
- First, tighten lowest wheel bolt hand-tight.
- Then, tighten all remaining wheel bolts in diagonal sequence. This process centres the wheel on the hub.
- Lower vehicle onto its wheels.
- Now use the torque wrench to firmly tighten the wheel bolts diagonally to the prescribed torque.

Carry out road test

- After balancing the wheels and tyres, carry out a road test.



If you detect vibration during the road test, it may be due to tolerance in the wheel centring.

In unfavourable circumstances, the component tolerances of wheels and hubs could cumulate. This too can lead to vibration. This vibration can be eliminated by using a finish balancer.

Balancing wheel, balancing wheel with finish balancer



Note

- ◆ *Before working with a finish balancer, the mechanic needs to have been instructed by the manufacturer of the balancer.*
- ◆ *To balance the wheels, set the wheels of the driven axle on the sensor platforms (only the front wheels of a front-wheel drive vehicle, all four wheels of a four-wheel drive vehicle).*

If you determine a residual imbalance greater than 20 grams when balancing the wheels, you should rotate the mounting position of the wheel on the hub.

- Mark the point at which the imbalance is indicated.
- Then, unbolt the wheel and rotate its position on the hub so that the marking points downwards.



Note

The hub must not rotate during this procedure.

- First, tighten lowest wheel bolt hand-tight.
- Then, tighten all remaining wheel bolts in diagonal sequence. This process ensures that the wheel is centred properly on the hub.
- Check whether the imbalance is less than 20 grams using the finish balancer.



Note

The imbalance should always be less than 20 grams before you change the balance weight.

- Loosen the wheel bolts again if necessary.
- Rotate wheel again by one or two wheel bolt holes in relation to wheel hub.
- Tighten wheels using the method described above.



Note

Do not try to reduce the imbalance using balancing weights until the imbalance is less than 20 grams.

- Balance wheels if imbalance is less five 5 grams.
- Tighten wheel bolts to specified torque if you have not already done so.



WARNING

Always tighten wheel bolts to specified tightening torque using a torque wrench!

3.4 Vibration control system

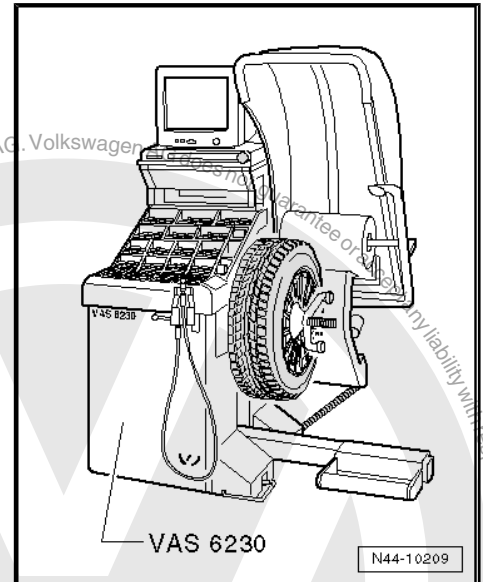
Using the vibration control system - VAS 6230 A- you can perform more functions than just stationary balancing.

A special feature of this system is the testing of the radial force of the wheel and tyre while rolling.

A roller presses against the wheel with a force of about 635 kg. This simulates the vertical tyre force against the road surface during travel.

Radial and lateral run-out in the wheel and tyre and differences in the stiffness of the tyre cause the vertical force of the wheel to vary.

The -VAS 6230 A- detects and stores the position of the maximum measured radial force in the tyre. Then the position of the smallest distance between the wheel rim flange and the centre of the rim is measured.



3.5 Checking radial and lateral runout of wheels and tyres

Radial and lateral run-out occur when the wheel and tyre do not run absolutely true.

For technical reasons, 100% true running is not possible.

Therefore, the manufacturers of these components allow a precisely determined tolerance.

Mounting the tyre in an unfavourable position on the wheel can cause the maximum allowed tolerance for wheel with tyre to be exceeded.

The table shows the maximum permissible tolerances for a wheel with mounted tyre.

Tolerances for radial and lateral runout of wheels with tyres

Wheel with tyre	Radial run-out (mm)	Lateral run-out (mm)
Passenger cars	0,9	1,1 (1.3 in vicinity of lettering)

Checking lateral run-out

- Preload tyre gauge approx. 2 mm.



- Fit tyre gauge to side wall of tyre.
- Turn wheel slowly.
- Make a note of the smallest and largest deflection of the indicator needle.



Note

If the difference is greater than 1.3 mm, the lateral run-out is too great.

In this case, you can reduce lateral run-out by match mounting the tyre ⇒ [page 93](#).

Extreme values on the tyre gauge due to small irregularities in the rubber may be disregarded.

Checking radial run-out

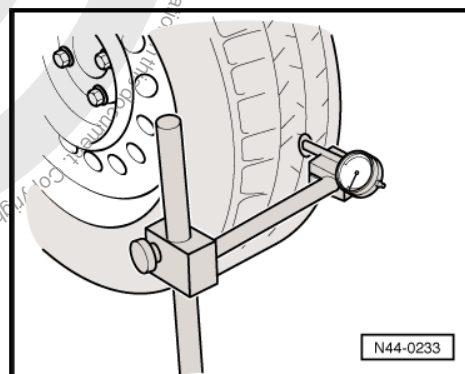
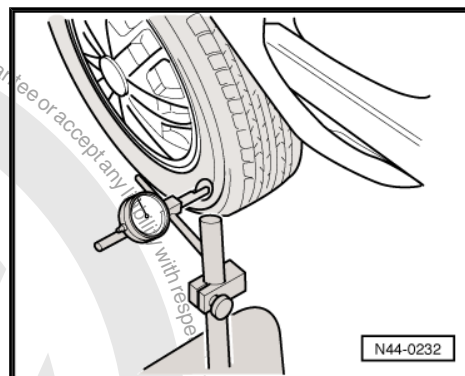
- Preload tyre gauge approx. 2 mm.
- Fit tyre gauge to running surface of tyre.
- Turn wheel slowly.
- Make a note of the smallest and largest deflection of the indicator needle.



Note

If the difference is greater than 1 mm, the radial run-out is too great.

In this case, you can reduce radial run-out by match mounting the tyre ⇒ [page 93](#).



3.6 Checking radial and lateral run-out on wheel rim

- Attach the wheel rim to the wheel balancing machine.
- Use the centring system for wheel balancing machines - VAS 5271-.
- Preload the tyre gauge approx. 2 mm.
- Turn wheel rim slowly.
- Make a note of the smallest and largest deflection of the indicator needle.

S - Lateral run-out

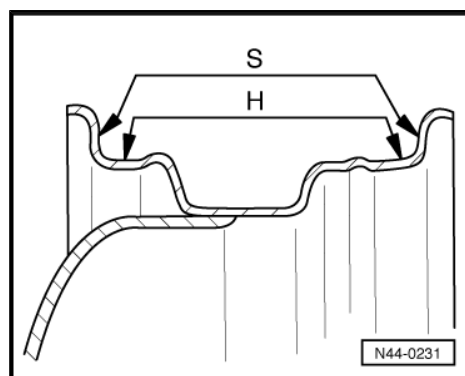
H - Radial run-out

- Compare the measured values with the specifications in the table ⇒ [page 93](#).



Note

Extreme values on the tyre gauge due to small irregularities may be disregarded.





Specifications for radial and lateral runout on wheel

Rim	Radial run-out (mm)	Lateral run-out (mm)
Steel wheel	0,5	0,5
Alloy wheel	0,5	0,8



Note

If the measured value exceeds the specification, acceptably smooth running cannot be attained.

3.7 Matching wheels and tyres

General

When radial or lateral runout of the wheel and tyre coincide, the imbalance of the wheel is amplified by the tyre.

For technical reasons, 100% true running is not possible
⇒ [page 91](#).

Before match mounting the used wheels which are fitted on the vehicle, run the tyres warm. This will eliminate any flat spots caused by storage or handling, ⇒ [page 94](#).

Procedure for match mounting

- Let air out of tyre.
- Press tyre beads off wheel rim flanges.
- Apply tyre assembly paste all round the tyre beads.
- Rotate tyre by 180° relative to wheel rim.
- Pump up tyre to approx. 4 bar.
- Attach the wheel (together with tyre) to the wheel balancing machine.
- Check wheel for true running and for radial and lateral runout.



Note

- ◆ *If the specified values for radial and lateral run-out are not exceeded, the wheel can be balanced to 0 gram. Specified values appear on ⇒ [page 91](#).*
- ◆ *If the radial and lateral run-out is not within the specifications, the tyre must be rotated again.*
- Let air out and press tyre beads off the wheel rim flanges.
- Rotate tyre by 90° relative to wheel (quarter of a turn).
- Pump up tyre again to 4 bar and check true running.



Note

- ◆ *If the specified values for radial and lateral run-out are not exceeded, the wheel can be balanced to 0 gram.*
- ◆ *If the radial and lateral run-out are not within the specified values, the tyre must be rotated again.*



- Press tyre off wheel rim flange again as described above.
- Rotate tyre by 180° relative to wheel rim (half a rotation).

If the radial and/or lateral runout are still not within the specified values, check the wheel for radial and/or lateral runout
⇒ [page 92](#) .

If the measured values for radial and lateral runout of the wheel are within the specified values, the tyre has impermissibly high radial or lateral runout. In this case, the tyre must be renewed.



Note

- ◆ *After fitting the tyres there will be fitting lubricant between the tyres and the rim flanges.*
- ◆ *You should therefore avoid severe braking and acceleration manoeuvres for the first 100 or 200 km driven. The tyres may otherwise rotate on the rims and the work will have been in vain.*

3.8 Determining flat spots on tyres

What is a flat spot?

The terms flat area and flats are also used for the term flat spot.

Flat spots caused by storage or handling also cause vibration in the same way as incorrectly balanced wheels do. It is important that flat spots on the tread are identified as such.

Flat spots caused by storage or handling cannot be balanced and they can reoccur at any time due to various circumstances. Flat spots caused by storage or handling can be eliminated without complicated special tools. Assuming it is not a flat spot caused by full braking ⇒ *Wheels and Tyres Guide - General Information*; Rep. gr. 44 ; Rolling noises due to tyres, locked-brake flat spots .



Note

Flat spots caused by hard braking cannot be repaired. Such tyres must be renewed.

Reasons for flat spots caused by storage or handling:

- ◆ The vehicle has been left standing in one place without being moved for several weeks.
- ◆ The tyre pressure is too low.
- ◆ The vehicle was placed in a paint shop drying booth after being painted.
- ◆ The vehicle was parked with warm tyres in a cool garage or similar for a long period of time. In this case, a standing flat spot may even occur overnight.

Eliminating flat spots caused by storage or handling

- ◆ Flat spots caused by storage or handling cannot be eliminated from the tyre using workshop equipment.
- ◆ Flat spots caused by storage or handling can be removed only by running the tyres warm.
- ◆ The method described below is not recommended in cold and wintry weather.



Requirements and conditions:

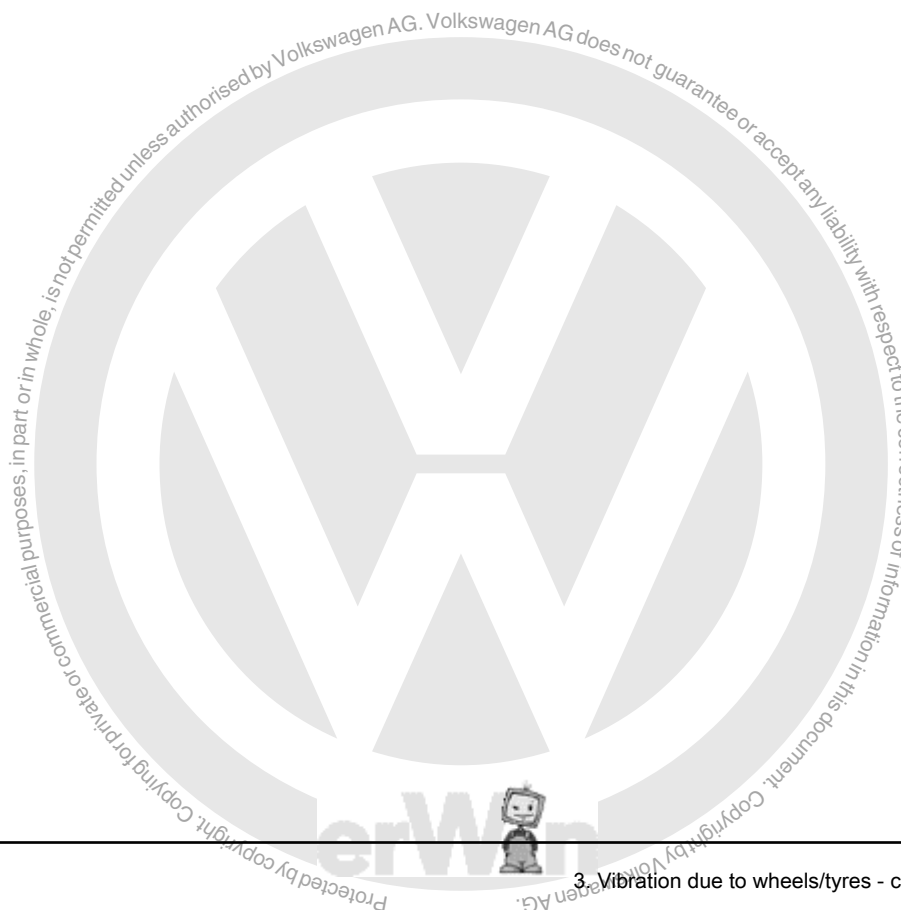
- If necessary, check tyre pressure and correct.
- If possible, drive the vehicle onto a motorway.
- Traffic and road conditions permitting, drive a 20 to 30 kilometre stretch at a speed of 120 to 150 km/h.



WARNING

- ◆ *Do not endanger yourself or other road users during this road test.*
- ◆ *Observe the highway code and speed limitations in force when performing the road test.*

- Jack up the vehicle immediately after the trip.
- Unbolt wheels from vehicle.
- Balancing wheels on stationary wheel balancer ⇒ [page 87](#) .





48 – Steering

1 Steering wheel

⇒ “1.1 Assembly overview - steering wheel”, page 96

⇒ “1.2 Removing and installing steering wheel”, page 96

1.1 Assembly overview - steering wheel

1 - Steering column

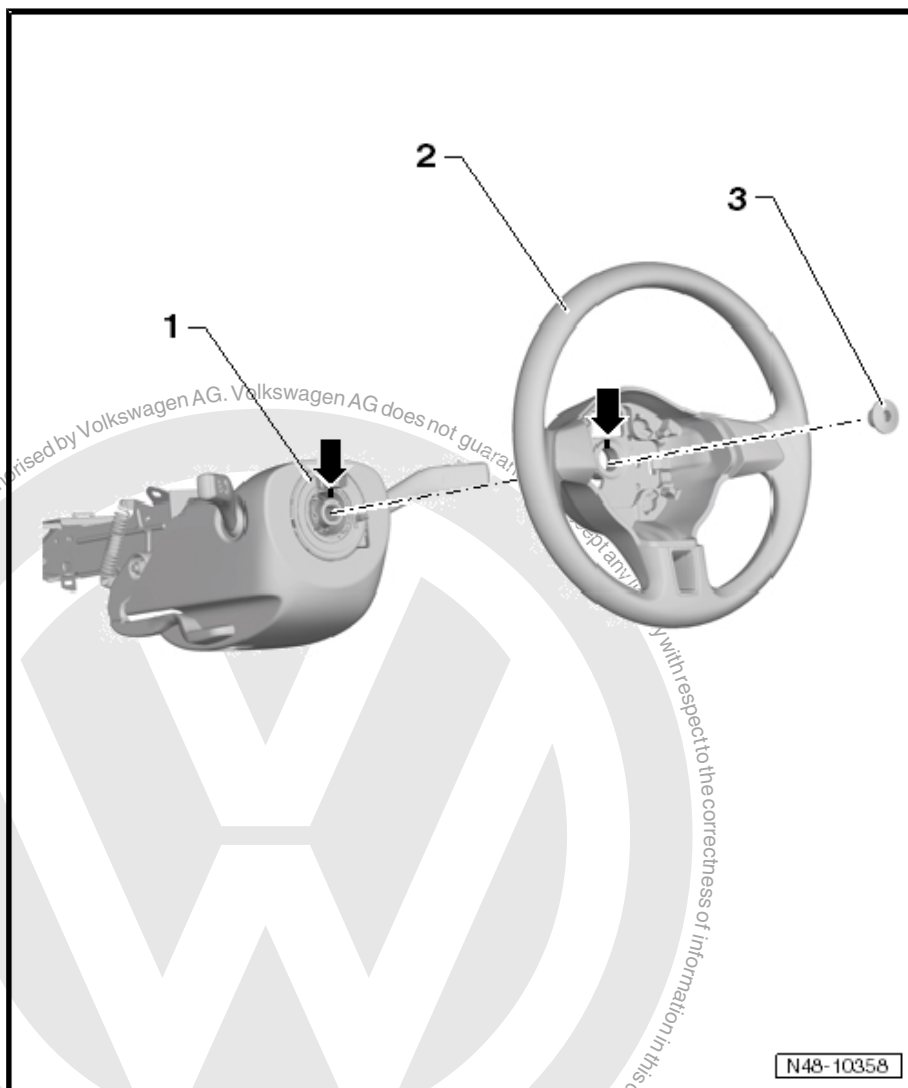
- ☐ Assembly overview
⇒ page 99 .
- ☐ Removing and installing
⇒ page 100 .

2 - Steering wheel

- ☐ Different versions possible. Refer to ⇒ Electronic Parts Catalogue
- ☐ Removing and installing
⇒ page 96 .

3 - Bolt

- ☐ Always renew after removing
- ☐ 30 Nm + 90°

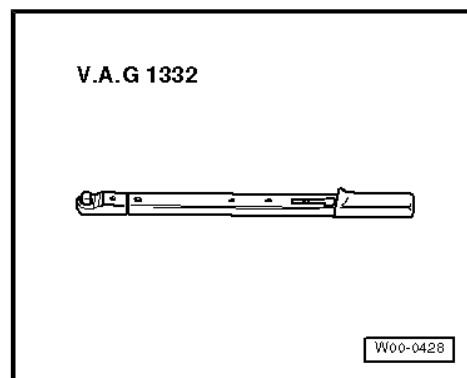


1.2 Removing and installing steering wheel

Special tools and workshop equipment required

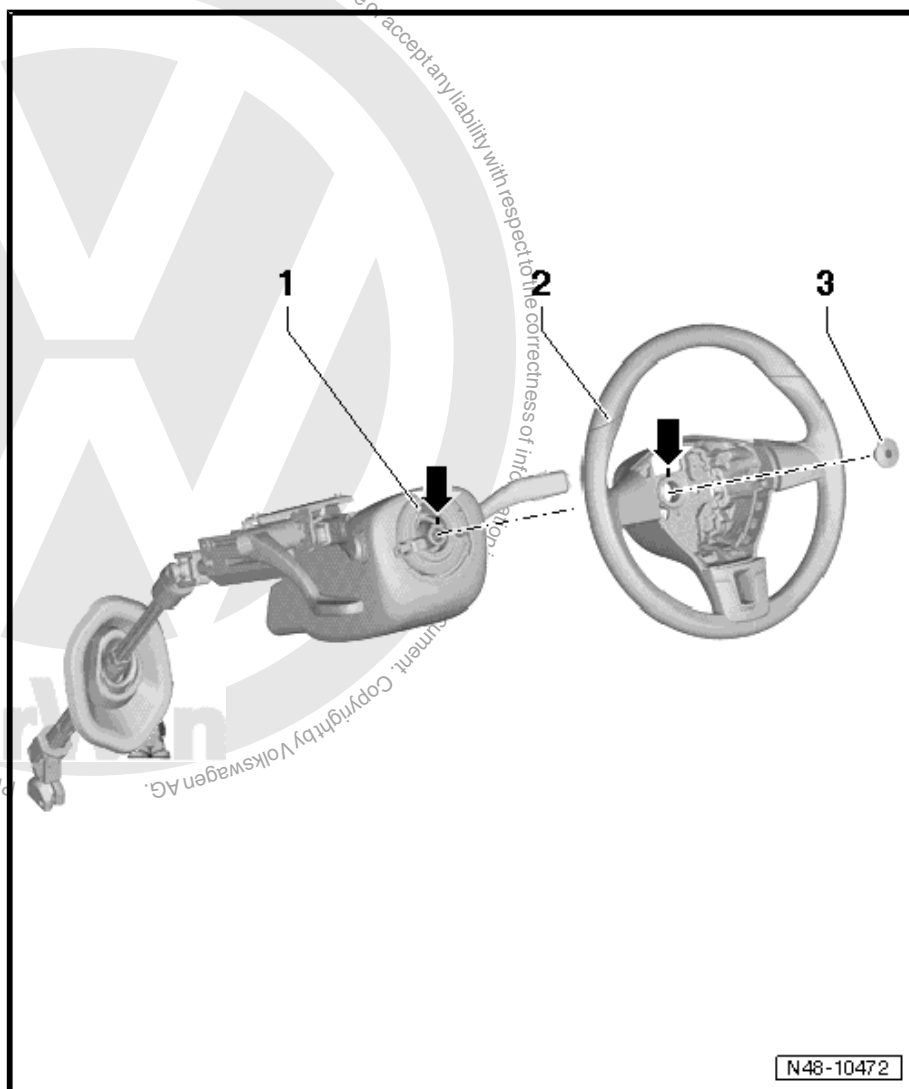


- ◆ Torque wrench - V.A.G 1332-



Removing

- Remove airbag unit on driver side ⇒ General body repairs, interior; Rep. gr. 69 ; Airbag; Removing and installing airbag unit on driver side .
- Turn steering wheel to centre position (wheels in straight-ahead position).



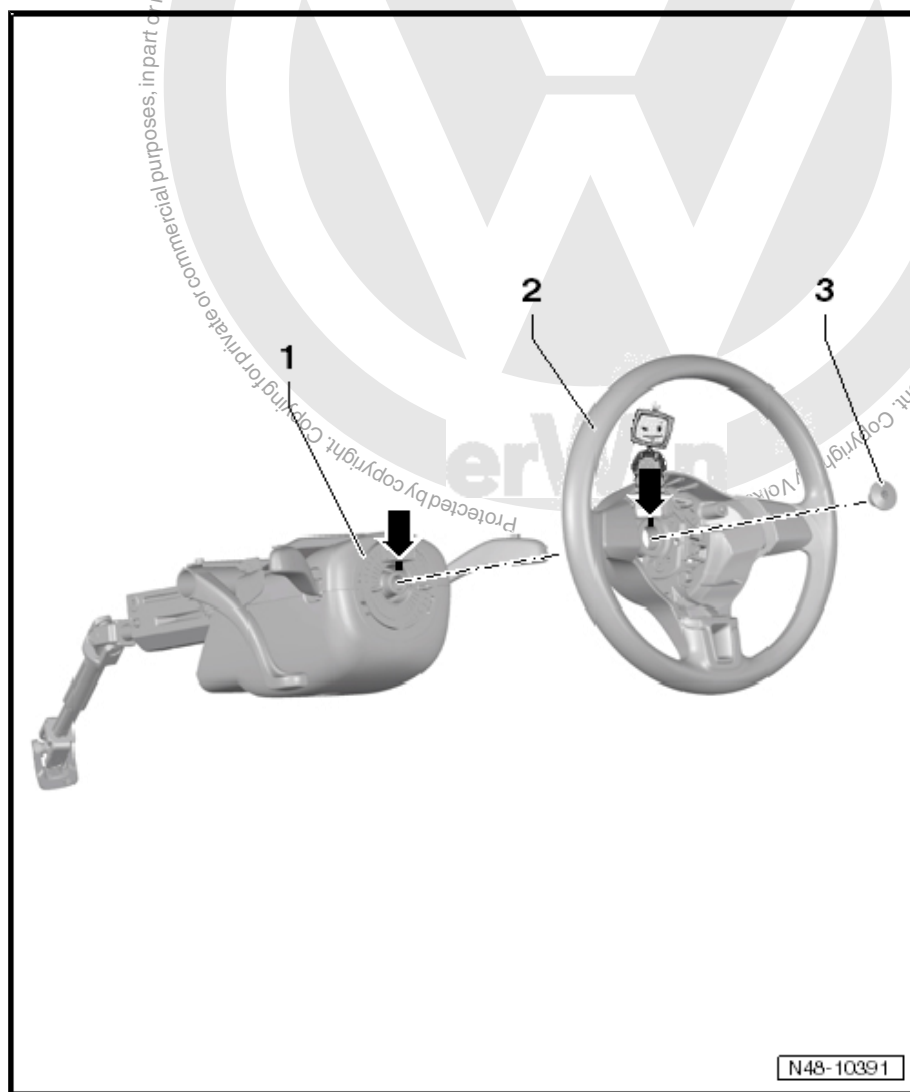
- Remove bolt -3-.



- Pull steering wheel -2- off steering column.

Installing

- Put steering wheel -2- onto steering column.
- Centre markings of steering wheel and steering column -arrows- must align.



- Guide connector for steering angle sender - G85- -1- into intended opening in the base of steering wheel.
- Secure steering wheel with bolt -3-.
- Install airbag unit on driver side ⇒ General body repairs, interior; Rep. gr. 69 ; Airbag; Removing and installing airbag unit on driver side .

Specified torques

- ♦ ⇒ [“1.1 Assembly overview - steering wheel”, page 96](#)



2 Steering column

- ⇒ [“2.1 Assembly overview - steering column”, page 99](#)
- ⇒ [“2.2 Removing and installing steering column”, page 100](#)
- ⇒ [“2.3 Handling and transporting steering column”, page 104](#)
- ⇒ [“2.4 Checking steering column for damage”, page 104](#)

2.1 Assembly overview - steering column



Note

- ◆ It is not permitted to carry out welding and straightening operations on load-bearing or wheel-guiding suspension components.
- ◆ Always renew self-locking nuts.
- ◆ Always renew corroded nuts and bolts.

1 - Assembly carrier with mounting

2 - Steering column

- ☐ Removing and installing
⇒ [page 100](#) .

3 - Bolt

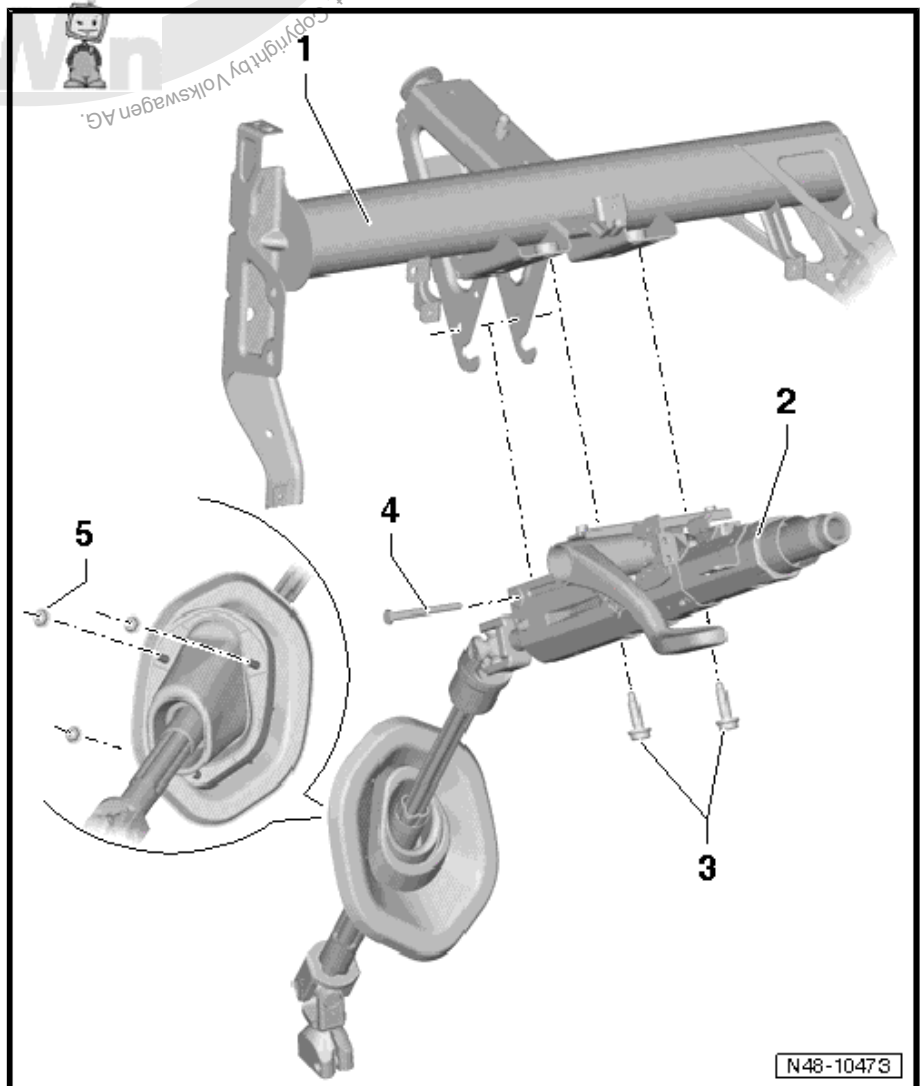
- ☐ Observe tightening sequence ⇒ [page 103](#) .
- ☐ 20 Nm

4 - Bolt

- ☐ Observe tightening sequence ⇒ [page 103](#) .
- ☐ 8 Nm

5 - Nut

- ☐ 5 Nm

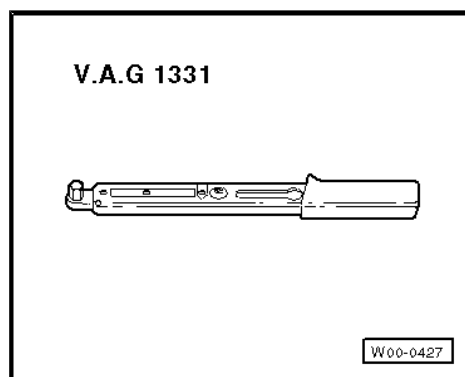




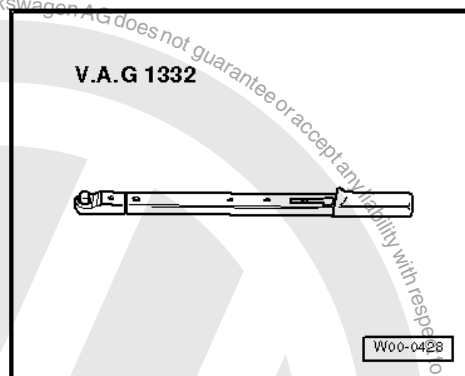
2.2 Removing and installing steering column

Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331-



- ◆ Torque wrench - V.A.G 1332-



Removing

Only the complete steering column is supplied as a replacement part. Repair is not possible.

Steering lock housing can be transferred ⇒ Electrical system;
Rep. gr. 96 ; Removing and installing steering lock housing .



WARNING

The following conditions must be met before starting work on the electrical system and removing the steering wheel:

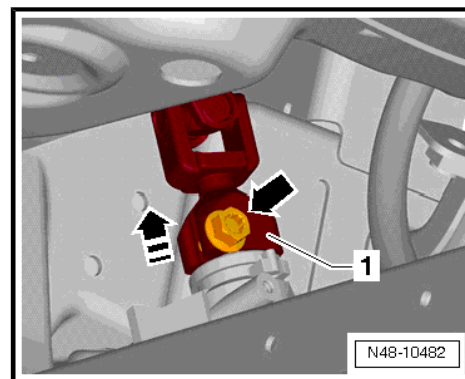
- ◆ ***Disconnect earth strap from battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and reconnecting the battery .***
- ◆ ***Wheels must be in straight-ahead position.***

Failure to comply with these precautions may lead to subsequent failure of the airbag system!

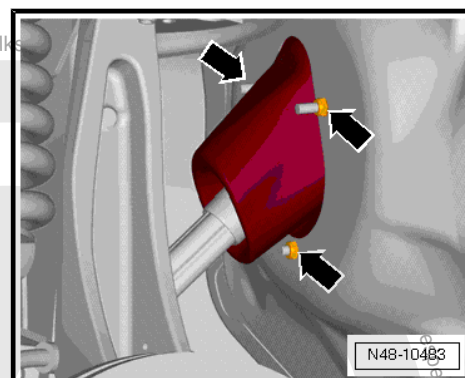
- Turn wheels to straight-ahead position.
- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .



- Unscrew bolt -arrow- from universal joint -1- and pull off universal joint in -direction of arrow-.



- Remove nuts -arrows- for steering column boot from plenum chamber bulkhead.
- Lower vehicle.
- Pull down lever on side of steering column.
- Swing steering column down as far as possible and pull out.
- Press lever on side of steering column back up.
- Remove airbag ⇒ General body repairs, interior; Rep. gr. 69 ; Airbag; Removing and installing airbag unit on driver side .
- Remove steering wheel ⇒ [page 96](#) .
- Remove steering column switch ⇒ Electrical system; Rep. gr. 94 ; Removing and installing steering column switch .



Removal and installation of the coil connector with slip ring must be carried out with the wheels in the straight-ahead position.

Coil connector with slip ring is secured as a new part in the centre position with a cable tie.

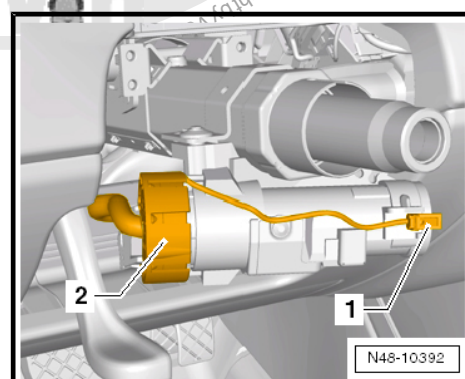
Vehicles with ESP

Vehicles with ESP are additionally equipped with a steering angle sensor - G85- . It is fitted in a housing together with the slip ring and coil connector.

After installation work on steering column switch, basic settings for steering angle sender - G85- must be carried out.

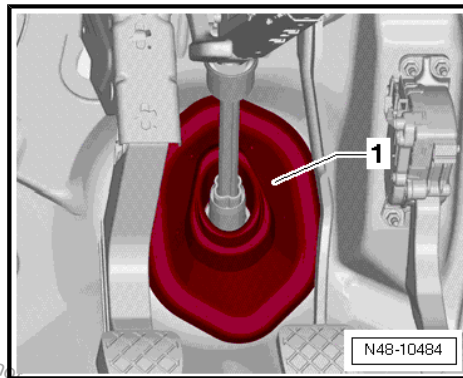
Continuation for all vehicles

- Unplug connector -1- from immobiliser reader coil -D2- .
- Pull connector -2- off steering lock housing.
- Unbolt earth cable for steering column.
- Remove earth cable and steering column switch line from cable retainer.
- Fold floor covering back slightly.

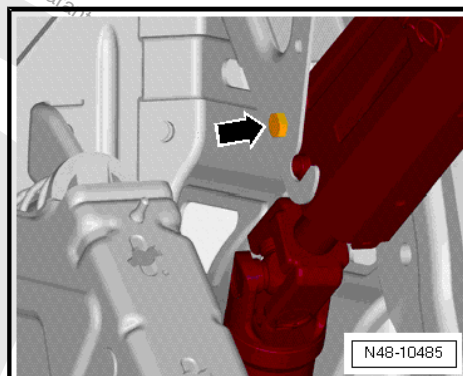




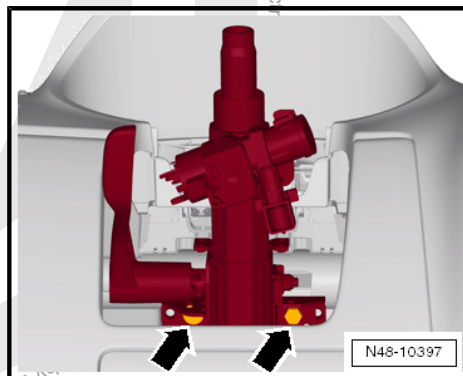
- Pull boot -1- out of plenum chamber bulkhead.



- Unscrew lower securing bolt -arrow- on left from mounting bracket.



- Unscrew bolts -arrows- from steering column and hold steering column.



- Lower steering column -2- slightly and carefully pull backwards in relation to driving direction out of guide -arrow- on mounting bracket -1-.

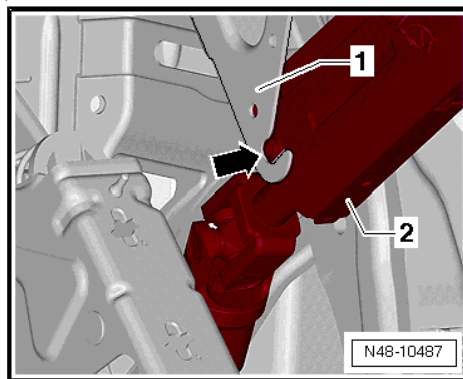


Caution

Take great care to ensure the steering column is handled and transported correctly ⇒ [page 104](#).

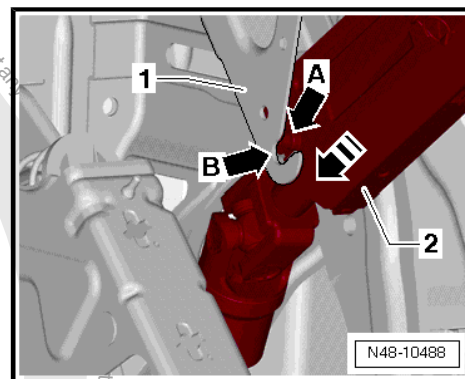
Installing

Install in reverse order. Note the following points:





- Insert steering column -2- with raised areas -arrow A- into guides -arrow B- on mounting bracket -1-.



- Swivel steering column up, align with mounting bracket and position.

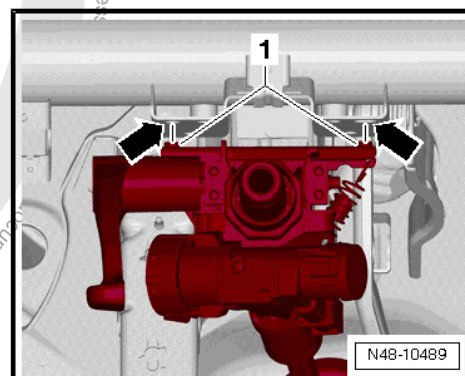
Holes -arrows- and journals -1- must align.

The correct installation position of the steering column relative to the mounting bracket is guaranteed only in this way.

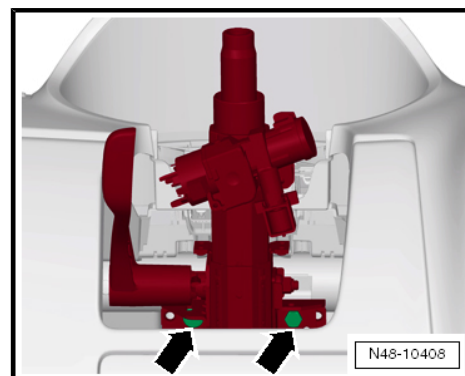


Note

When installing steering column, adhere strictly to bolting sequence.



- Tighten steering column bolts -arrows-.
- Release lever on side of steering column.

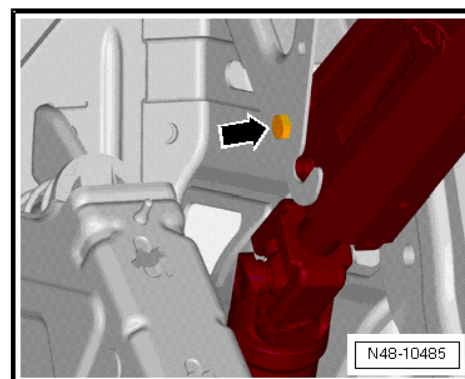


- Screw in lower securing bolt -arrow- and tighten.
- Install airbag unit ⇒ General body repairs, interior; Rep. gr. 69 ; Airbag; Removing and installing airbag unit on driver side .



WARNING

When connecting battery ensure that no people are in the vehicle!



Vehicles with ESP

- Perform basic setting for steering angle sender - G85- using ⇒ Vehicle diagnostic tester.

Specified torques

- ♦ ⇒ [“2.1 Assembly overview - steering column”, page 99](#)
- ♦ ⇒ [“3.1 Assembly overview - steering rack”, page 106](#)



2.3 Handling and transporting steering column

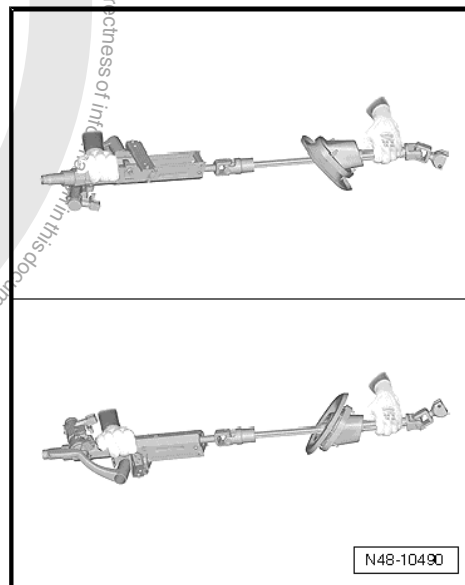


WARNING

- ◆ *Adherence to proper steering column handling is essential.*
- ◆ *Improper handling of steering column may damage the steering column, leading to safety risks.*

Proper steering column handling and transport

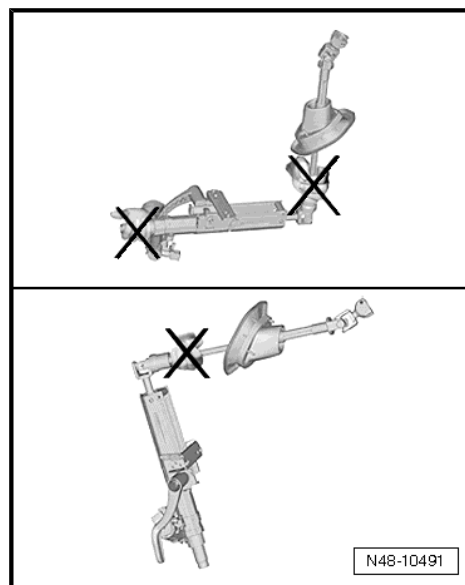
- ◆ Use both hands to transport steering column.
- ◆ Hold steering column at upper jacket tube and in area just above lower universal joint.
- ◆ Do not touch or contaminate plastic tube on intermediate steering shaft.



Improper handling of steering column with safety risks

Following methods of handling will damage universal joint bushes and lower steering column bearing:

- ◆ Transporting steering column with one hand on jointed shaft.
- ◆ Bending joints more than 90°.



2.4 Checking steering column for damage

Visual check

- Check all steering column parts for damage.

Checking function

- Check that steering column turns smoothly and easily.



- Check whether steering column can be moved in the longitudinal direction and vertically.



3 Steering rack

⇒ "3.1 Assembly overview - steering rack", page 106

⇒ "3.2 Removing and installing steering rack", page 107

⇒ "3.3 Repairing steering rack", page 110

⇒ "3.4 Checking shock absorber mountings", page 110

⇒ "3.5 Removing and installing shock absorber mountings", page 111

⇒ "3.6 Removing and installing track rod", page 114

⇒ "3.7 Removing and installing track rod ball joint", page 116

⇒ "3.8 Removing and installing boot", page 118

3.1 Assembly overview - steering rack

1 - Ladder frame

2 - Steering column

3 - Bolt

- ☐ Always renew after removing
- ☐ 35 Nm +90°

4 - Pressure line

- ☐ Various versions
- ☐ Allocation ⇒ Electronic parts catalogue "ETKA"

5 - Union bolt

- ☐ 32 Nm

6 - Return line

7 - Banjo bolt

- ☐ 35 Nm

8 - Sealing ring

- ☐ Always renew after removing

9 - Power steering rack

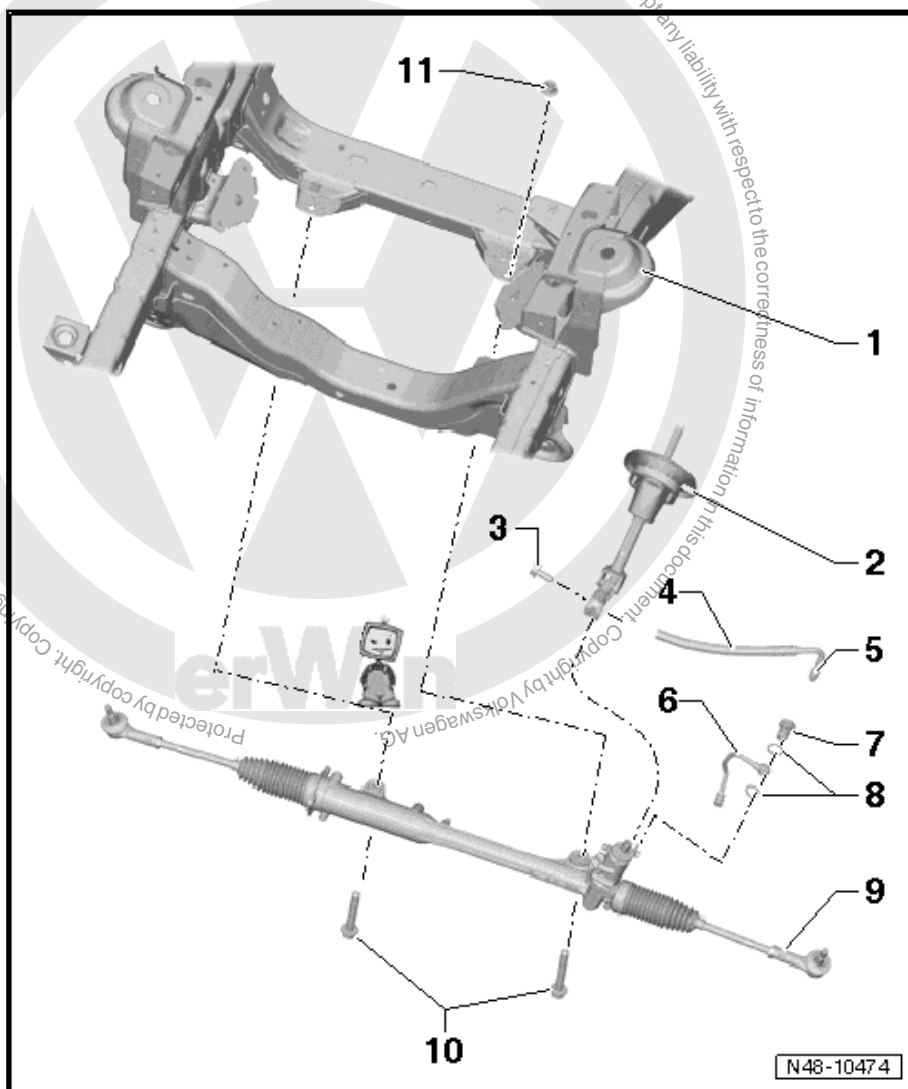
- ☐ Removing and installing
⇒ page 107 .

10 - Bolt

- ☐ Always renew after removing
- ☐ 90 Nm +120°

11 - Nut

- ☐ Always renew after removing

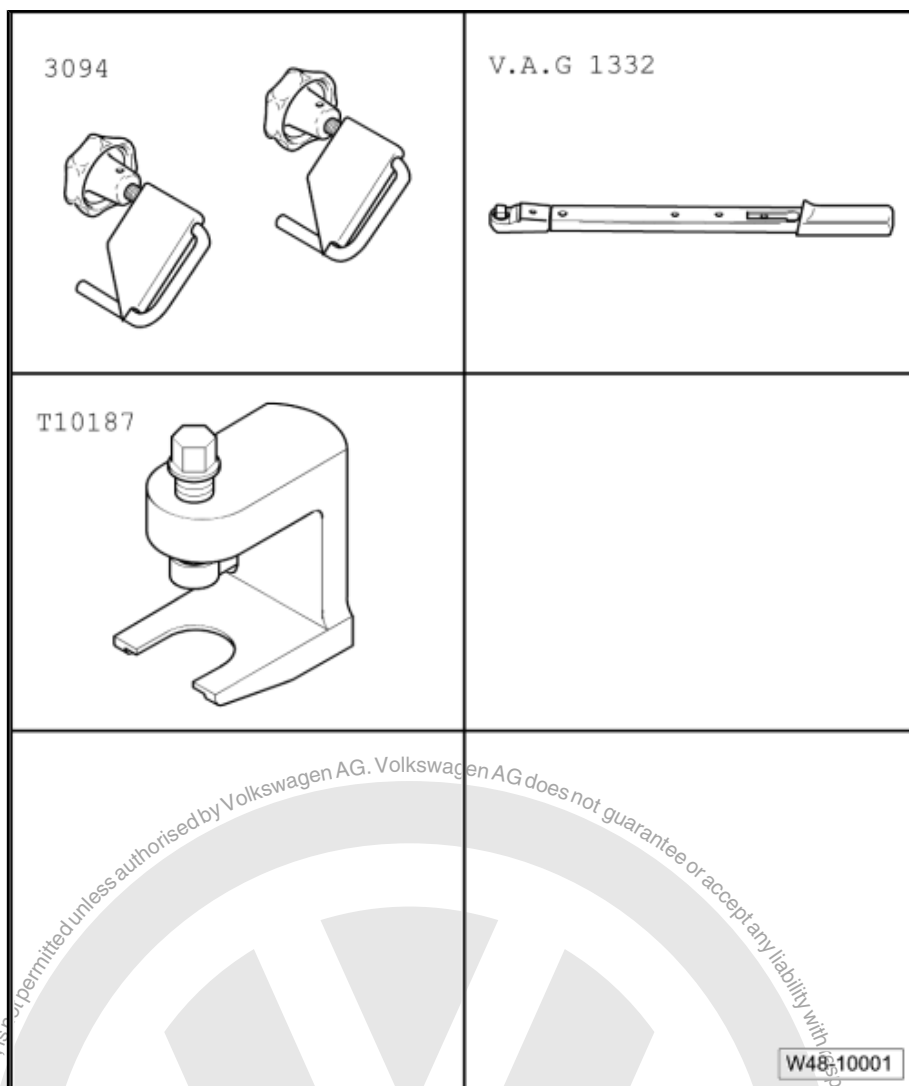




3.2 Removing and installing steering rack

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-
- ◆ Torque wrench - V.A.G 1332-
- ◆ Ball joint puller - T10187-



Removing

- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Remove wheels.
- Remove engine/gearbox guard, if fitted ⇒ General body repairs, exterior; Rep. gr. 50
- Clamp off suction hose and return line using hose clamps to 25 mm diameter - 3094- .



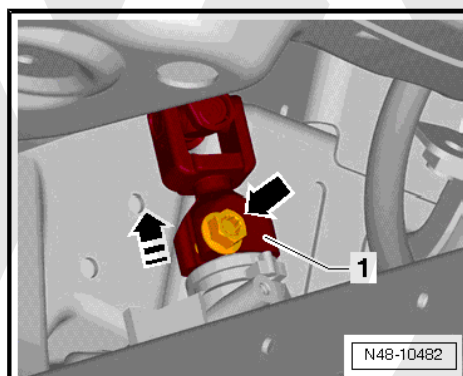
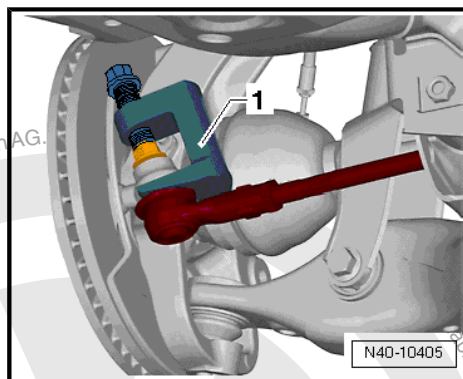
- Loosen nut on track rod ball joint but do not remove completely.



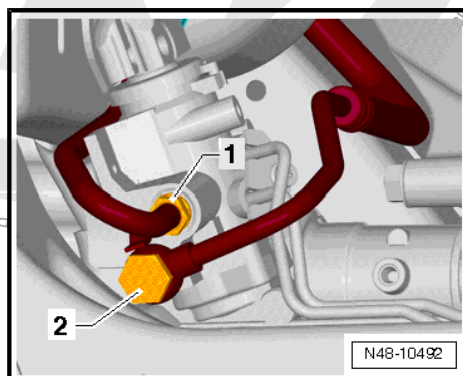
Caution

Leave nut screwed on a few turns to protect thread on pin.

- Push track rod off wheel bearing housing and remove nut.
- 1 - Ball joint puller - T10187-
- Unscrew bolt -arrow- from universal joint -1- and pull off universal joint in -direction of arrow-.



- Unscrew pressure line -1- from steering rack and pull it out.
- Close off line with a plastic bag and adhesive tape.
- Remove banjo bolt -2- for return line from steering rack.
- Close off line with a plastic bag and adhesive tape.



- Remove bolts -arrows- for steering rack -1- from ladder frame.



Note

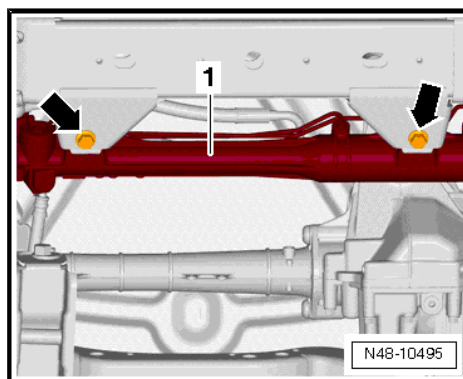
Bolt on left side of vehicle is screwed into a nut.

- Remove steering rack to left side of vehicle.



Note

- ♦ Watch out for narrow point at front final drive!
- ♦ Do not damage control line on steering rack!



Installing

Install in reverse order. Note the following points:



Note installation position of pressure line.

- ◆ Pressure line -1- must be installed at a distance -a- of at least 2 mm from steering rack -2-.
- ◆ Mounting stop -arrow- of return line -3- must be in contact with steering rack when tightened.



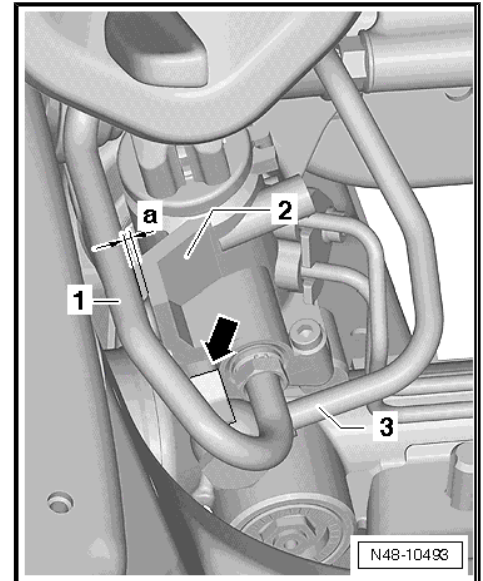
Note

Use new seals.

- Bleed steering system ⇒ [page 127](#) .
- Check steering system for leaks ⇒ [page 128](#) .
- Check hydraulic fluid level and top up if necessary ⇒ [page 127](#) .
- Check wheel alignment after completing the installation ⇒ [page 77](#) .
- Install wheel and tighten bolts or nuts ⇒ [page 71](#) .

Specified torques

- ◆ ⇒ ["3.1 Assembly overview - steering rack", page 106](#)



Component	Specified torque
Track rod to wheel bearing housing	90 Nm



3.3 Repairing steering rack

1 - Track rod ball joint

- ☐ Right.
- ☐ Identified with an "arrow" pointing in direction of travel
- ☐ Check that dust caps are undamaged and correctly seated.
- ☐ Tapered pin must be free of oil and grease.
- ☐ If necessary, clean with a dry cloth but do not use cleaning solutions.

2 - Hexagon nut

- ☐ 90 Nm

3 - Spring-type clip

4 - Boot

- ☐ Check for damage
- ☐ Do not twist when adjusting track.

5 - Clamp

- ☐ Always renew after removing

6 - Track rod

- ☐ 100 Nm
- ☐ Removing and installing ⇒ [page 114](#) .

7 - Shock absorber mounting

- ☐ Check upper and lower collars for damage in pressed-in condition
- ☐ Use assembly lubricant for installing ⇒ Electronic Parts Catalogue (ETKA) .
- ☐ Check shock absorber mountings for wear ⇒ [page 110](#) .

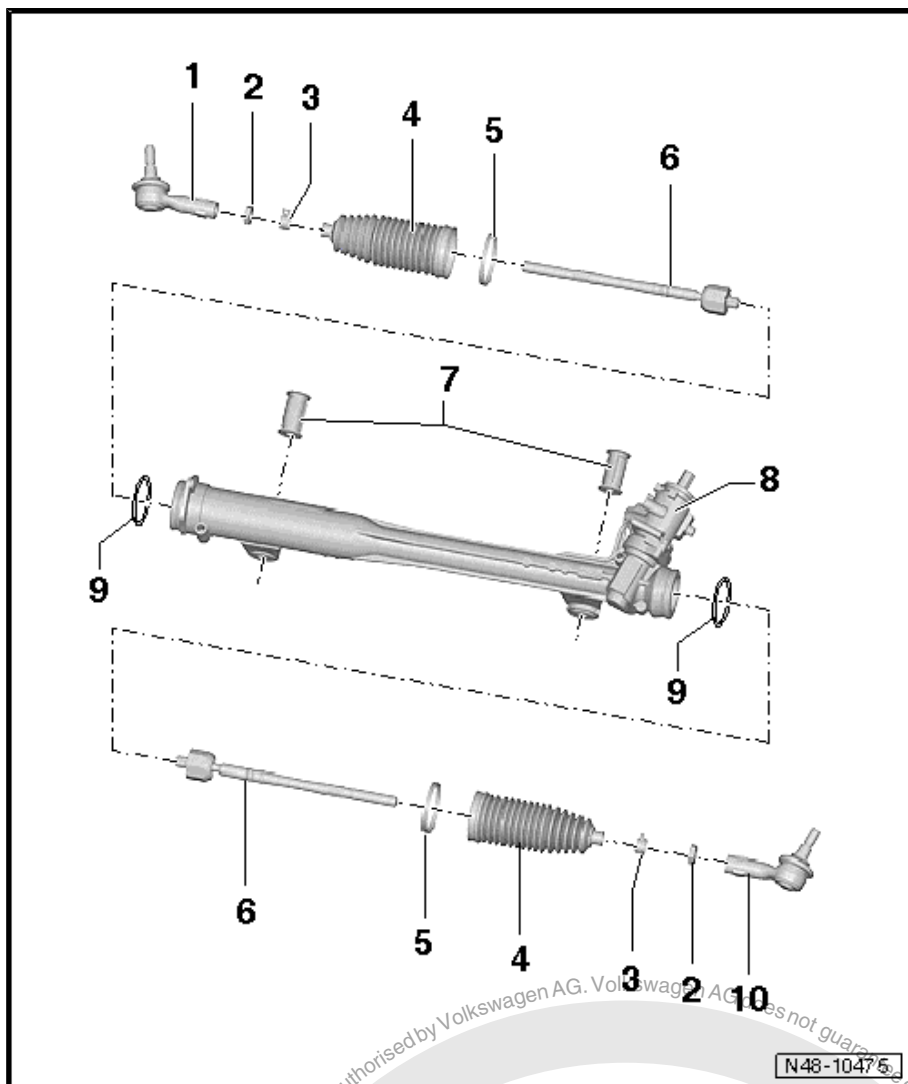
8 - Power steering rack

- ☐ Removing and installing ⇒ [page 107](#) .

9 - Sealing ring

10 - Track rod ball joint

- ☐ Left.
- ☐ Identified with an "arrow" pointing in direction of travel
- ☐ Check that dust caps are undamaged and correctly seated.
- ☐ Tapered pin must be free of oil and grease.
- ☐ If necessary, clean with a dry cloth but do not use cleaning solutions.



3.4 Checking shock absorber mountings

High mileage and environmental influences (dust, sand, mud, bad roads) can cause wear to the shock absorber mountings of the steering rack. As wear progresses, material may be scoured away and/or the rubber collar of the shock absorber mountings may deteriorate, so that in extreme cases this collar may disappear

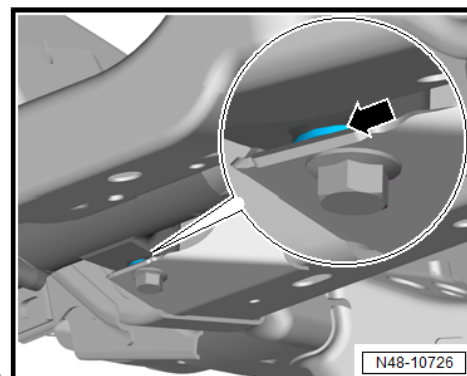


completely and the base of the steering rack may, in the lower position, completely contact the steering rack connection.

The threaded connection of the steering rack is not affected by wear to the bush and is OK.

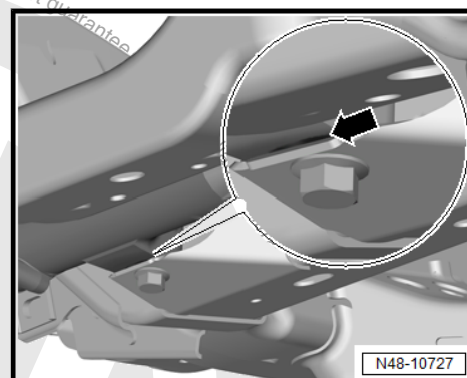
- Using commercially available 0.5 mm feeler gauge, check gap between base of steering rack and steel support.

If the rubber collar of the shock absorber mounting -arrow- can be felt, then it is not necessary to renew the shock absorber mounting.



If the gap -arrow- is smaller than the feeler gauge, then both shock absorber mountings should be renewed.

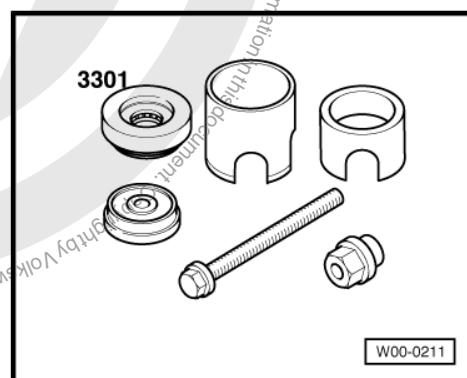
Removing and installing shock absorber mountings
⇒ [page 111](#).



3.5 Removing and installing shock absorber mountings

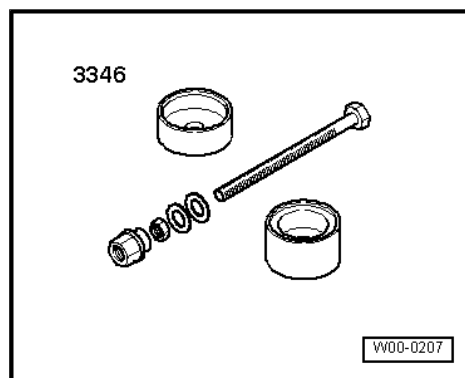
Special tools and workshop equipment required

- ◆ Assembly tool - 3301-

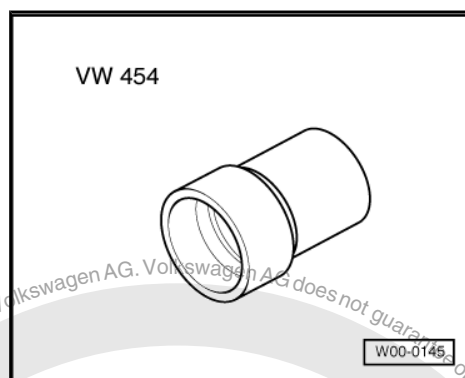




◆ Assembly tool - 3346-



◆ Thrust piece - VW 454-



Removing

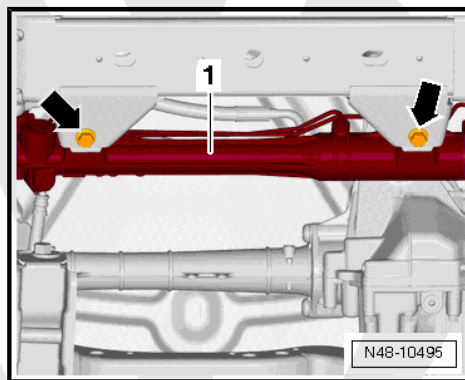
- Undo bolt of rear bush of bevel gear.
- Remove bolts -arrows- for steering rack -1- from ladder frame.



Note

Bolt on left side of vehicle is screwed into a nut.

- Unscrew bolt -arrow- from universal joint.
- Pull off steering rod in -direction of arrow-.
- Pull steering rack forwards until the damping bushes are easily accessible.
- Combine assembly tool - 3301- and assembly tool - 3346- with thrust piece - VW 454- as shown in the illustration.



Note

Use a standard nut with a washer instead of the nut of the assembly tool.

- Tighten standard nut with washer.
- Pull out shock absorber mounting by pulling threaded rod -3301M- downwards.



- If necessary, counterhold standard nut with spanner.

Installing

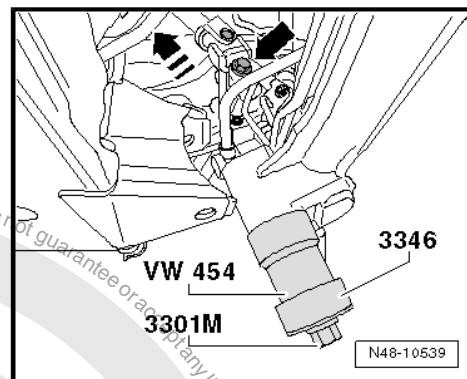
Install in reverse order. Note the following points:

Use assembly lubricant for installing ⇒ Electronic Parts Catalogue (ETKA) .



WARNING

If you use assembly lubricant ⇒ Electronic Parts Catalogue (ETKA) , the vehicle must not be moved for several hours as otherwise the shock absorber mountings may become twisted. The assembly lubricant ⇒ Electronic Parts Catalogue (ETKA) must first evaporate.



- Press shock absorber mounting into bush.



Note

The markings on the shock absorber mountings -arrows- must be aligned to the direction of travel.

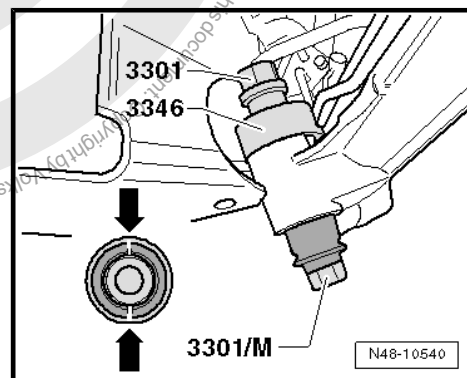
- Place component and tools in position as shown in illustration.
- Pull in shock absorber mounting by pulling threaded rod -3301M- upwards.
- If necessary, counterhold nut -3301- with spanner.



Note

Press in shock absorber mounting 5 mm further than dimension specified. Then push it back 5 mm until the rubber lips are uniformly seated on both sides.

- Fasten steering rack to conductor frame.
- Bolt bevel gear onto rear bush.



Note

Misalignment of steering wheel following removal and installation of components is permitted within a tolerance of $\pm 1.5^{\circ}$ without requiring wheel alignment.

2) If the tolerance is greater than the permissible value, wheel alignment must be carried out. ⇒ [page 77](#)

Specified torques

- ◆ ⇒ ["3.1 Assembly overview - steering rack", page 106](#)

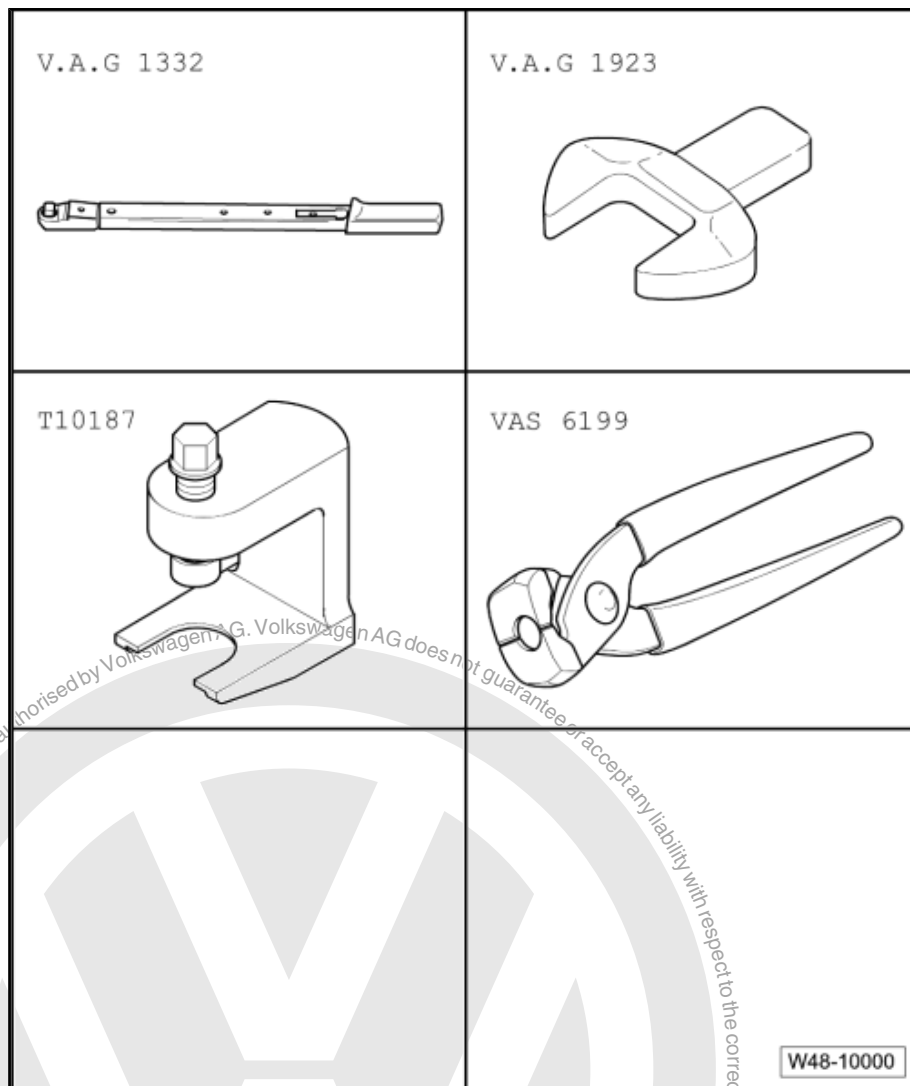
Component	Specified torque
Rear bush of bevel gear	60 Nm + 90°



3.6 Removing and installing track rod

Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1332-
- ◆ Open-end spanner attachment - V.A.G 1923-
- ◆ Ball joint puller - T10187-
- ◆ Locking pliers - VAS 6199-



Removing

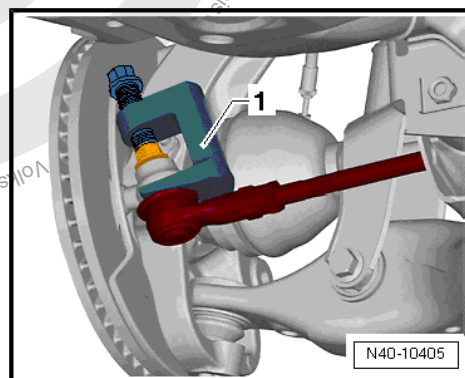
- Raise vehicle → Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Remove wheel.
- Loosen nut on track rod ball joint but do not remove completely.



Caution

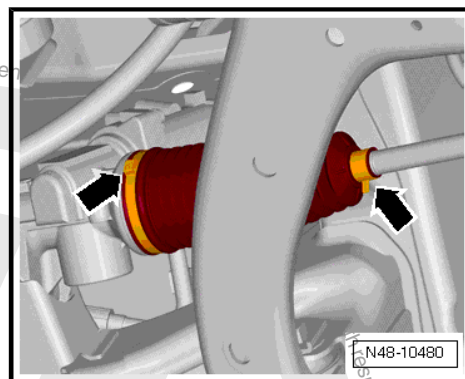
Leave nut screwed on a few turns to protect thread on pin.

- Push track rod off wheel bearing housing and remove nut.
- 1 - Ball joint puller - T10187-
- Clean outside of power steering rack in vicinity of boot.





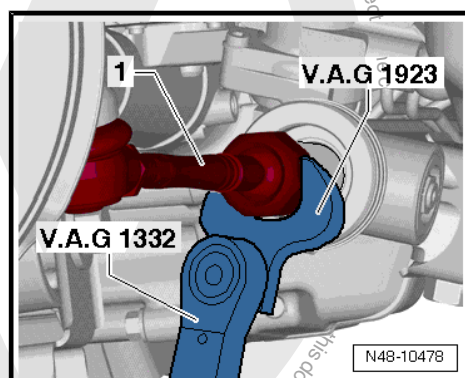
- Open clamps -arrows- and push boot back.



- Use open-end socket attachment - V.A.G 1923- to unscrew track rod.

Installing

Install in reverse order. Note the following points:

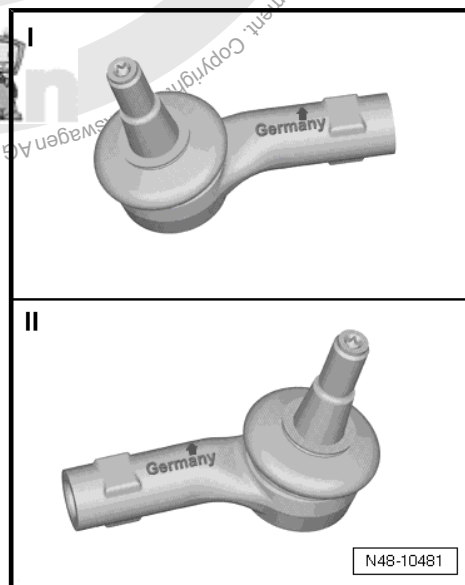


- Make sure that correct track rod ball joint is installed on each side.

Arrow on track rod ball joint must always point in direction of travel.

I - Left track rod ball joint

II - Right track rod ball joint





- Tighten track rod using open-end spanner attachment - V.A.G 1923- .
- Check boots for wear (splits, tears) and check sealing surfaces for soiling.
- Install boot and clamp.



Note

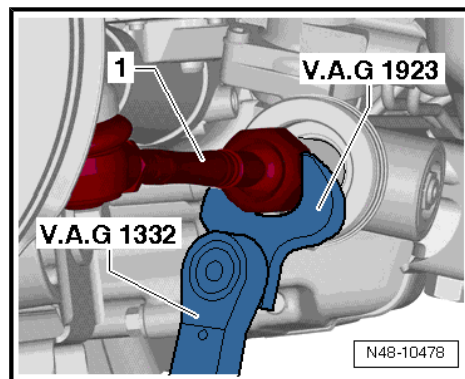
Only use genuine clamps.

- Install wheel and tighten bolts or nuts ⇒ [page 71](#) .
- Check wheel alignment after completing the installation ⇒ [page 77](#) .

Specified torques

- ◆ ⇒ ["3.3 Repairing steering rack", page 110](#)

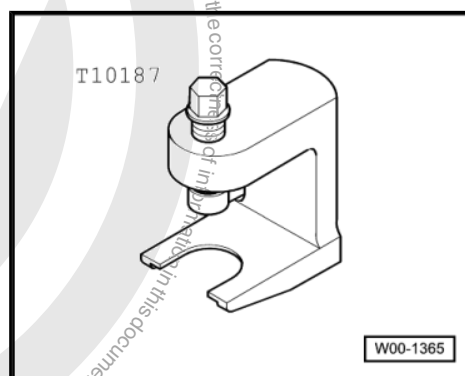
Component	Specified torque
Track rod to wheel bearing housing	90 Nm



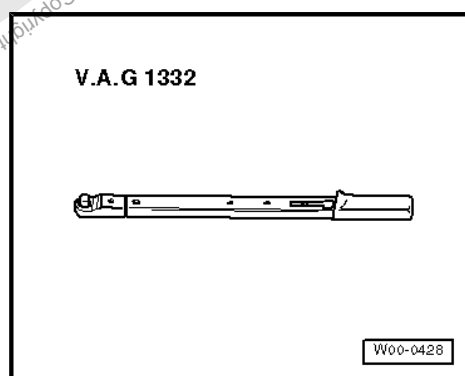
3.7 Removing and installing track rod ball joint

Special tools and workshop equipment required

- ◆ Ball joint puller - T10187-



- ◆ Torque wrench - V.A.G 1332-



Removing

- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Remove wheel.



- Loosen nut on track rod ball joint but do not remove completely.

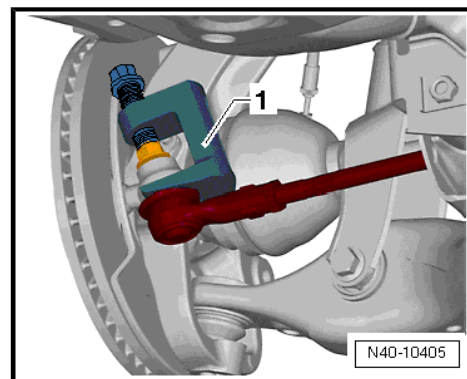


Caution

Leave nut screwed on a few turns to protect thread on pin.

- Push track rod off wheel bearing housing and remove nut.

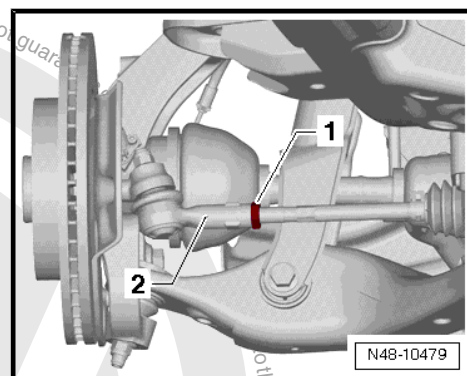
1 - Ball joint puller - T10187-



- Loosen nut -1-.
- Mark position of track rod ball joint on track rod.
- Unscrew track rod ball joint -2- from track rod.

Installing

Install in reverse order. Note the following points:



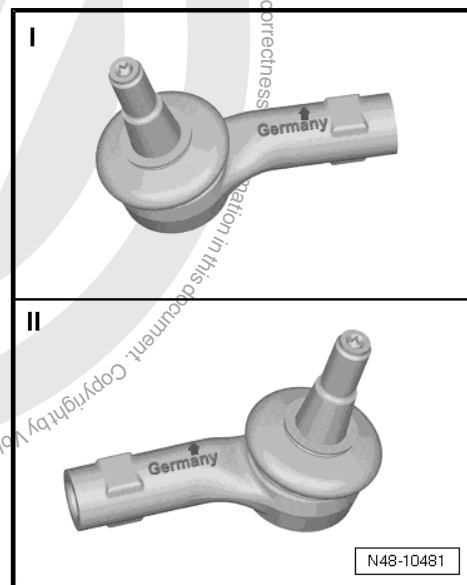
- Make sure that correct track rod ball joint is installed on each side.

Arrow on track rod ball joint must always point in direction of travel.

I - Left track rod ball joint

II - Right track rod ball joint

- Screw track rod ball joint onto track rod as far as previously applied mark and secure with lock nut.
- Bolt track rod ball joint with new nut.
- Install wheel and tighten bolts or nuts ⇒ [page 71](#).
- Check wheel alignment after completing the installation ⇒ [page 77](#).



Specified torques

- ◆ ⇒ [“3.3 Repairing steering rack”, page 110](#)

Component	Specified torque
Track rod ball joint to wheel bearing housing	90 Nm



3.8 Removing and installing boot



Note

- ♦ If boot is defective, moisture and dirt will enter steering rack. There must be a palpable film of grease in the area of the teeth on the steering rack. If there is no film of grease, the steering rack must be renewed.
- ♦ Also renew steering rack if there is corrosion, damage, wear or signs of contamination on the steering rack.

Removing

- Raise vehicle ⇒ Maintenance ; Booklet ; Descriptions of work; Raising vehicle .
- Turn steering wheel to straight-ahead position.
- Remove wheel.
- Clean outside of steering rack in vicinity of boot.

No dirt must be allowed to enter the steering rack through a defective rubber boot during this operation.

- Remove track rod ball joint ⇒ [page 116](#) .
- Open hose clips -arrows-.
- Pull boot off steering rack housing and track rod.

Installing

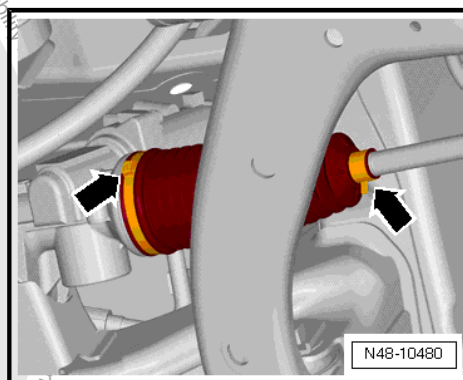
Install in reverse order. Note the following points:

Before installation, steering rack must be coated with steering rack grease provided in repair set ⇒ Electronic Parts Catalogue (ETKA) .



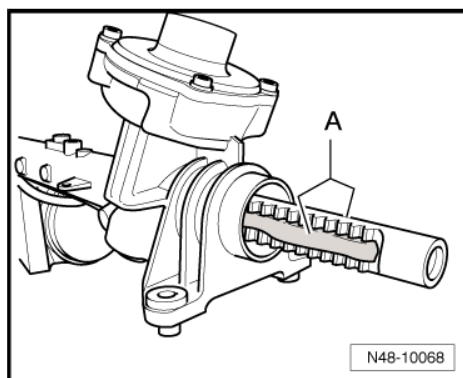
Caution

Never use any other grease.



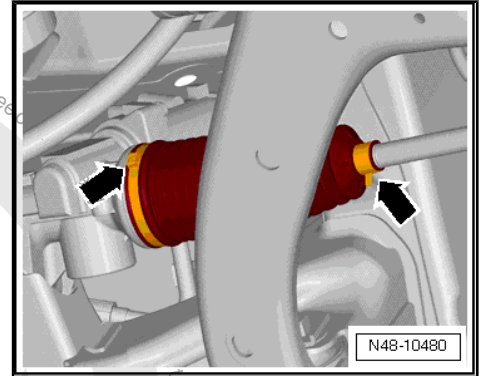
To grease, turn steering to full lock on each side in succession.

- Grease steering rack on toothed side using steering rack grease ⇒ Electronic Parts Catalogue (ETKA) .
- Turn steering wheel to straight-ahead position.





- Push boot onto track rod and steering rack and secure with new clamps -arrows-.
- Install track rod ball joint => [page 116](#) .





4 Hydraulic power steering

⇒ [“4.1 Assembly overview - vane pump”, page 120](#)

⇒ [“4.2 Assembly overview - hydraulic lines, reservoir”, page 121](#)

⇒ [“4.3 Checking delivery pressure of vane pump”, page 121](#)

⇒ [“4.4 Removing and installing vane pump”, page 124](#)

⇒ [“4.5 Checking power steering fluid level”, page 127](#)

⇒ [“4.6 Bleeding steering system”, page 127](#)

⇒ [“4.7 Check steering for leaks”, page 128](#)

4.1 Assembly overview - vane pump

1 - Spring retainer

2 - Bush

- ☐ Drive bush back slightly when installing vane pump.

3 - Bolt

- ☐ 24 Nm

4 - Bolt

- ☐ 9 Nm

5 - Pressure line



Note

When installing, press on to the pin in vane pump.

- ☐ Contains
⇒ [Item 8 \(page 120\)](#)

6 - Suction hose

- ☐ Note installation position on vane pump: marking -arrow A- must align with marking -arrow B- on vane pump.

7 - Clamp

- ☐ Install on marking on suction hose.

8 - Sealing ring

- ☐ Always renew after removing

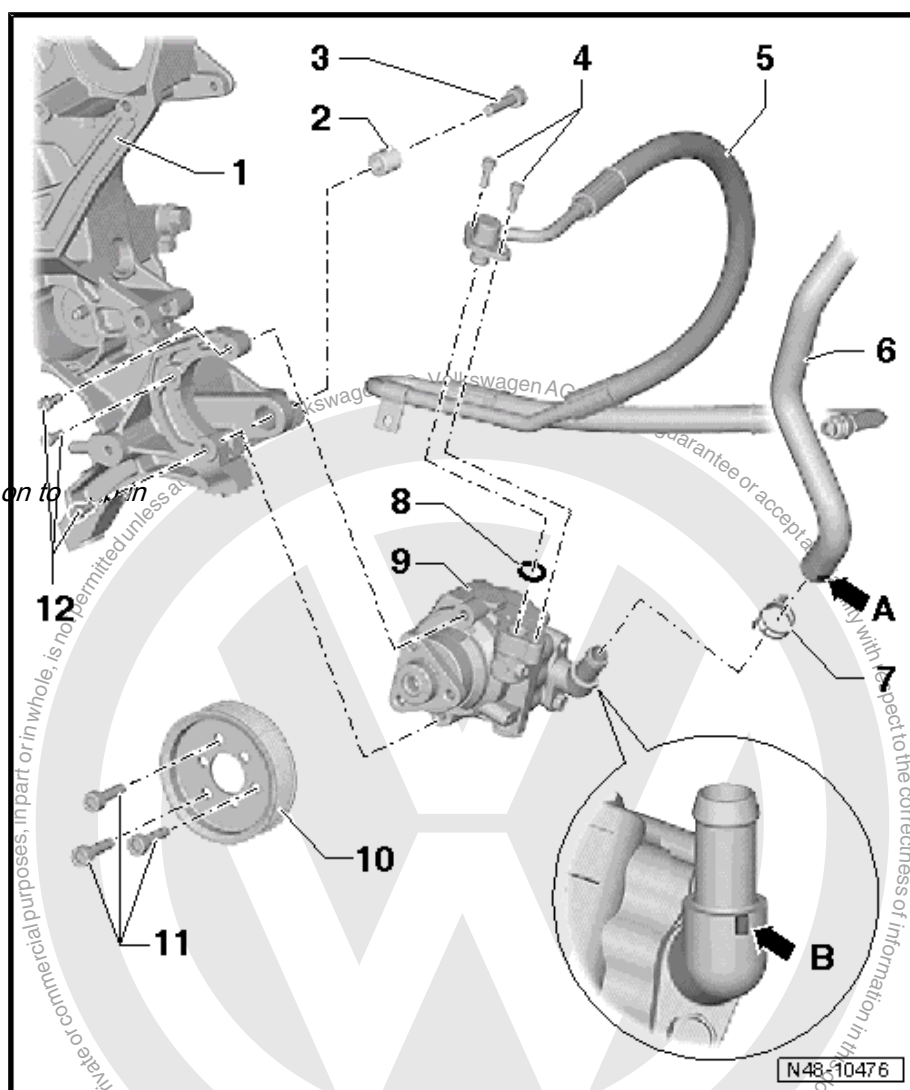
9 - Vane pump

- ☐ Allocation ⇒ Electronic parts catalogue “ETKA”
- ☐ Fill with hydraulic fluid before installing.
- ☐ Removing and installing ⇒ [page 124](#).

10 - Belt pulley

11 - Bolt

- ☐ 23 Nm





12 - Bolt

- ☐ 24 Nm

4.2 Assembly overview - hydraulic lines, reservoir

1 - Reservoir

2 - Sealing cover with dipstick

- ☐ Check power steering fluid level ⇒ [page 127](#).

3 - Spring retainer

- ☐ For reservoir

4 - Clamp

5 - Return hose

6 - Suction hose

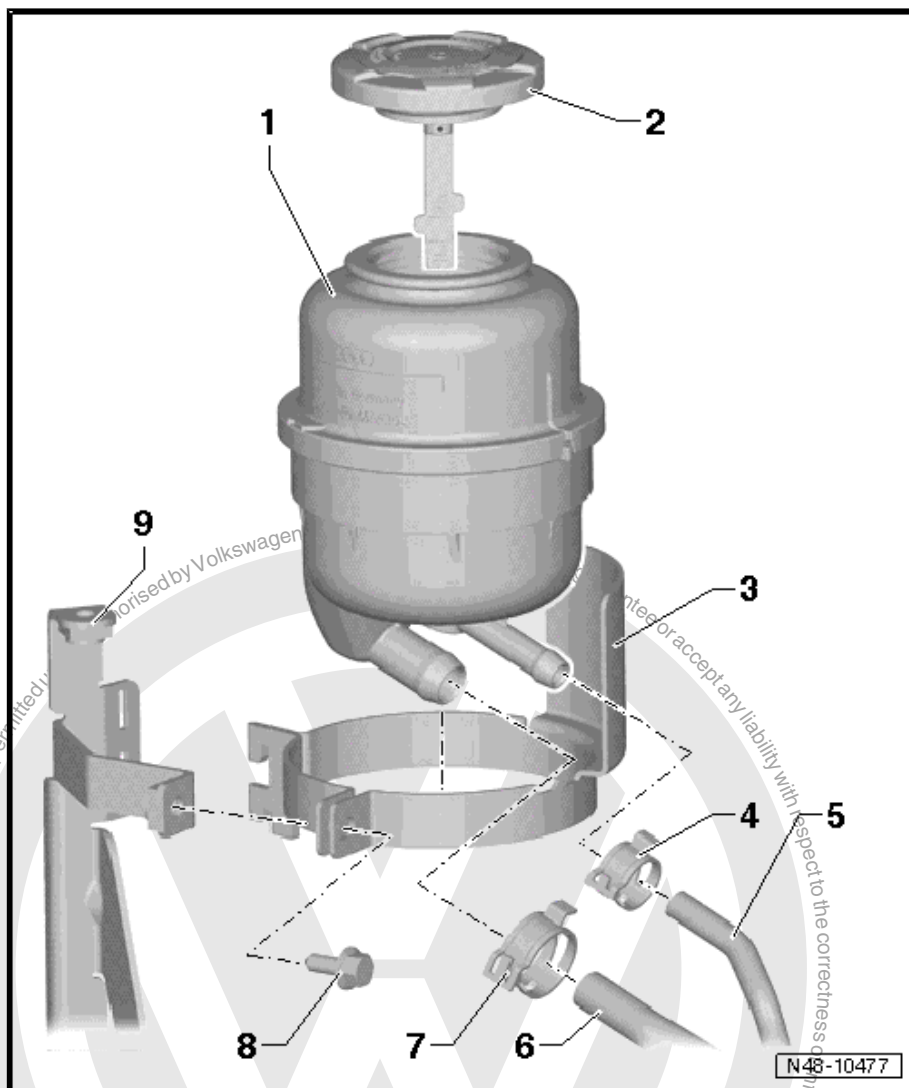
7 - Clamp

8 - Bolt

- ☐ 9 Nm

9 - Spring retainer

- ☐ For engine control unit

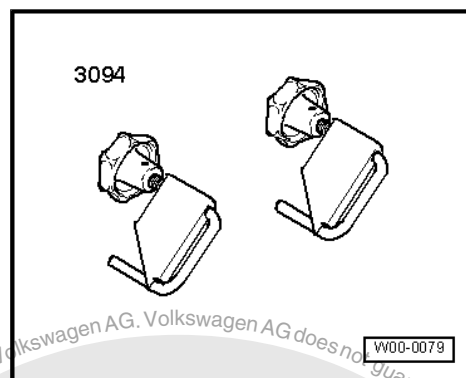


4.3 Checking delivery pressure of vane pump

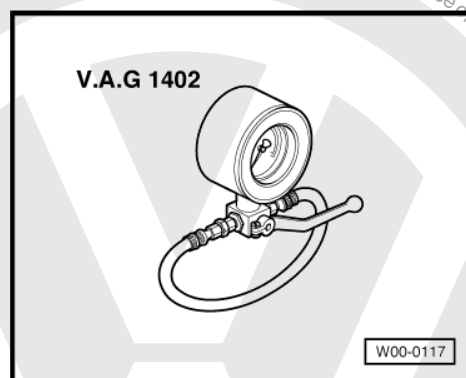
Special tools and workshop equipment required



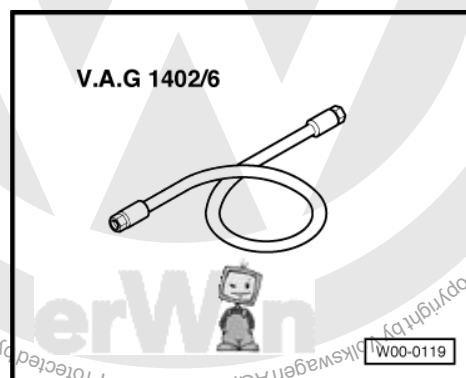
- ◆ Hose clamps, up to 25 mm - 3094-



- ◆ Power steering tester - V.A.G 1402-



- ◆ Adapter set - V.A.G 1402/6-



- ◆ Adapter - V.A.G 1402/18-
 - Clamp off suction hose at vane pump with hose clamp to 25 mm - 3094- .
 - Remove pressure line from vane pump.

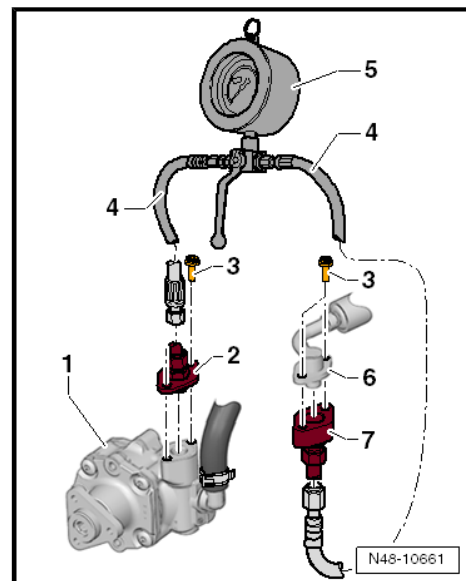


– Fit special tools as shown in illustration.

- 1 - Vane pump
- 2 - Adapter - V.A.G 1402/18-1- ³⁾
- 3 - Securing bolt of pressure line ➔ [Item 4 \(page 120\)](#)
- 4 - Hose from adapter set - V.A.G 1402/6-
- 5 - Power steering tester - V.A.G 1402-
- 6 - Pressure line
- 7 - Adapter - V.A.G 1402/18-2-

3) If seal is leaking or damaged on adapter - V.A.G 1402/18-1-, replace with new seal ➔ [Item 8 \(page 120\)](#) ➔ Electronic Parts Catalogue .

– Remove hose clamp, up to Ø 25 mm - 3094- from suction hose.

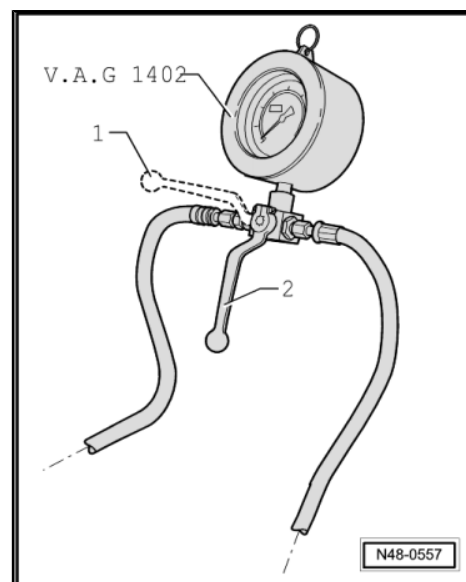


Make sure lever on power steering tester - V.A.G 1402- is in position -2-.

- Top up hydraulic fluid in reservoir if necessary ➔ [page 127](#) .
- Start engine.
- Turn steering wheel approx. 10 times from lock to lock.
- Check delivery pressure

Test prerequisites:

- System must be free of leaks
- Hoses and lines must not be not kinked or restricted



- With engine idling, turn shut-off valve to position -1- (not longer than 5 seconds) and read pressure from power steering tester - V.A.G 1402- .



Note

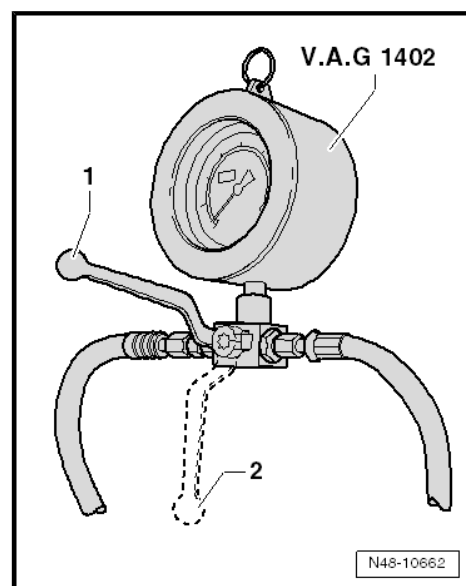
Ensure that the shut-off valve is not closed in position -1- for more than 5 seconds to avoid damage to the vane pump.

Specification for delivery pressure:

110...120 bar

If specification is not attained, renew vane pump ➔ [page 124](#) .

- Remove pressure gauge and adapter.
- Bleed steering system ➔ [page 127](#) .
- Check hydraulic fluid level and top up with hydraulic fluid if necessary ➔ [page 127](#) .
- Check steering system for leaks ➔ [page 128](#) .

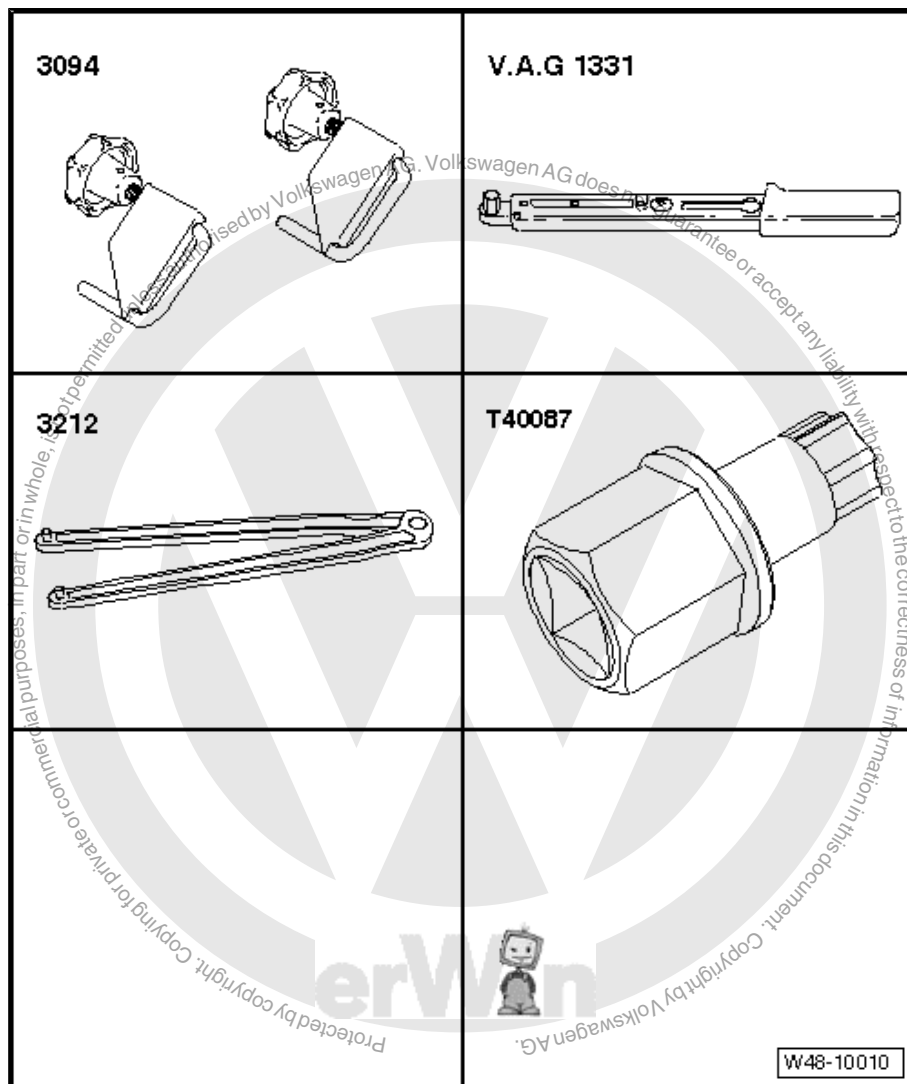




4.4 Removing and installing vane pump

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Pin wrench - 3212-
- ◆ Tool insert - T40087-



Removing



WARNING

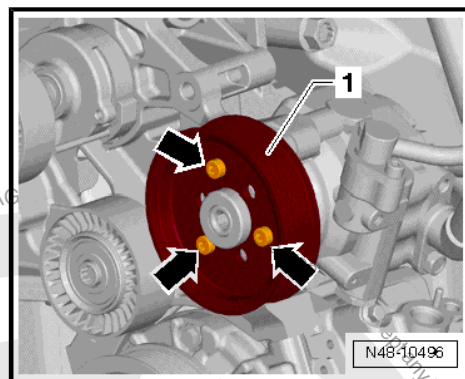
Please note the following points during all assembly work, in particular in the engine compartment, due to the narrow installation conditions:

- ◆ *Route lines of all kinds (for example for fuel, hydraulic fluid, activated charcoal filter system, coolant, refrigerant, brake fluid, vacuum) and electrical cables so that the original line/cable routing is re-established.*
- ◆ *Make sure there is adequate clearance from all moving or hot components.*

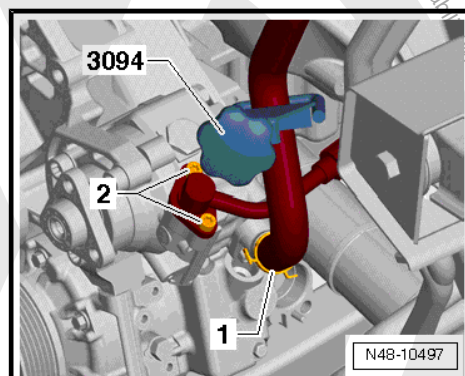
- If fitted, remove air intake hose.
- Remove poly V-belt ⇒ Power unit; Rep. gr. 13 ; Cylinder head, pulley end; Removing and installing poly V-belt .



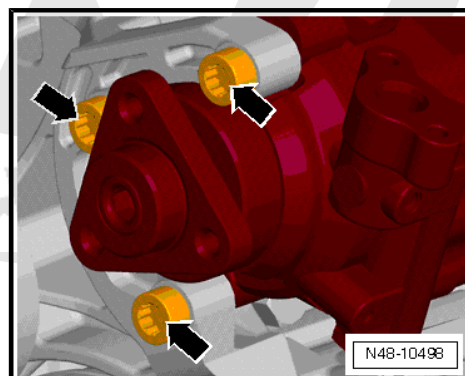
- Unscrew bolts -arrows-, counterhold poly V-belt pulley -1- with pin wrench - 3212- for this.



- Clamp off suction hose using hose clamps, up to Ø 25 mm - 3094- .
- Open spring-type clip -1- and pull suction hose off vane pump.
- Close off suction hose with a plastic bag and adhesive tape.
- Remove bolts -2- and pull pressure line out of vane pump.
- Close off pressure line with a plastic bag and adhesive tape.



- Remove bolts -arrows-.





- Remove bolt -arrow- and remove vane pump from retainer.

There is no provision for repairing the vane pump. If problems are reported, determine the cause by means of a pressure test and a leakage test ⇒ [page 121](#) . If a fault is found, the vane pump unit must be renewed.



Note

- ◆ Always check steering system for leaks if fluid level in reservoir is low.
- ◆ If leakage appears near pipe connections, first check lines and connections for leaks, tighten connections as necessary and wipe dry.
- ◆ Vane pumps taken from parts stock contain no fluid. Therefore it is essential to fill vane pump with hydraulic fluid ⇒ *Electronic Parts Catalogue (ETKA)* and to rotate pump by hand prior to installation. Otherwise vane pump may be damaged or be noisy during operation.
- ◆ Fluid type: hydraulic fluid ⇒ *Electronic Parts Catalogue (ETKA)* .

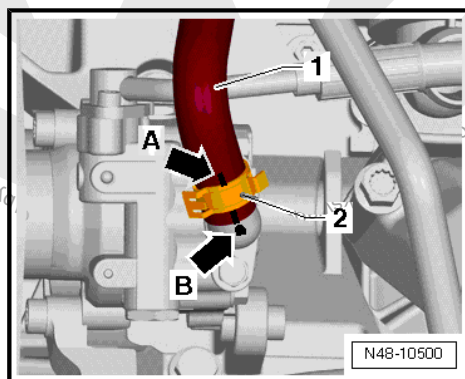
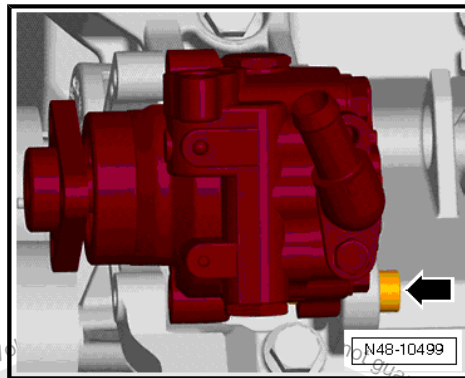
Installing

Install in reverse order. Note the following points:

- Fill vane pump with hydraulic oil.
- Fill hydraulic oil in through connection port of vane pump.
- Turn hub by hand until oil emerges from pressure side.
- Install vane pump, initially tightening only front bolts.
- Install suction hose -1- so that marks -arrow A- and -arrow B- align with one another.
- Mount clamp -2- on mark -arrow A-.
- Install poly V-belt ⇒ Power unit; Rep. gr. 13 ; Cylinder head, pulley end; Removing and installing poly V-belt .
- Bleed steering system ⇒ [page 127](#) .
- Check hydraulic fluid level ⇒ [page 127](#) .
- Check steering system for leaks ⇒ [page 128](#) .

Specified torques

- ◆ ⇒ [“4.1 Assembly overview - vane pump”, page 120](#)





4.5 Checking power steering fluid level

When fluid is cold: (approx. 20°C):

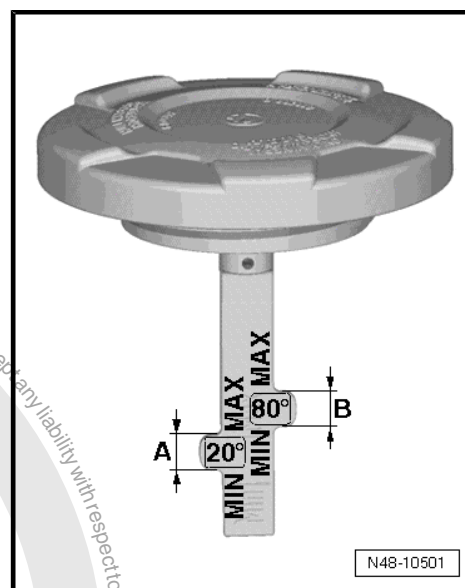
- Unscrew filler cap.
- Wipe dipstick with a clean, lint-free cloth.
- Screw filler cap on hand tight and unscrew again.



Note

The cap must be fully screwed on in order to obtain an accurate fluid level reading.

- Check fluid level: fluid level should be in area -A-.



When fluid is at operating temperature (approx. 80 °C):

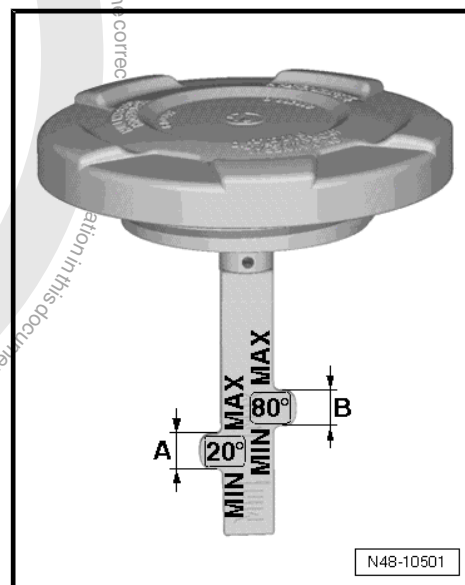
- Unscrew filler cap.
- Wipe dipstick with a clean, lint-free cloth.
- Screw filler cap on hand tight and unscrew again.



Note

The cap must be fully screwed on in order to obtain an accurate fluid level reading.

- Check fluid level: fluid level should be in area -B-.



Note

- ◆ If fluid level is above specified area, excess fluid must be extracted.
- ◆ If fluid is below specified range, hydraulic system must be checked for leaks. It is not sufficient just to top up with fluid.
- ◆ Do not re-use hydraulic fluid which has been drained off.

4.6 Bleeding steering system

- Check hydraulic fluid level and top up if necessary.
- Raise vehicle until front wheels are free.
- Start engine and let it idle.
- Check hydraulic fluid level and top up if necessary
⇒ [page 127](#).
- Turn steering wheel 10 times from lock to lock.
- Check hydraulic fluid level and top up if necessary
⇒ [page 127](#).



Note

Bleeding has finished when no more air bubbles can be seen in fluid in reservoir.

- Lower vehicle.

4.7 Check steering for leaks



Note

If hydraulic fluid level in reservoir is low after repairs are completed, steering system must be checked for leaks.

- Start engine and let it idle.
- Turn steering wheel left and right to lock and hold briefly.

This develops the maximum possible pressure.

In this position, the following components must be checked for leaks:

- ◆ Steering rack: steering pinion on valve block, connection point between valve and steering rack housing, housing
- ◆ All hose and pipe connections.
- ◆ Vane pump: shaft seal, all threaded connections, housing
- ◆ Reservoir

