Workshop Manual

Audi A6 2005 ➢
Audi A6 Avant 2005 ➢

Brake system

Edition 04.2019

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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 Technical data

(ARL006362; Edition 04.2019)

1.1 Allocation of PR number (factory code) to brake components

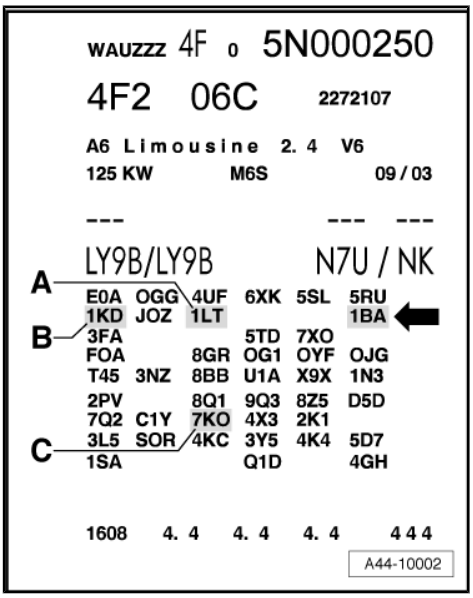
The type of brake system installed in the vehicle is indicated by the corresponding PR number on the vehicle data sticker.

The vehicle data sticker can be found in the spare wheel well and in the Service Schedule.

Item -A- indicates the PR number of the front brakes.

Item -B- indicates the PR number of the rear brakes.

- For correct version refer to ⇒ ETKA
- The tables appearing below explain the PR numbers. These are important to obtain the correct combination of brake calipers/brake discs and brake pads.



1.2 Brakes, technical data

Front brakes						
Factory code (PR No.)		1LT	1LD	1LG/1LV	1LH/1ZL/ 1ZT	1LJ/1LL [1)]
Brake caliper		FN-3 (16")	FNR G60 16"	FNR G60 16"	FNR G60 17"	2 FNR 42 AL 18"
Brake disc, ventilated	∅ mm	314	321	321	347	385
Brake disc, thickness	mm	25	30	30	30	36
Brake disc, wear limit	mm	23	28	28	28	34
Brake caliper, piston	∅ mm	57	60	60	60	60
Brake pad thickness	mm	19.5	20.24	20.24	20.24	20.43
Brake pad wear limit	mm	3	4	4	4	4

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Note

- *Maximum lateral run-out of steel brake disc: 0.06 mm*
- *Perform measurement with brake disc installed.*
- *Use dial gauge bracket VAS 6079/1 and dial gauge VAS 6079.*
- *Remove any dirt and rust from brake disc.*
- *Perform measurement 10 mm from outer edge of brake disc.*

⇒ “1 Front brakes FN3 (PR 1LT)”, page 56

⇒ “2 Front brakes FNR G60 (PR 1LG/1LD/1LH/1LV/1ZL)”, page 62

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⇒ “2 Front brakes FNR G60 (PR 1LG/1LD/1LH/1LV/1ZL)”, page 62

⇒ “3 Front brakes (PR 1LJ/1LL)”, page 70

1) PR 1LL: special security vehicle

Front brakes (RS 6, steel version)		
Factory code (PR No.)		1LM
Brake caliper		Brembo (19")
Brake disc, ventilated	∅ mm	390
Brake disc, thickness	mm	36
Brake disc, wear limit (mm)	mm	34.4
Brake caliper, 6 pistons (mm)	mm	6 pistons (2x ∅34; 2x ∅36; 2x ∅36 mm)
Brake pad thickness including backplate (mm)	mm	16.62
Pad wear limit (including backplate)	mm	9.5

Note

- *Maximum lateral run-out of steel brake disc: 0.06 mm*
- *Perform measurement with brake disc installed.*
- *Use dial gauge bracket VAS 6079/1 and dial gauge VAS 6079.*
- *Remove any dirt and rust from brake disc.*
- *Perform measurement 10 mm from outer edge of brake disc.*

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⇒ “4 Front brakes (steel version) - RS 6”, page 77

Brake discs

Note

- *When performing repair work on brakes, hairline cracks are often found on the friction surface of the brake discs. Hairline cracks up to a length of 10 mm do not present a technical problem and do not justify a renewal of brake discs.*
- *Brake discs with cracks going all the way across the friction surface must be renewed.*

Ceramic front brakes		
Factory code (PR No.)		1LN
Brake disc, ventilated	∅ mm	∅ 420
Brake disc, thickness	mm	40
Brake disc, wear limit		The minimum thickness of the brake disc is stamped onto the brake disc hub as a wear limit specification.
Brake caliper, 8 piston	∅ mm	8x ∅ 30.2
Brake pad thickness (including backplate)	mm	20
Pad wear limit (including backplate)	mm	10

Note

Hairline cracks on the friction surfaces of ceramic brakes can be caused during manufacturing and therefore already appear to varying degrees when the brakes are new. Hairline cracks on the friction surfaces do not justify a renewal of the ceramic brake discs.

⇒ “5 Ceramic front brakes”, page 88

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Rear brakes			
Factory code (PR No.)		1KD/1KQ/2ED	1KW/2EE/2EL
Brake caliper		C41 (16”)	C43 (17”)
Brake disc, ventilated	∅ mm	302	330
Brake disc, thickness	mm	12	22
Brake disc, wear limit	mm	10	20
Brake caliper, piston	∅ mm	41	41
Brake pad thickness	mm	16.90	17.46
Brake pad wear limit	mm	3	3

Note

- *Maximum lateral run-out of steel brake disc: 0.06 mm*
- *Perform measurement with brake disc installed.*
- *Use dial gauge bracket VAS 6079/1 and dial gauge VAS 6079.*
- *Remove any dirt and rust from brake disc.*
- *Perform measurement 10 mm from outer edge of brake disc.*

⇒ "6 Rear brakes, electronic parking brake and handbrake (EPB)", page 104

Rear brakes (RS 6, steel version)		
Factory code (PR No.)		1KJ
Brake caliper		TRW C45 (19")
Brake disc, ventilated	∅ mm	356
Brake disc, thickness	mm	28
Brake disc, wear limit	mm	26.4
Brake caliper, piston	∅ mm	45
Brake pad thickness (including backplate)	mm	16.9
Pad wear limit (including backplate)	mm	9

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Note

- *Maximum lateral run-out of steel brake disc: 0.06 mm*
- *Perform measurement with brake disc installed.*
- *Use dial gauge bracket VAS 6079/1 and dial gauge VAS 6079.*
- *Remove any dirt and rust from brake disc.*
- *Perform measurement 10 mm from outer edge of brake disc.*

⇒ "6 Rear brakes, electronic parking brake and handbrake (EPB)", page 104

Ceramic rear brakes		
Brake caliper		TRW C45 (20")
Factory code (PR No.)		1KK
Brake disc, ventilated	∅ mm	356
Brake disc, thickness	mm	28
Brake disc, wear limit		The minimum thickness of the brake disc is stamped onto the brake disc hub as a wear limit specification.

Ceramic rear brakes		
Brake caliper, 1 piston	∅ mm	∅ 45
Brake pad thickness (including backplate)	mm	16.9
Pad wear limit (including backplate)	mm	9

Hairline cracks on the friction surfaces of ceramic brakes can be caused during manufacturing and therefore already appear to varying degrees when the brakes are new. Hairline cracks on the friction surfaces do not justify a renewal of the ceramic brake discs.

⇒ “6 Rear brakes, electronic parking brake and handbrake (EPB)”, page 104

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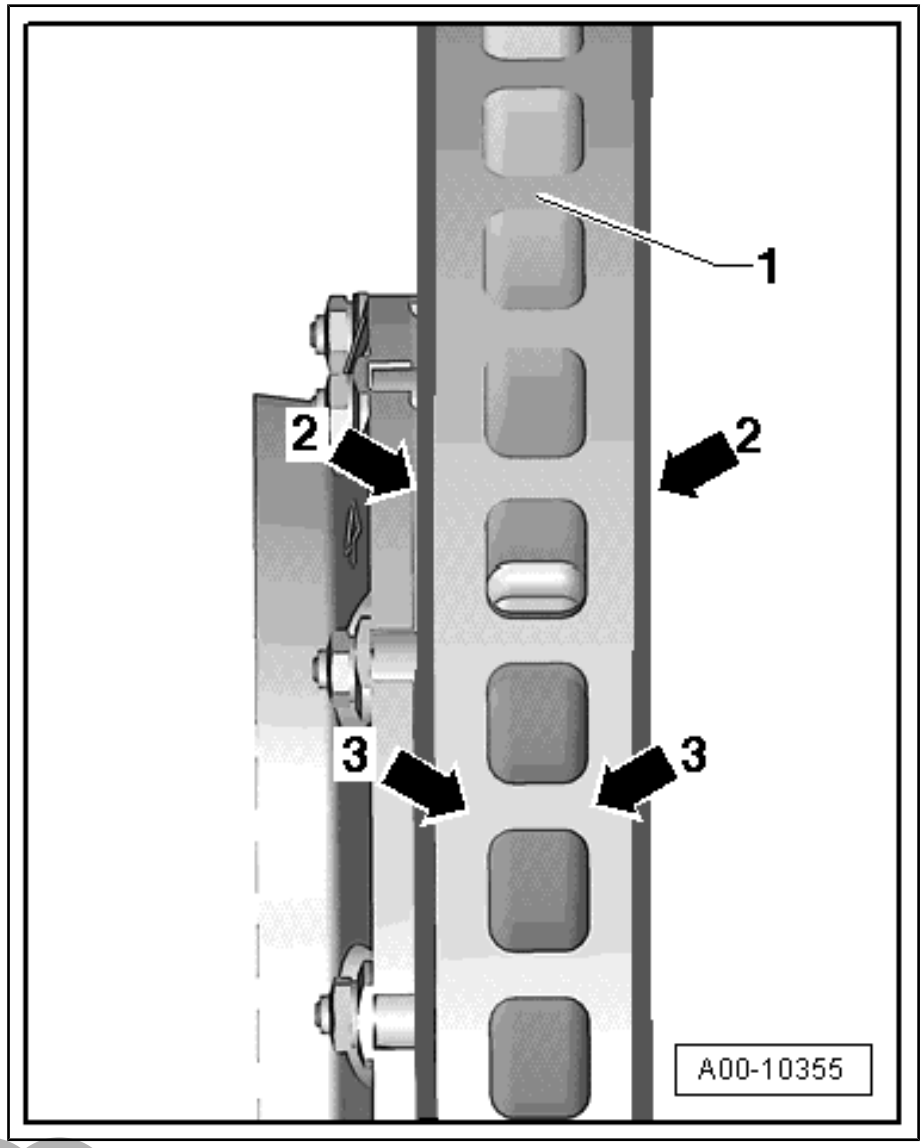
2 Assessment of ceramic brake discs

1 - Cooling channel lands
2 - Friction layer
3 - Carrier material



2.1 Visible features of ceramic brake discs

Checking area of bolted connection on friction ring and brake disc hub:

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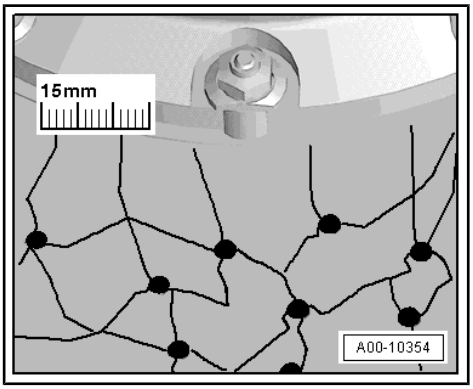
WARNING

The brake disc rotor and the brake disc hub are bolted together and must NOT be separated. DO NOT slacken the bolted connection on the brake disc hub.

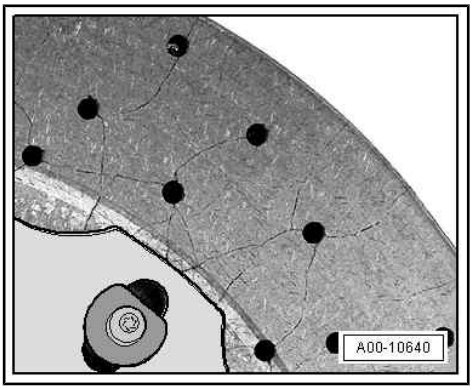
Due to the production process there already are relaxation cracks (varying degrees) on the friction surface of the brake disc when it is new.



Note

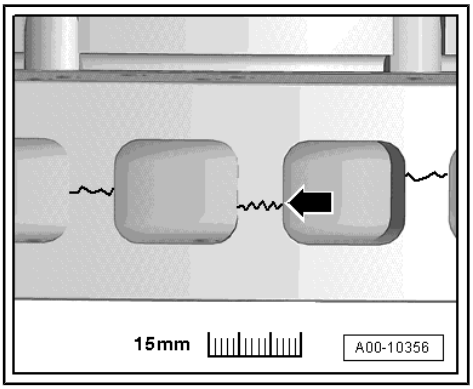
Relaxation cracks on a ceramic brake disc do not constitute a technical problem.

Even on new brake discs relaxation cracks may be clearly visible, and their size can vary.



2.2 Superficial cracks in cooling channel lands

Superficial cracks in the cooling channel lands -arrow- are caused during manufacturing.

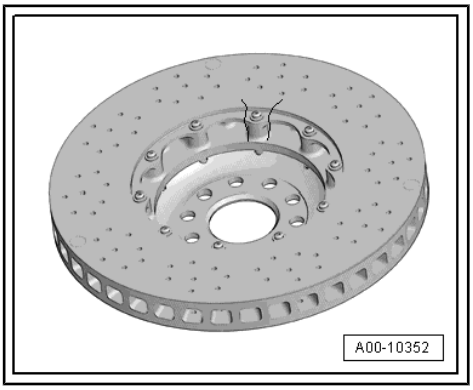


Note

Superficial cracks in the cooling channel lands do not constitute a technical problem on the ceramic brake discs.

2.3 Cracks in area of bolted connection on ceramic brake discs

Checking area of bolted connection on friction ring and brake disc hub:



WARNING

The brake disc rotor and the brake disc hub are bolted together and must NOT be separated. DO NOT slacken the bolted connection on the brake disc hub.

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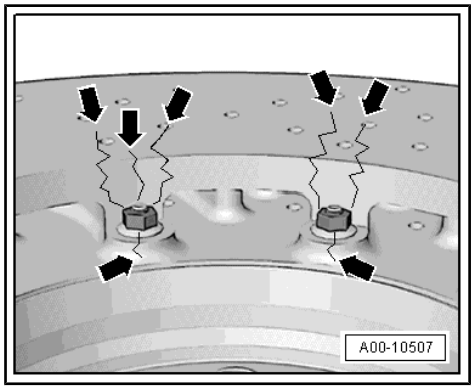
Ceramic brake discs must be renewed if there are cracks in the area of the bolted connection of the brake disc hub extending into the friction surface of the brake disc -arrows-.

Ceramic brake discs must be renewed if there are radial cracks in the area of the bolted connection on the brake disc hub.



> **WARNING**
>
> ***If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.***

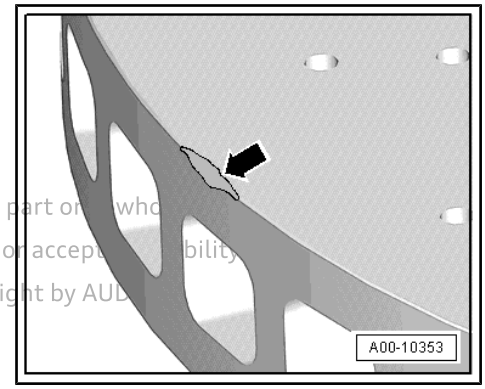
2.4 Edge fractures

Edge fractures -arrow- are caused by mechanical damage to the edges.

Permissible:

- max. width/depth = 2 mm
- max. length = 20 mm
- max. 3 edge fractures per brake disc

If any of the criteria listed above are exceeded, the brake disc must be renewed. ⇒ page 101



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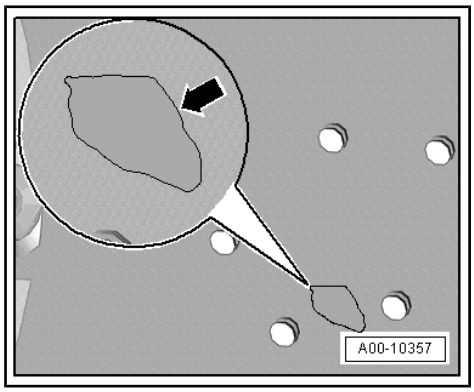
> **WARNING**
>
> ***If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.***

2.5 Chipping on ceramic brake discs

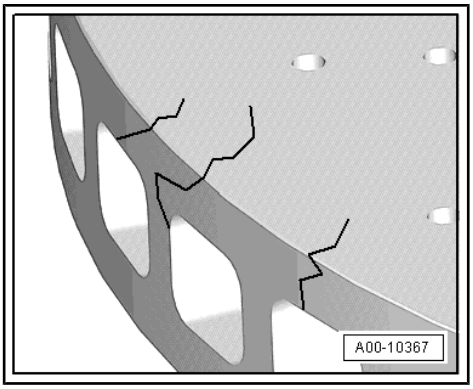
Always renew ceramic brake discs if there is chipping (larger than 1 cm² -arrow-) on the friction surface.



> **WARNING**
>
> ***If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.***

2.6 Cracks extending into cooling channels

Always renew ceramic brake discs if there is any cracking extending from the friction surface of the brake disc to the cooling channel or through the cooling channel.



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3 Assessing degree of wear on ceramic brake discs

When minimum weight is stamped on hub of brake disc:

> **WARNING**
>
> *The brake disc rotor and the brake disc hub are bolted together and must NOT be separated. DO NOT slacken the bolted connection on the brake disc hub.*

Designation of ceramic brake disc on brake disc hub

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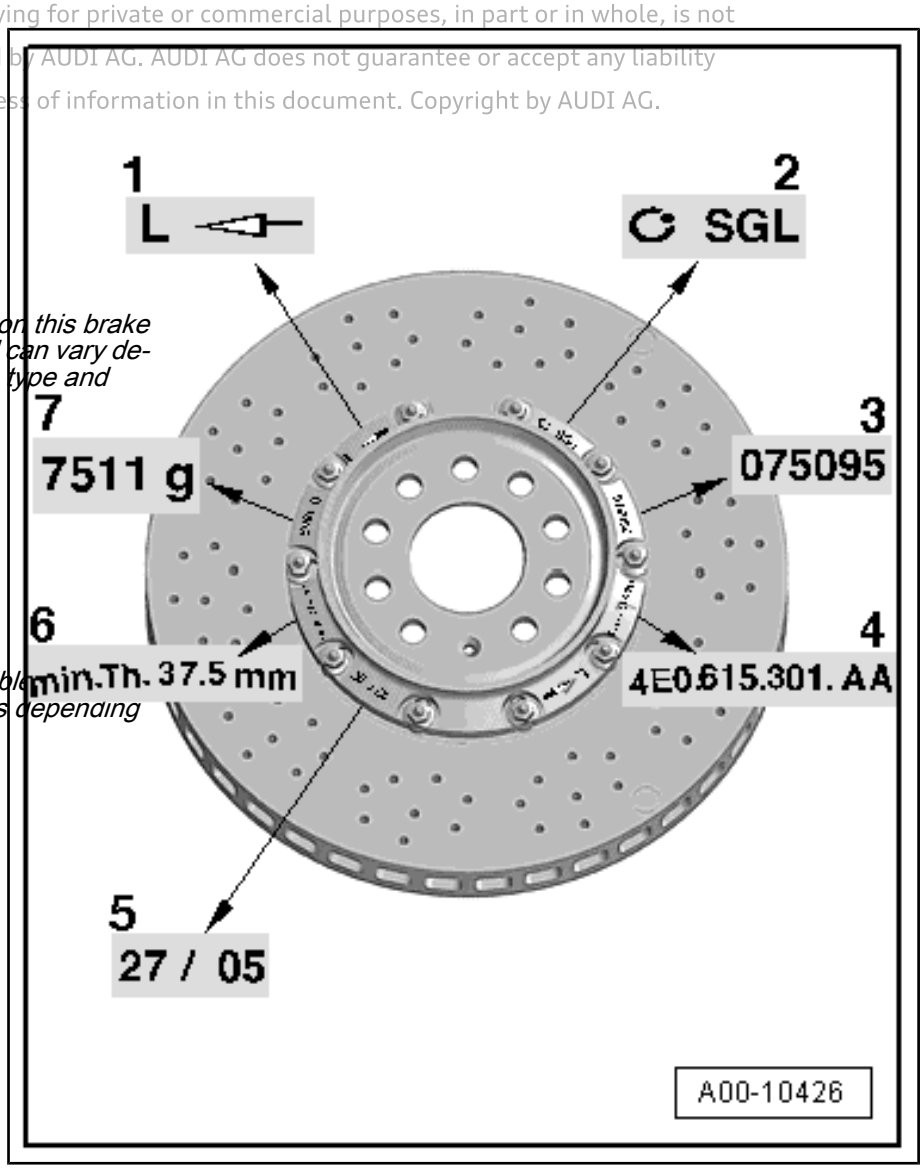

1 - Direction of rotation

2 - Supplier

3 - Serial production number of brake disc

4 - Audi part number

Note

The Audi part number on this brake disc is an example and can vary depending on the vehicle type and model.

5 - Production date of brake disc

6 - Permissible minimum thickness of brake disc

Note

The minimum permissible thickness of the brake disc differs depending on the type of vehicle.

7 - Weight of new brake disc with brake disc hub

Checking area of bolted connection on friction ring and brake disc hub:

> **WARNING**
>
> *The brake disc rotor and the brake disc hub are bolted together and must NOT be separated. DO NOT slacken the bolted connection on the brake disc hub.*

Note

Depending on the version, the minimum permissible weight for a used brake disc is stamped on the brake disc hub. The disc must be renewed when the weight of the disc is less than or equal to the indicated minimum weight.

Caution

If the minimum permissible weight of the disc is indicated on the hub of the disc ("min. weight"), the disc must be additionally weighed to assess the amount of wear.

WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

The brake disc must first be cleaned before assessing the degree of wear as described below.

WARNING

DO NOT clean the brake disc with water or other fluids. Otherwise false results will be obtained.

Note

- *The brake disc ventilation drillings must be completely free of brake dust and dirt. Clear out carefully with a suitable tool if necessary. Do not use force.*
- *Thoroughly blow out the brake discs with compressed air (including the area between the cooling channels and ventilation drillings).*
- *Carefully place the clean, dry brake disc on the scales.*

Caution

Always observe respiratory protection requirements when cleaning brake discs or other parts of the brake system using compressed air.

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To assess the brake disc wear, proceed as follows:

- 1. Wear assessment by checking thickness of brake disc

- 2. Wear assessment according to wear indicators

1. Wear assessment by checking thickness of brake disc ⇒ page 13	
Thickness of brake discs in permissible range → brake disc OK	
Brake disc thickness in critical range min. Th + 0.2 mm	Value at or below limit
↓ ↓	↓ ↓
Further wear assessment according to wear indicators	Renew brake disc.
↓ ↓	----------
2. Wear assessment according to wear indicators ⇒ page 14	
None of the six wear indicators fully worn out → brake disc OK	
----------	One of the six wear indicators fully worn out
---------	↓ ↓
----------	Renew brake disc.

Note

Depending on the version, the minimum permissible weight for a used brake disc is stamped on the brake disc hub. The disc must be renewed when the weight of the disc is less than or equal to the indicated minimum weight.

Caution

If the minimum permissible weight of the disc is indicated on the hub of the disc ("min. weight"), the disc must be additionally weighed to assess the amount of wear. The disc must be renewed when the weight of the disc is less than or equal to the indicated minimum weight.

Brake disc with minimum weight stamped on hub:

To assess the wear of the brake disc, proceed as follows:

- 1. Wear assessment by checking thickness of brake disc
- 2. Wear assessment according to wear indicators
- 3. Wear assessment by weighing brake disc

1. Wear assessment by checking thickness of brake disc (if minimum weight is stamped on hub) ⇒ page 13	
Thickness of brake discs in permissible range → brake disc OK	
Brake disc thickness in critical range min. Th + 0.05 mm	Value at or below limit
↓ ↓	↓ ↓
Further wear assessment according to wear indicators	Renew brake disc
↓ ↓	----------
2. Wear assessment according to wear indicators ⇒ page 14	
None of the six wear indicators fully worn out → brake disc OK	
----------	One of the six wear indicators fully worn out

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---	↓ ↓
---	3. Weighing brake disc ⇒ page 15
---	Minimum weight not reached
---	↓ ↓
---	Brake disc OK
---	Minimum weight reached
---	↓ ↓
---	Renew brake disc

If one of the three wear limits defined below has been reached, do NOT continue using the brake disc.

The brake disc must be renewed.

WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

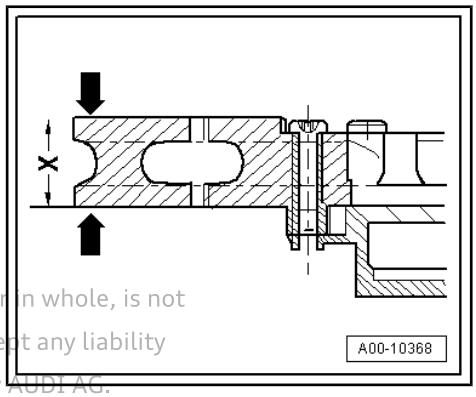
3.1 Wear assessment by checking thickness of brake disc

Special tools and workshop equipment required

- Use a commercially available caliper gauge or micrometer gauge.

The minimum permissible thickness of the brake disc is engraved as “min.th.” on the brake disc hub.

– Measure the brake disc thickness -x- at three points on the periphery next to the individual wear indicators.--



Note

If the thickness is x = min. th. + 0.2 mm, additionally check the wear of the brake disc by inspecting the wear indicators ⇒ page 14 .

If the thickness of the brake disc is less than or equal to the minimum permissible thickness “min.th.”, do NOT continue using the brake disc. The brake disc must be renewed.

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WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

3.2 Wear assessment by checking thickness of brake disc

Brake disc with minimum weight stamped on hub:

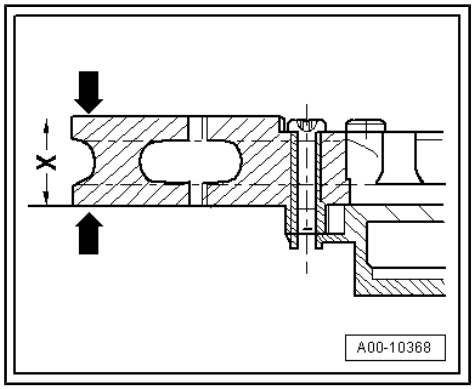
Special tools and workshop equipment required

- Use a commercially available caliper gauge or micrometer gauge.

Measurement of the brake disc thickness involves removing the brake discs.

The minimum permissible thickness of the brake disc is engraved as “min.th.” on the brake disc hub.

– The brake disc thickness should be measured at three points on the periphery next to the individual wear indicators -x-.



If the values are at or below these limits, the brake discs must be renewed. It is no longer permissible to use these brake discs.

Brake disc with minimum weight stamped on hub:

Note

If the thickness x = “min. th.” + 0.05 mm, additionally check the wear of the brake disc by inspecting the wear indicators *⇒ “3.3 Wear assessment according to wear indicators”, page 14* *.*

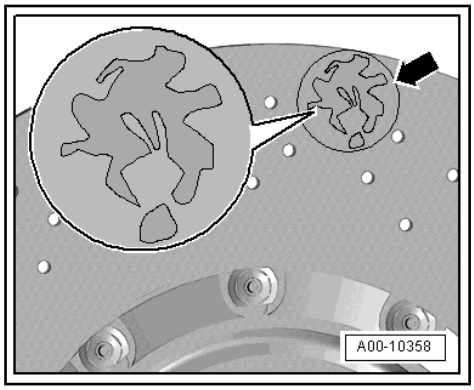
WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

3.3 Wear assessment according to wear indicators

Wear indicators are positioned at intervals of 120 degrees on the friction surfaces of the brake disc.

The wear indicators -arrow- appear in a different colour.



There are three indicators on each side of the brake disc (outside and inside).

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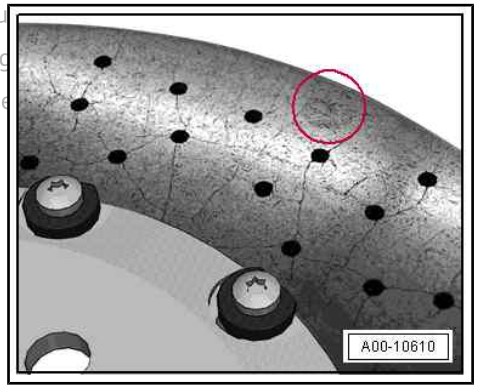
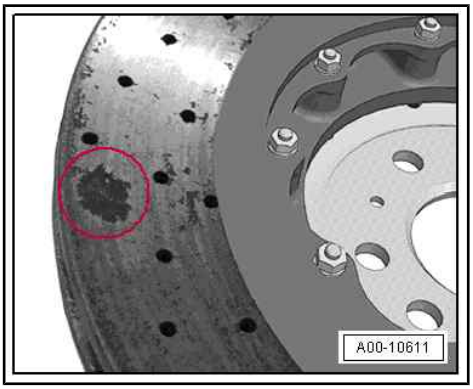
The following illustration shows a wear indicator on a disc that has not reached the wear limit.

The wear on the ceramic brake disc appears as a dark, burnt out recess at the wear indicator.

Do NOT continue using the brake disc if one of the six indicators is completely burnt out. The brake disc must be renewed.

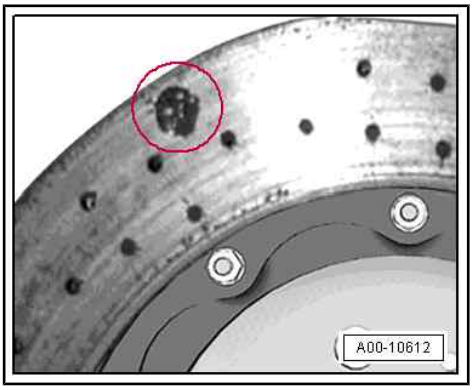


The following two illustrations show brake discs on which the wear indicators are burnt out. In this case the brake disc must be renewed.



> **WARNING**
>
> ***If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.***

When doing so, always renew the brake pads on both sides of the axle.



Checking area of bolted connection on friction ring and brake disc hub:

> **WARNING**
>
> ***The brake disc rotor and the brake disc hub are bolted together and must NOT be separated. DO NOT slacken the bolted connection on the brake disc hub.***

Note

Checking area of bolted connection on friction ring and brake disc hub:

– Checking area of bolted connection on friction ring and brake disc hub:

> **WARNING**
>
> ***The brake disc rotor and the brake disc hub are bolted together and must NOT be separated. DO NOT slacken the bolted connection on the brake disc hub.***

3.4 Wear assessment by weighing brake disc

> **WARNING**
>
> ***If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.***

Brake disc with minimum weight stamped on hub:

Special tools and workshop equipment required

♦ Commercially available scales with a tolerance of ± 1 g

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Procedure

– Remove front brake disc for weighing.

– Remove rear brake disc for weighing.

Note

Depending on the version, the minimum permissible weight for a used brake disc is stamped on the brake disc hub. The disc must be renewed when the weight of the disc is less than or equal to the indicated minimum weight.

- The brake disc must be cleaned and dry before it is weighed.

Caution

DO NOT clean the brake disc with water or other fluids. Otherwise false results will be obtained.

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Note

- *The brake disc ventilation drillings must be completely free of dirt. Clear out carefully with a suitable tool if necessary.*
- *Thoroughly blow out the brake discs with compressed air (including the area between the cooling channels and ventilation drillings).*

– Carefully place the clean brake disc on the scales.

The disc must be renewed when the weight of the disc is less than or equal to the indicated minimum weight.

WARNING

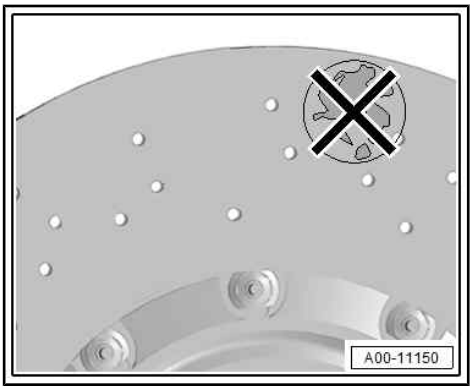
If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

3.5 Wear assessment of ceramic brake disc with tester - VAS 6813-

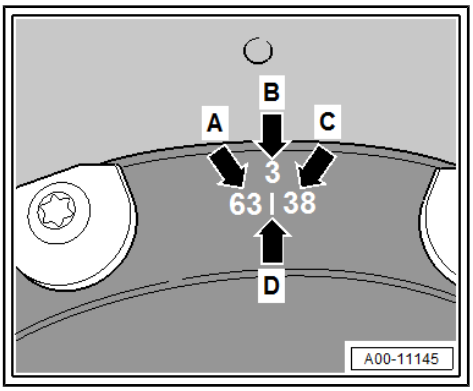
Note

- *The following applies for wear assessment with the tester - VAS 6813- :*
- *This is a new method for measuring the wear limit of ceramic brake discs.*
- *The wear indicators on the brake disc are no longer visible.*
- *The brake does not have to be weighed.*

You can identify the brake disc as follows:



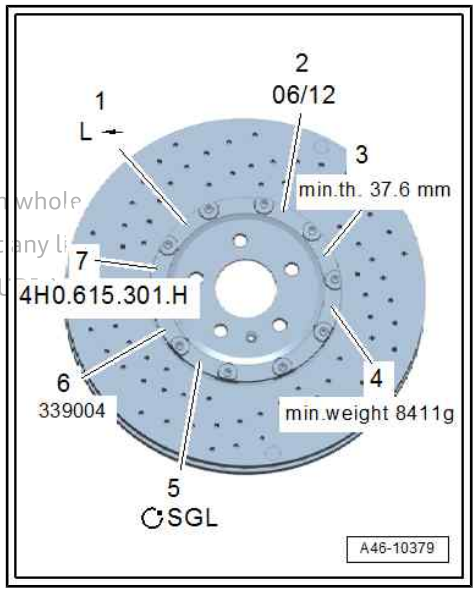
- The wear indicators -arrow- on the friction surface of the brake disc are no longer visible
- By looking at the laser-etched markings -A to D-



Note

- *The degree of wear is determined by measuring the brake disc thickness AND the wear value using the tester - VAS 6813- ; both values must be measured three times each.*
- *The minimum permissible thickness of the brake disc is engraved as "min.th." on the brake disc hub.*
- *The wear value -C- of the brake disc for the tester - VAS 6813- is engraved on the brake disc hub.*
- *Value -A- is a value from the production of the new brake disc.*
- *Values -A and C- may vary depending on the measuring point.*
- *Values -A and C- may vary depending on the brake disc.*

Example of minimum brake disc thickness (min.th. -3-); the brake disc thickness must not be less than this value.



Note

Value -3- may vary depending on the brake disc.

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3.5.1 Checking brake disc thickness

The markings for measuring the degree of wear are spaced at intervals of 120°.

Measure the brake disc thickness at these three points.

Example shows third measuring point

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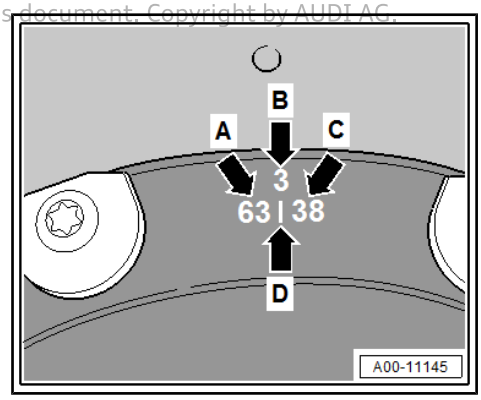
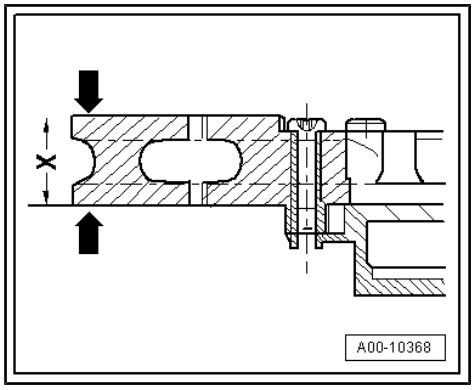
The minimum permissible thickness of the brake disc is engraved as “min.th.” on the brake disc hub.

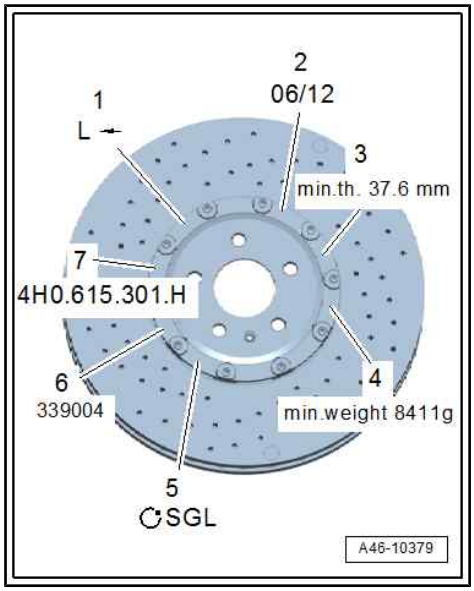


– Measure the thickness -x- of the brake disc at the measuring points all around the brake disc (three times).

If the thickness of the brake disc is below the “min.th.” value at one of the measuring points, the brake disc must be renewed.



Example of minimum brake disc thickness (min.th. -3-); the brake disc thickness must not be less than this value.



Note

Value -3- may vary depending on the brake disc.

WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

If the thickness of the brake disc is not below the minimum value, proceed to:

3.5.2 Checking tester - VAS 6813-

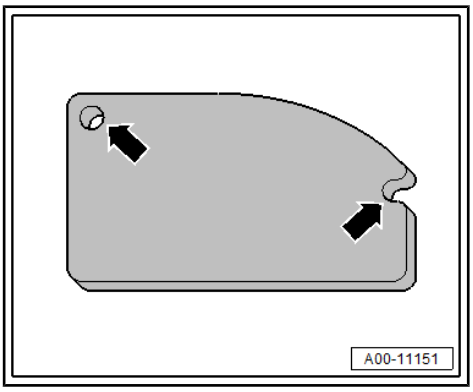
Before taking measurements, the tester - VAS 6813- must be checked using the measuring plate provided.

Measuring plate:

– Place tester in both openings -arrows- of measuring plate so that laser beam points downwards towards marking with affixed reference value.

– Switch on tester.

The value now shown must correspond to the reference value affixed to the measuring plate.



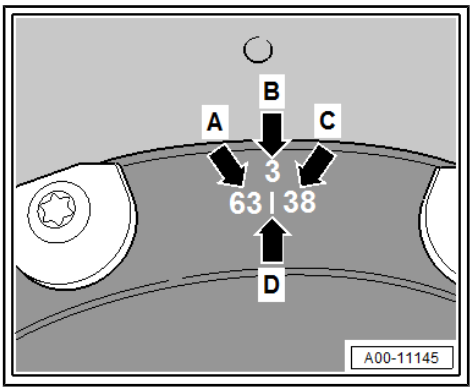
Note

- *If the value shown differs from the reference value by more than ± 2.0 units, the tester must be re-calibrated by the supplier.*
- *Please refer to the enclosed instructions for further information.*

3.5.3 Wear assessment with tester - VAS 6813-

Note

- *The degree of wear is determined by measuring the brake disc thickness AND the wear value using the tester - VAS 6813- ; both values must be measured three times each.*
- *The wear value -C- for the tester - VAS 6813- is engraved on the brake disc hub.*
- *Values -A and C- may vary depending on the measuring point.*
- *Values -A and C- may vary depending on the brake disc.*
- *Value -A- is a value from the production of the new brake disc.*



- Wheel has been removed.
- Brake disc thickness has been checked.
- Tester has been checked

⇒ “3.5.2 Checking tester VAS 6813”, page 19.

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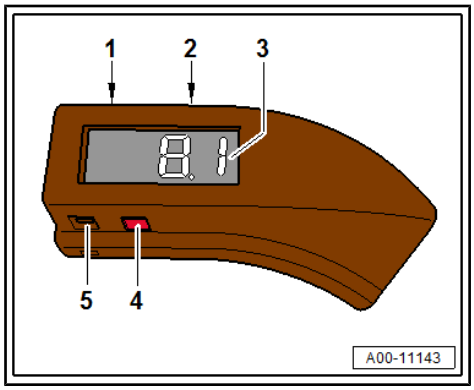
Special tools and workshop equipment required

- Tester - VAS 6813-

Tester - VAS 6813- :



- 1 ON/OFF switch
- 2 Button for taking measurement
- 3 Display for measurement
- 4 Laser beam for positioning
- 5 Interface

Note

Please refer to the enclosed instructions for further information about the tester - VAS 6813- .

Measurement:

- The brake disc must be clean.
- The brake disc must be dry.

WARNING

Risk to health

- ***Always observe respiratory protection requirements when cleaning ceramic brake discs using compressed air.***
- ***DO NOT clean the brake disc with water or other fluids.***

The markings for measuring the degree of wear are spaced at intervals of 120°.

The measuring procedure described below must be performed at all three measuring points to ensure that the degree of wear is determined reliably.

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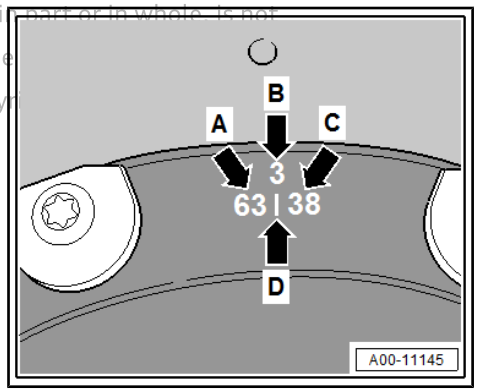
-A-: new value, -C-: wear value, -B-: measuring point number, -D-: marking for laser beam for measuring wear value.

The third measuring point -B- (of points 1 to 3) can be seen in the example.



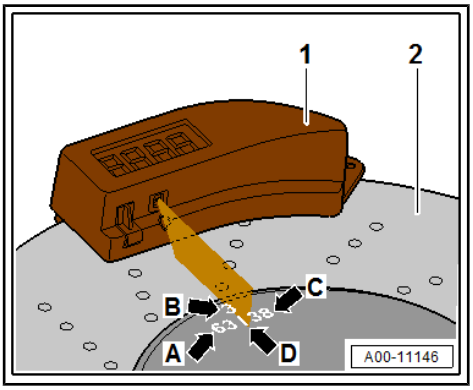
Note

- *Values -A and C- vary depending on the measuring point.*
- *Values -A and C- vary depending on the brake disc.*

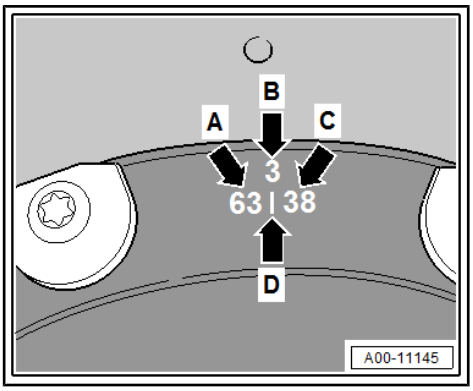
– Place tester - VAS 6813- at outer edge of brake disc so that it is flush.

– Switch on tester - VAS 6813- .

– Move tester - VAS 6813- -1- along outer edge -2- until laser beam points exactly towards marking -D- on brake disc.
– Measure wear at all three measuring points (1 to 3) on brake disc.
– To do so, read off value displayed on tester - VAS 6813- .



The brake disc must be removed and checked further for wear if the value is less than or equal to one of the three wear values -C- .



Note

Wear value -C- varies depending on the measuring point.

– Remove brake disc.

Note

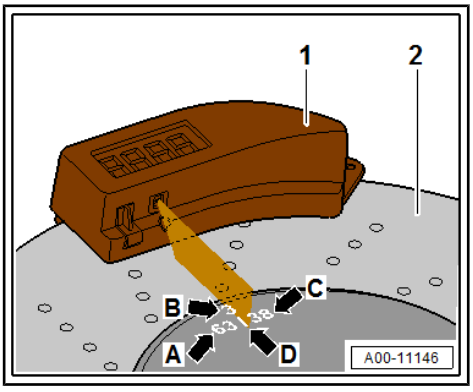
- *To ensure that the following measurement is completely accurate, place the brake disc on a non-conductive surface (e.g. wooden table).*
- *The surface must be clean and dry.*
- *The brake disc must be clean and dry.*

– Place tester - VAS 6813- at outer edge of brake disc again so that it is flush.

The measuring procedure must be performed at all three measuring points to ensure that the degree of wear is determined reliably.

– Move tester - VAS 6813- -1- along outer edge -2- until laser beam points exactly towards marking -D- on brake disc.
– Measure wear at all three measuring points (1 to 3) on brake disc.
– To do so, read off value displayed on tester - VAS 6813- .

The brake disc must be renewed if the value is less than or equal to one of the three wear values -C- .



WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

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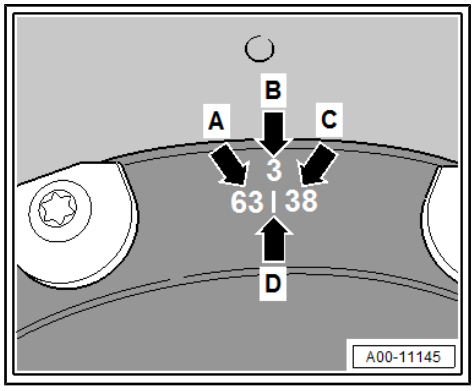
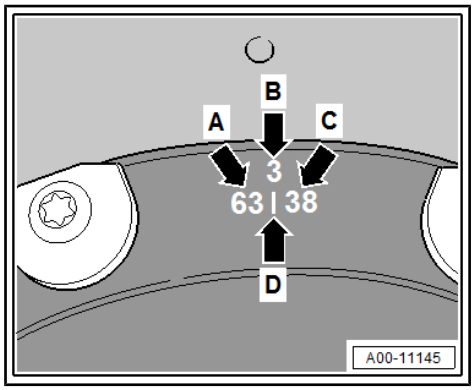
3.5.4 Notes on ceramic brake disc wear limit



Note

- *The degree of wear is determined by measuring the brake disc thickness AND the wear value using the tester - VAS 6813- ; both values must be measured three times each.*
- *The brake disc hub is engraved with the minimum permissible thickness of the brake disc (“min.th.”) and the wear value -C- for the tester - VAS 6813- .*
- *The wear value -C- varies depending on the brake disc and the measuring point.*



Note

- *If the thickness of the brake disc is below the “min.th.” value at one of the measuring points, the brake disc must be renewed.*
- *“Or”*
- *If the value is less than or equal to one of the three wear values -C- when determining the degree of wear with the tester - VAS 6813- , the brake disc must be renewed.*

Note

The wear value -C- varies depending on the brake disc.

WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

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4 Brake test

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4.1 General notes

The wheels are driven by the brake test rollers.

During the test the gearbox must be in neutral on manual gearboxes or in position N on automatic gearboxes.

Follow the instructions provided by the manufacturer of the brake test equipment when performing the test.

Note

Electronic brake control systems are inoperative when the ignition is switched off.

4.2 Vehicles with front-wheel drive

Perform brake test on a single-axle brake dynamometer.

The roller speed must be at least 4 km/h.

The roller speed must not exceed 6 km/h. Otherwise the EDL control can activate the brakes if the rollers start at different points in time.

All brake test equipment approved by Audi meets these requirements.

4.3 Vehicles with four-wheel drive

Testing on a single-axle brake dynamometer for vehicles with four-wheel drive

The rollers drive the wheels of one axle in opposite directions to avoid transmitting torque to the other axle.

The roller speed must be at least 4 km/h.

The roller speed must not exceed 6 km/h. Otherwise the EDL control can activate the brakes if the rollers start at different points in time.

WARNING

The self-locking centre differential will be irreparably damaged if test speed exceeds 6 km/h.

All brake test equipment approved by Audi meets these requirements.

Testing on a single-axle brake dynamometer

The roller speed must be at least 4 km/h.

The roller speed must not exceed 6 km/h. Otherwise the EDL control can activate the brakes if the rollers start at different points in time.

All brake test equipment approved by Audi meets these requirements.

4.4 Electromechanical parking brake on brake test equipment

Test sequence:

- Drive rear wheels of vehicle onto test rollers; do not switch off ignition.
- The “test mode” (TÜV mode) is activated as soon as the rollers reach a speed between 4 km/h and 9 km/h.
- The instrument cluster will then display a crossed-out, yellow symbol for the electromechanical parking brake ⇒ Owner's Manual; Instruments and warning/indicator lamps .

The electromechanical parking brake will now function as follows:

The full brake force is not applied at once, but step by step each time the parking brake switch is operated. After operating the switch three times the brake force attained is sufficient for the measuring procedure.

The brake is released by pressing the switch once.

Requirements for “test mode”:

- Ignition on
- Front wheels, speed = 0 km/h
- Rear wheels, min. speed = 4 km/h, max. speed = 9 km/h.

WARNING

When testing models with four-wheel drive you must use brake test rollers with synchronised wheel speeds.

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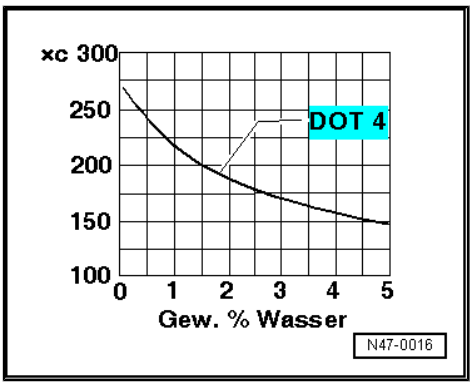
5 Brake fluid

5.1 General notes

Brake fluid is hygroscopic; in other words it has the tendency to absorb water and moisture from the atmosphere.

The boiling point decreases as the water content increases, which means that vapour bubbles can form when the brake fluid becomes hot. This can cause brake failure.

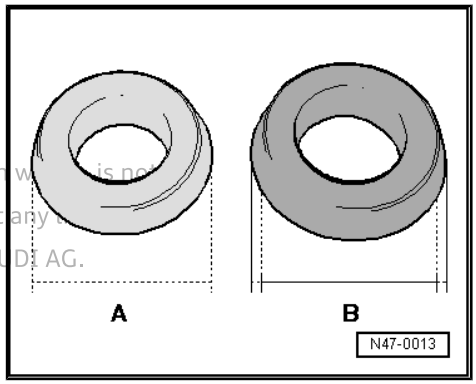


The colour of the brake fluid becomes darker over the course of time. A dark brake fluid colour is not an indication of its condition. The change in colour is caused by chemical reactions and may occur within a short period (several weeks), particularly in vehicles equipped with ABS.

WARNING

Rubber brake system components (rubber sleeves, seals) are not compatible with mineral oil, petrol and cleaning agents.

Even minute quantities coming into contact with a seal or rubber sleeve will affect the component and could impair brake operation. The consequences of a contaminated brake system only become apparent months later, and then give rise to greater expenses, particularly in vehicles equipped with ABS.



A = Rubber sleeve (original size)

B = Rubber sleeve (swollen due to contact with mineral oil)

Summary of the above mentioned points:

Always keep brake fluid containers properly sealed. This is the only way of preventing contamination by oil, dirt, cleaning agents or moisture.

Brake fluid containers should be kept completely separate from oils (including hydraulic fluid) and cleaning agents to prevent any mixture of fluids or even filling of the brake system with an incorrect fluid.

We recommend using brake fluid approved by Audi ⇒ ETKA .⇒

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45 – Anti-lock brake system

1 General information on the anti-lock brake system

1.1 Notes for repair work on the ABS

WARNING

The anti-lock brake system is basically maintenance-free.

Testing, removing, installing and repair work may only be performed by qualified personnel.

Failure to observe the information described in this Workshop Manual may result in damage to the system and could make the vehicle unsafe.

- Before carrying out repair work on the anti-lock brake system, determine the cause of the problem using self-diagnosis.
- When installing a new hydraulic control unit, always check its coding. ⇒ Vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-
- Always switch off the ignition before carrying out installation or repair work. On vehicles with a coded radio, find out the anti-theft code and disconnect the battery earth strap.
- When working with brake fluid, observe the relevant safety precautions and notes ⇒ page 25 .
- Always bleed the brake system (using brake filling and bleeding equipment - V.A.G 1869- or VAS 5234 or similar) after all work which involves opening the hydraulic system ⇒ page 129 . In addition, a high and low-pressure test should be carried out on the brake system. ⇒ page 129
- During the final road test, ensure that at least one ABS-controlled braking operation is performed (pulsation must be felt at the brake pedal). See ⇒ vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5051B- .
- Absolute cleanliness is required when working on the anti-lock brake system; avoid any products that contain mineral oil, such as oil, grease, etc.
- Thoroughly clean all connections and the adjacent areas before loosening, but do not use aggressive cleaning agents such as brake cleaner, petrol, thinners or similar.
- After removal, place parts on a clean surface and cover them.
- Carefully cover or seal open components if repairs cannot be carried out immediately. (Use sealing plugs from repair kit 1 H0 698 311 A).
- Only use lint-free cloths.
- Only remove replacement parts from packaging immediately prior to installation.
- Only use genuine spare parts from original packaging.
- When the system is open, do not work with compressed air and do not move the vehicle.

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- Ensure that no brake fluid enters electrical connectors.

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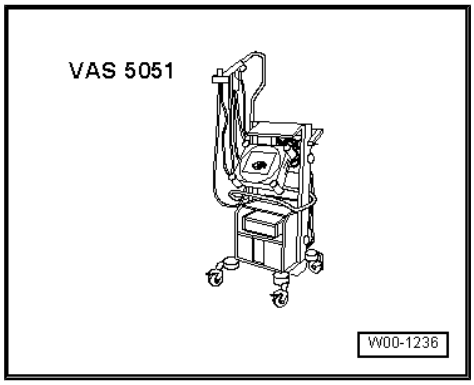
2 Connecting vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052- and selecting functions

Special tools and workshop equipment required

- Vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-



WARNING

- *Testers and measuring equipment must always be secured on the rear seat during a road test.*
- *During the road test, the equipment may only be operated by the passenger.*

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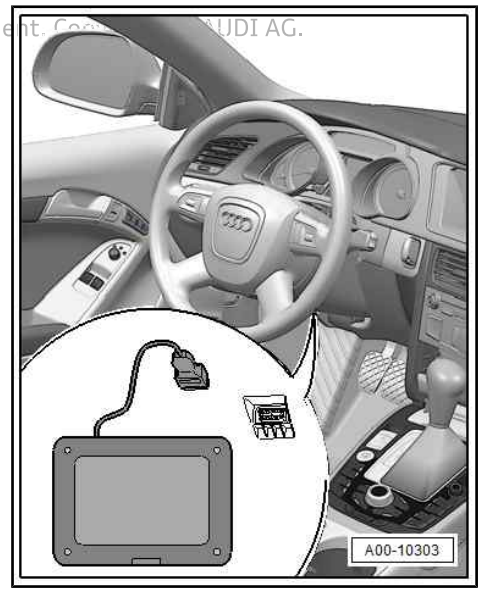
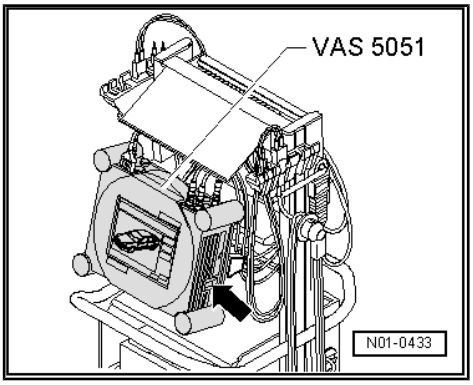
– Plug in connector of diagnostic cable VAS 5051/5a at diagnostic connection.



– Switch on the tester -arrow-.



The tester is ready as soon as a picture of a car appears in the display.

– Switch on ignition.
– Press the Guided Fault Finding button on the display screen.
– Select the following:

♦ Make
♦ Type
♦ Model year
♦ Version
♦ Engine code

– Confirm the entered information.

Wait until the tester has interrogated all the control units in the vehicle.

– Press the Go to button and select the option “Function/component selection”.
– Select “Running gear” on the display.
– Select “Brake system” on the display.
– Select the function you require on the display.

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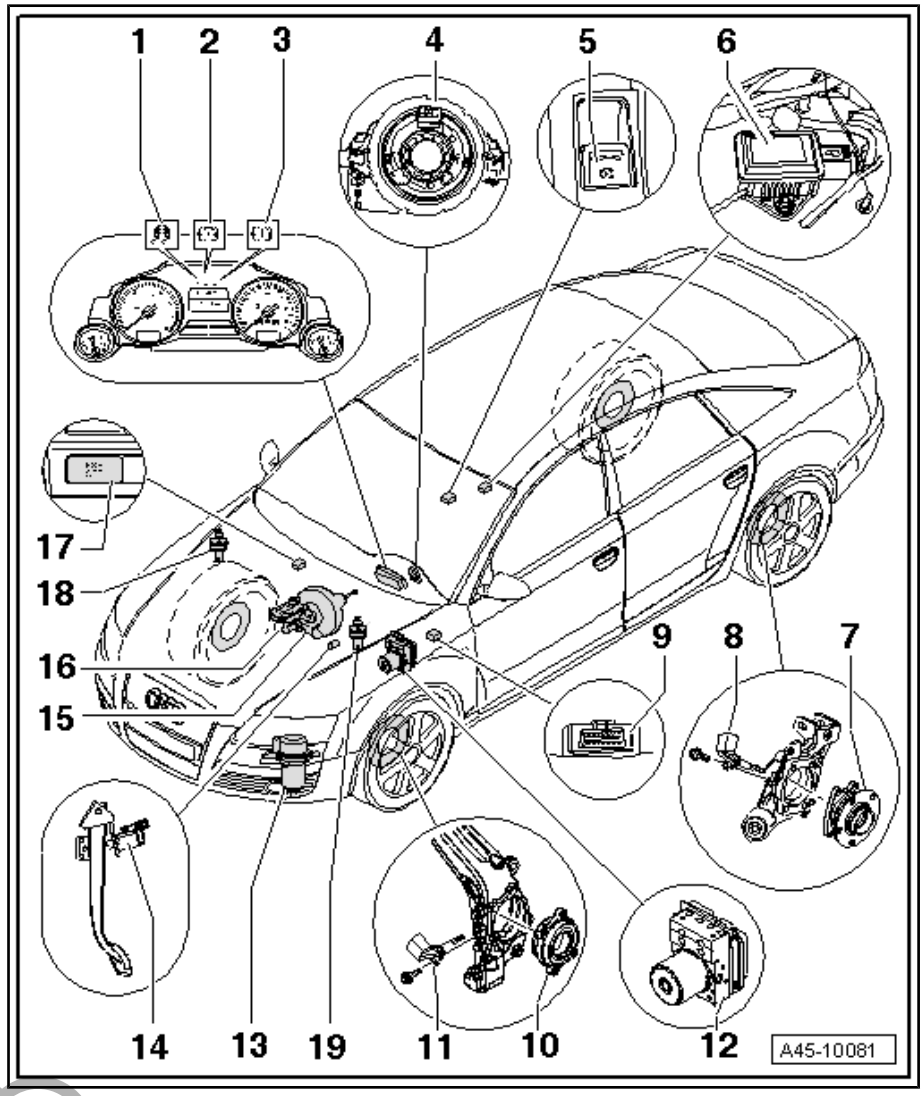
3 Exploded view - ABS/ESP components



1 - Traction control system warning lamp (00824-3424) - K86-

- Location: In the dash panel insert
- See ⇒ Owner's Manual for further information
- The warning lamp flashes when the vehicle is in motion and the ESP control is in operation
- The warning lamp lights up to confirm function when the ignition is switched on
- The warning lamp lights up when the ignition is switched on and goes out after the vehicle has been in motion for a short time, during which the ESP performs an automatic learning procedure of its sensor systems.
- The warning lamp lights up in case of malfunction of the ESP or ASR (traction control) system.
- The warning lamp lights up when the ESP is switched off.
- The warning lamp lights up in case of a malfunction of the ABS, since the ESP works in conjunction with the ABS.
- If the battery is disconnected and re-connected, if the engine has been started by boost starting or if the battery is heavily discharged, the ESP will perform a learning procedure for its sensor systems while the vehicle is driven for the first few metres. During this procedure the warning lamp will light up. The warning lamp goes out soon as the learning procedure is finalised.
- If the warning lamp lights up as soon as the engine is started, the system may have performed an automatic cut-off of the ESP. In this case, the ESP can be re-activated by switching the ignition off and back on again. The ESP system is ready to operate in the normal way when the warning lamp goes out.

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2 - ABS warning lamp - K47-

- Location: In the dash panel insert
- See ⇒ Owner's Manual for further information
- The warning lamp lights up for some seconds when the ignition is switched on and while the engine is being started. The warning lamp goes out after an automatic test sequence has been performed successfully.

The following conditions indicate a malfunction of the ABS system:

- The warning lamp does not light up when the ignition is switched on.
- The warning lamp does not go out after some seconds.

♦ The warning lamp lights up while the vehicle is in motion.
- ❑ The vehicle can be decelerated with the standard brake system, i.e. without ABS.
- ❑ The ESP warning lamp lights up as well if there is a malfunction in the ABS.

The following conditions indicate a malfunction of the complete brake system.

- ❑ If the ABS warning lamp lights up together with the brake system warning lamp, the brake system itself (not merely the ABS) may be defective.
- ❑ In case of a malfunction of the brake system the symbol will appear in the instrument cluster display.

3 - Brake system warning lamp - K118-
- ❑ Fitting location: in driver information system/ dash panel insert
- ❑ There is a malfunction in the brake system if the warning lamp flashes

The brake system warning lamp flashes if the level of the brake fluid is too low, in case of a malfunction of the ABS or a malfunction of the electromechanical parking brake.

- ❑ See ⇒ Owner's Manual for further information

4 - Steering angle sender (00778-3132) - G85- (vehicles with ESP)
- ❑ Fitting location: incorporated in return ring with slip ring on steering column ⇒ Rep. gr. 69
- ❑ Perform zero compensation.

Vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-

5 - Parking brake switch - F234-
- ❑ Fitting location: in centre console
- ❑ Removing and installing ⇒ page 54

6 - ESP sensor unit - G419-
- ❑ Fitting location: under extension of centre console
- ❑ Can be checked in “Guided Fault Finding” using vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-
- ❑ Observe installation instructions

⇒ page 52

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7 - Wheel bearing/wheel bearing unit

- ❑ The ABS sensor ring is installed in the wheel bearing

8 - Rear right/left speed sensor - G44/G46-

- ❑ Can be checked in “Guided Fault Finding” using vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-
- ❑ Removing and installing ⇒ page 49

9 - Diagnostic connection

- ❑ Fitting location: cover in driver's footwell

10 - Wheel bearing/wheel bearing unit

- ❑ The ABS sensor ring is installed in the wheel bearing

11 - Front right/left speed sensor - G45/G47-

- ❑ Can be checked in “Guided Fault Finding” using vehicle diagnostic, testing and information system -VAS 5051B- or -VAS 5052-
- ❑ Removing and installing ⇒ page 46

12 - ABS hydraulic unit - N55- with ABS control unit with EDL - J104-

- ❑ The hydraulic unit and the control unit together form the hydraulic control unit.
- ❑ The brake pressure sender (01435) - G201- is integrated in the ABS hydraulic unit - N55- and can only be renewed together with this unit.
- ❑ Do not disconnect connector (42 pin) before successfully completing self-diagnosis. Switch off ignition before detaching connector.
- ❑ Located on the hydraulic unit on left of engine compartment.
- ❑ Removing and installing ⇒ page 36
- ❑ Removing and installing (RS 6 and S6) ⇒ page 40

13 - Electric vacuum pump for brakes - V192-

- ❑ Removing and installing ⇒ page 185
- ❑ Removing and installing (S6) ⇒ page 188

Mechanical vacuum pump for brake servo ⇒ page 168

Removing and installing mechanical vacuum pump (TFSI 3.0 ltr.) ⇒ page 175

Mechanical vacuum pump for brake servo (RS 6 model) ⇒ page 177

Note

On the RS 6 model the vacuum pump can only be removed and installed after taking out the engine.

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14 - Brake light switch -F- and cruise control system brake pedal switch - F47-

- ❑ Removing and installing ⇒ page 50
- ❑ Removing and installing brake light sensor (new version) ⇒ page 51
- ❑ Can be checked in “Guided Fault Finding” using vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-

15 - Tandem brake servo

- ❑ Removing and installing ⇒ page 165

16 - Brake fluid level warning contact - F34-

17 - TCS and ESP button - E256-

- ❑ Fitting location: in centre console

18 - Brake pressure sender for ACC - G519-

- ❑ Fitting location: on brake pipe connector in engine compartment
- ❑ Replace old version with new version if necessary

Note

The brake system cannot be completely bled if the older type of pressure sensor (1J0) is installed. Replace the pressure sensor with the new version (4F0) ⇒ ETKA .

- ❑ Removing and installing ⇒ page 54
- ❑ Tightening torque: 28 Nm

19 - Brake pressure sender for ACC - G518-

- ❑ Fitting location: on brake pipe connector in engine compartment
- ❑ Replace old version with new version if necessary

Note

The brake system cannot be completely bled if the older type of pressure sensor (1J0...) is installed. Replace the pressure sensor with the new version (4F0...) ⇒ ETKA .⇒

- ❑ Removing and installing ⇒ page 54
- ❑ Tightening torque: 28 Nm

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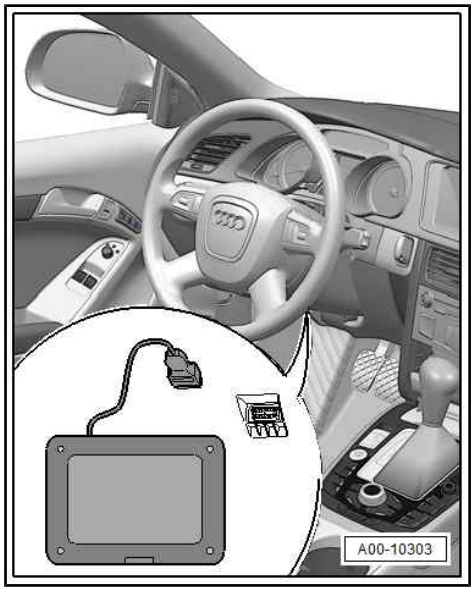
Diagnostic connection



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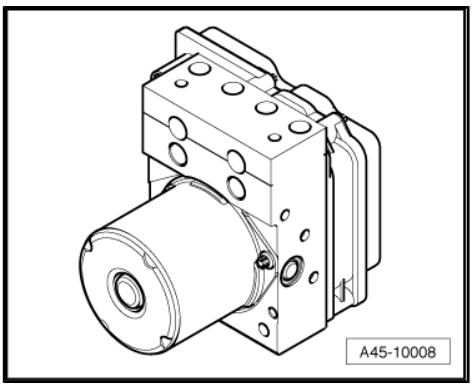
4 Anti-lock brake system (ABS) Bosch 8.0

The vehicle is equipped with a diagonally split ABS brake system. The servo-assistance is pneumatic, supplied by the vacuum brake servo unit.

The hydraulic unit and control unit are combined in a single component. This is therefore referred to as the hydraulic control unit.

The direct connection between these components reduces possible sources of faults. There is no provision for repairing the hydraulic control unit - it must be renewed if necessary.

Do not unscrew the bolts which connect the individual components of the hydraulic control unit.



4.1 Hydraulic unit and brake lines

1 - Brake master cylinder and brake servo

2 - Brake line

- ❑ Brake master cylinder/ primary piston circuit to hydraulic unit

3 - Brake line

- ❑ Brake master cylinder/ secondary piston circuit to hydraulic unit

4 - Brake line

- ❑ Hydraulic unit to front right brake caliper

5 - Brake line

- ❑ Hydraulic unit to rear left brake caliper

6 - Brake line

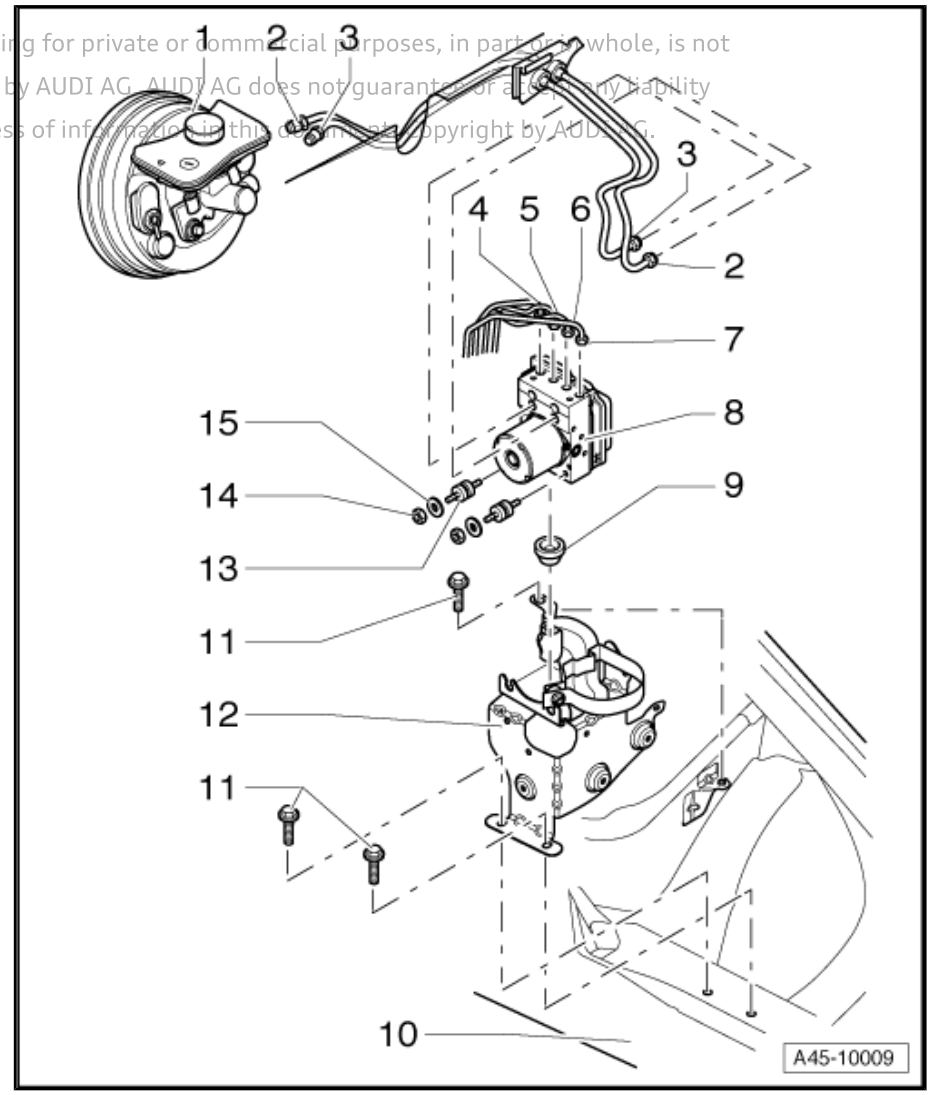
- ❑ Hydraulic unit to rear right brake caliper

7 - Brake line

- ❑ Hydraulic unit to front left brake caliper

8 - ABS hydraulic unit - N55- with ABS control unit with EDL - J104-

- ❑ With integrated brake pressure sender
- ❑ Removing and installing ⇒ page 36
- ❑ Removing and installing (S6 and RS 6)



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⇒ page 40

9 - Buffer (2 x)

10 - Longitudinal member (body)

11 - Nut and washer assembly, 10 Nm

12 - Bracket for ESP

13 - Bolt with bonded rubber bush, tightening torque 10 Nm

- ❑ Cannot be removed from component

14 - Nut and washer assembly, 8 Nm

15 - Washer

4.2 Removing and installing hydraulic control unit

Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-

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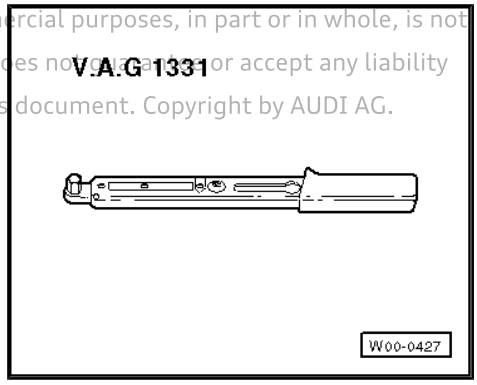
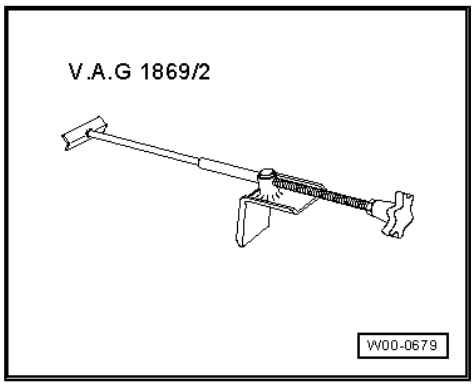


- Brake pedal actuator - V.A.G 1869/2-
- Sealing plugs (repair kit) - 1H0 698 311 A-



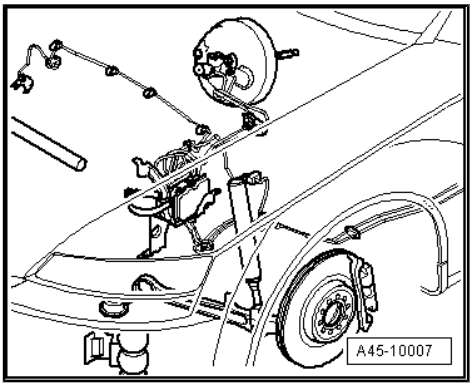
Removing

Fitting location:

The hydraulic control unit is fitted on the left-hand side of the engine compartment.

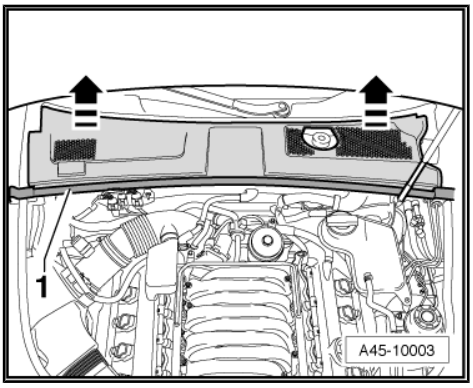
WARNING

Do not bend the brake lines.

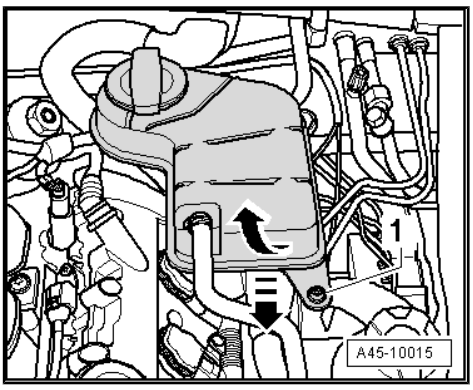


– Note or request radio code on vehicles with coded radio if necessary.
– Disconnect battery ⇒ Rep. gr. 27

– Remove rubber seal -1-.
– Detach plenum chamber cover. ⇒ Rep. gr. 50



– Remove hexagon bolts -1- securing coolant expansion tank.
– Unplug connector from coolant expansion tank.
– Move coolant expansion tank clear to one side.



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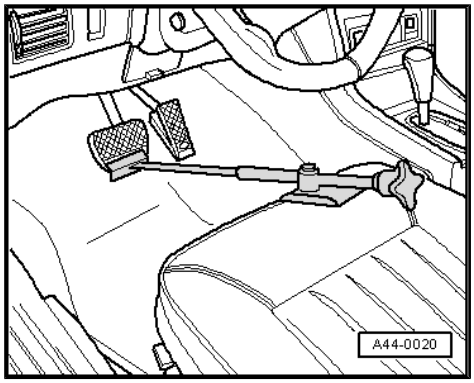
– Insert brake pedal actuator - V.A.G 1869/2- between brake pedal and driver's seat. Depress the brake pedal at least 60 mm.
– Connect hose of bleeder bottle to bleeder screws of front left and rear left brake calipers and open bleeder screws.



Note

This will release the pressure in the hydraulic unit.

– Close front left and rear left bleeder screws.
– Do not remove brake pedal actuator - V.A.G 1869/2- .
– As protection against escaping brake fluid, place a sufficient number of lint-free cloths in area beneath control unit and hydraulic unit.

Note

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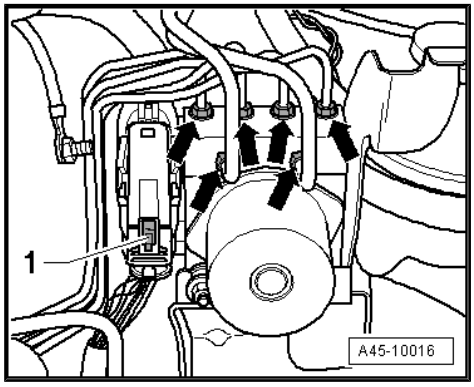
Mark brake lines with numbers.

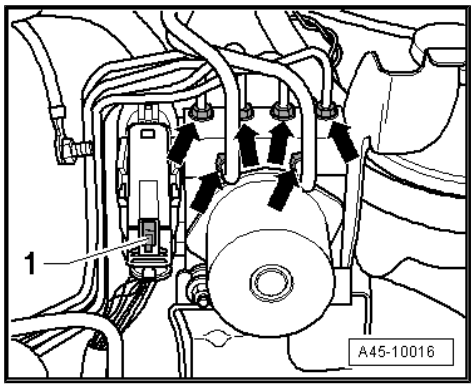
WARNING

Do not bend the brake lines in the vicinity of the hydraulic unit.

– Completely unscrew brake lines from brake master cylinder.
– Disconnect remaining brake lines -arrows- on hydraulic unit.
– Seal brake lines and tapped holes with sealing plugs from repair kit.



– Press red retainer catch upwards.

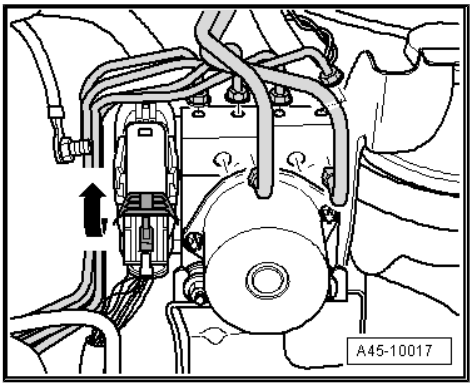


Note

- *Make sure brake fluid does not get into connector housing of control unit. This can result in corrosion of the contacts and failure of the system.*
- *Use compressed air to carefully clean connector housing if necessary.*

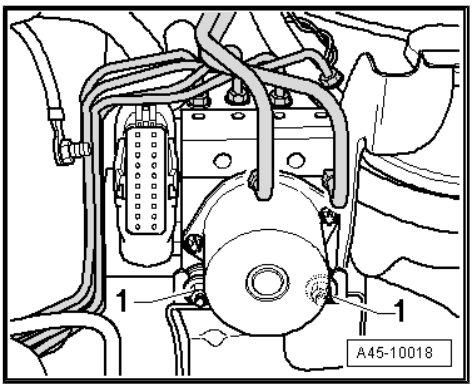
– Release control unit connector -arrow- and unplug.

– Push retaining clip in -direction of arrow- and unplug connector.



– Remove bolts -1-.

– Remove hydraulic control unit.



Installing

Install in reverse sequence, paying attention to the following:

Note

- *Do not remove sealing plugs from new hydraulic unit until corresponding brake line is ready to be fitted.*
- *If the sealing plugs are removed from the hydraulic unit sooner, brake fluid may escape and it may no longer be possible to fill and bleed the unit properly.*

– Fit hydraulic control unit in bracket.

– Connect pipes as previously marked:

1 - To front right brake caliper “VR”

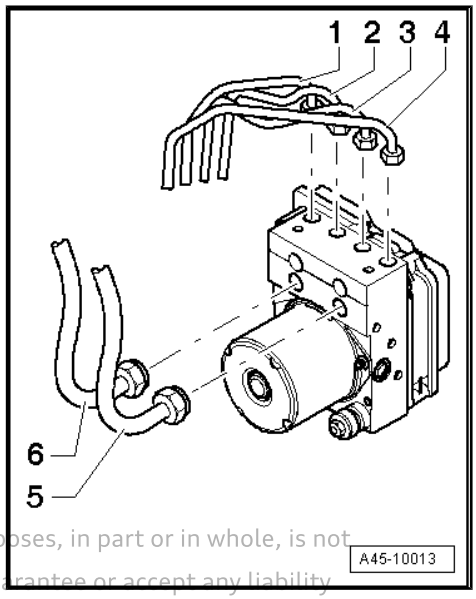
2 - To rear left brake caliper “HL”

3 - To rear right brake caliper “HR”

4 - To front left brake caliper “VL”

5 - To primary piston circuit “HZ 1”

6 - To secondary piston circuit “HZ 2”



Note

Do not tighten bolts completely. This will make it easier to attach the individual brake lines to the hydraulic unit.

– Attach connector to hydraulic control unit and lock connector.

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– Press down red retainer catch.

Tighten connections of all brake lines to hydraulic unit and brake master cylinder.

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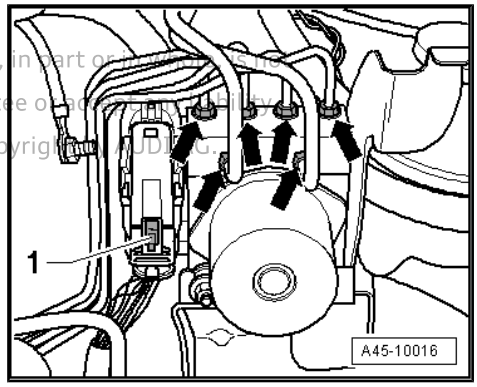
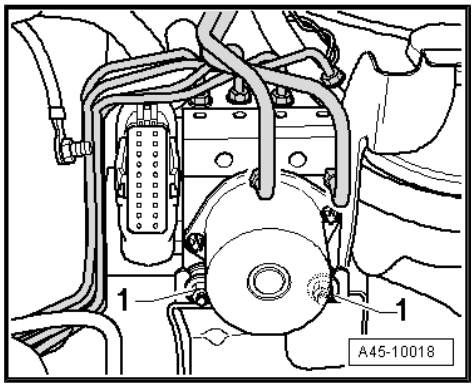


– After tightening brake lines, tighten hydraulic unit -1-.
– Remove brake pedal actuator - V.A.G 1869/2- .
– Bleed brake system ⇒ page 154 .
– Code ABS with EDL control unit - J104- . ⇒ Code control unit using VAS 5051 via ”Guided fault finding” function.
– When renewing the control unit, select the function “Replace” for the relevant control unit in the “Guided Fault Finding”.



To do so, use the vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052.- .

– Perform final control diagnosis after attaching brake lines to hydraulic unit. ⇒ Vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-

Note

The final control diagnosis indicates whether the connection has been interchanged.

Tightening torques

Component	Nm
Brake lines to hydraulic unit M10 (brake line diameter 5 mm)	12
Brake lines to hydraulic unit M12 (brake line diameter 5 mm)	12
Brake lines to hydraulic unit M12 (brake line diameter 8 mm)	16

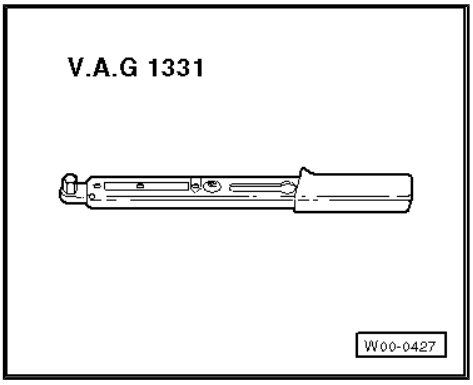
Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

4.3 Removing and installing hydraulic control unit - S6 and RS 6

Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-



- Brake pedal actuator - V.A.G 1869/2-
- Sealing plugs (repair kit) - 1H0 698 311 A-

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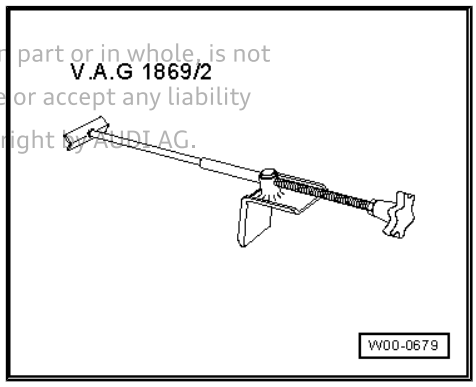
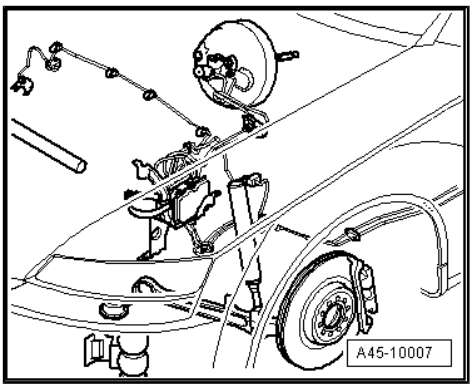


Removing

Fitting location:

The hydraulic control unit is fitted on the left-hand side of the engine compartment.

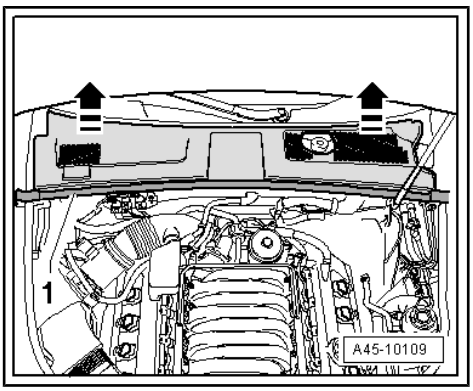


WARNING

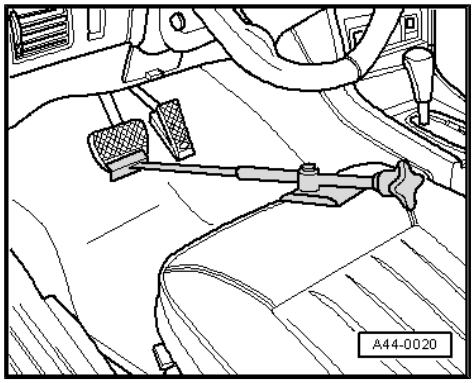
Do not bend the brake lines.

– Note or request radio code on vehicles with coded radio if necessary.
– Disconnect battery ⇒ Rep. gr. 27
– Detach plenum chamber cover. ⇒ Rep. gr. 50

– To do so, remove rubber seal -1-.



– Insert brake pedal actuator - V.A.G 1869/2- between brake pedal and driver's seat. Depress the brake pedal at least 60 mm.
– Connect hose of bleeder bottle to bleeder screws of front left and rear left brake calipers and open bleeder screws.



Note

This will release the pressure in the hydraulic unit.

– Close front left and rear left bleeder screws.
– Do not remove brake pedal actuator - V.A.G 1869/2- .
– As protection against escaping brake fluid, place a sufficient number of lint-free cloths in area beneath control unit and hydraulic unit.

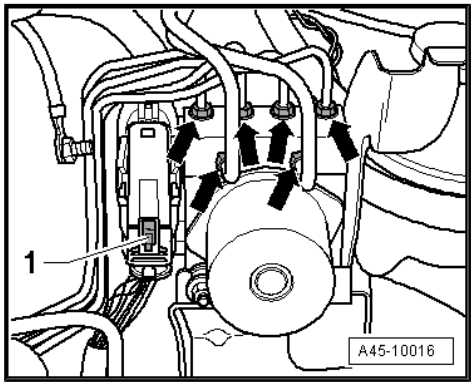
Note

Mark brake lines with numbers.

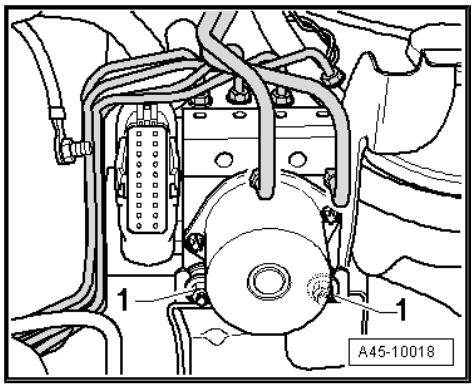
WARNING

Do not bend the brake lines in the vicinity of the hydraulic unit.

– Completely unscrew brake lines from brake master cylinder.
– Disconnect remaining brake lines -arrows- on hydraulic unit.



– Loosen bolts -1- at hydraulic control unit.



Note

To make it easier to pull out the rear left and rear right brake lines, loosen bolts -1- and press the hydraulic control unit slightly forwards towards the engine.

– Seal brake lines and tapped holes with sealing plugs from repair kit.

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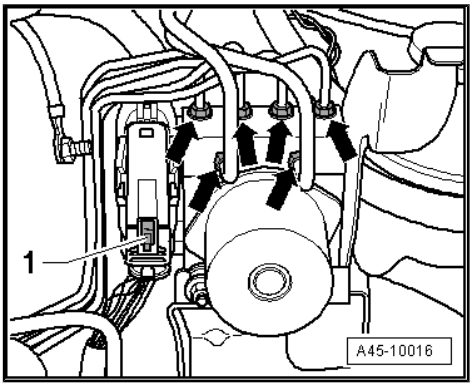
– Press red retainer catch upwards.

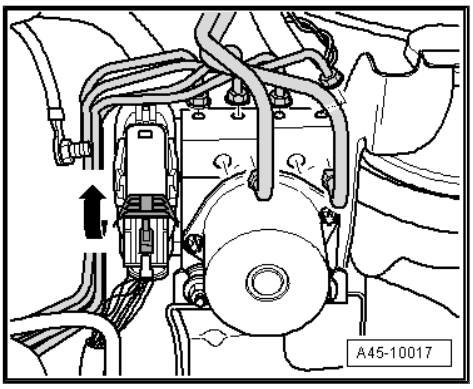


Note

- *Make sure brake fluid does not get into connector housing of control unit. This can result in corrosion of the contacts and failure of the system.*
- *Use compressed air to carefully clean connector housing if necessary.*

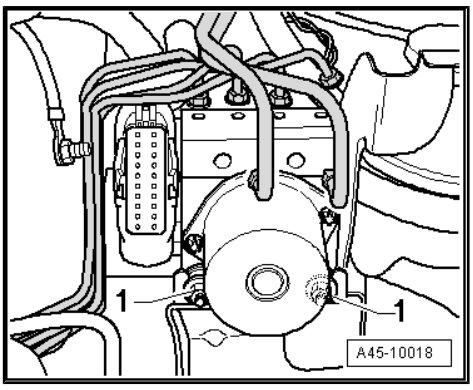
– Release control unit connector -arrow- and unplug.

– Push retaining clip in -direction of arrow- and unplug connector.



– Remove bolts -1-.

– Remove hydraulic control unit.



Installing

Install in reverse sequence, paying attention to the following:

Note

- *Do not remove sealing plugs from new hydraulic unit until corresponding brake line is ready to be fitted.*
- *If the sealing plugs are removed from the hydraulic unit sooner, brake fluid may escape and it may no longer be possible to fill and bleed the unit properly.*

– Fit hydraulic control unit in bracket.

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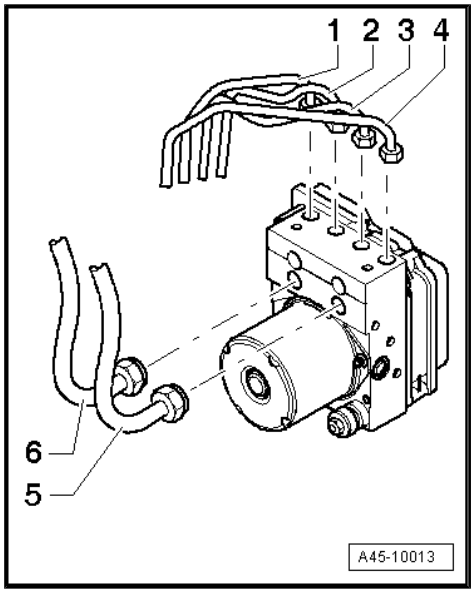
– Connect pipes as previously marked:



Note

To make it easier to assemble the rear left and rear right brake lines, press the hydraulic control unit slightly forwards and tighten the bolts for the brake lines slightly.

1 - To front right brake caliper “VR”

2 - To rear left brake caliper “HL”

3 - To rear right brake caliper “HR”

4 - To front left brake caliper “VL”

5 - To primary piston circuit “HZ 1”

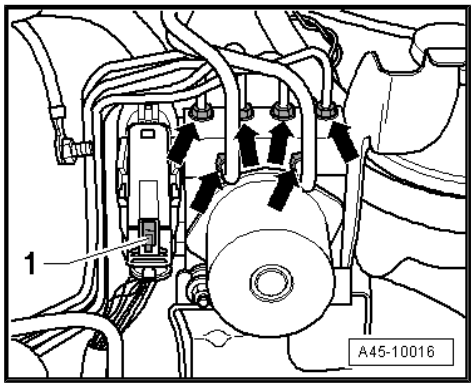
6 - To secondary piston circuit “HZ 2”

Note

Do not tighten bolts completely. This will make it easier to attach the individual brake lines to the hydraulic unit.

– Attach connector to hydraulic control unit and lock connector.

– Press down red retainer catch -1-.



Tighten connections of all brake lines to hydraulic unit and brake master cylinder.

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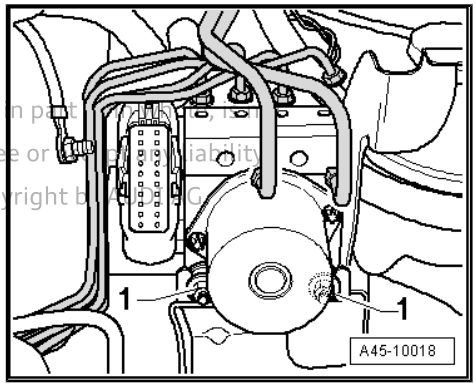


– After tightening brake lines, tighten hydraulic unit -1-.
– Remove brake pedal actuator - V.A.G 1869/2- .
– Bleed brake system ⇒ page 154.
– Code ABS with EDL control unit - J104- . ⇒ Code control unit using VAS 5051B or VAS 5052 via "Guided Fault Finding" function.
– When renewing the control unit, select the function "Replace" for the relevant control unit in the "Guided Fault Finding".

To do so, use the vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052- .

– Perform final control diagnosis after attaching brake lines to hydraulic unit. ⇒ Vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-

Note

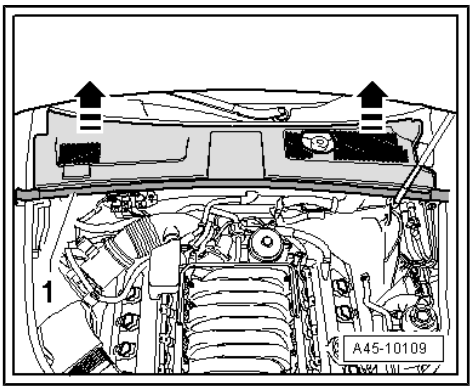
The final control diagnosis indicates whether the connection has been interchanged.

Tightening torques

Component	Nm
Brake lines to hydraulic unit M10 (brake line diameter 5 mm)	12
Brake lines to hydraulic unit M12 (brake line diameter 5 mm)	12
Brake lines to hydraulic unit M12 (brake line diameter 8 mm)	16

– Install plenum chamber cover. ⇒ Rep. gr. 50

– Install rubber seal -1-.



Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

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5 Removing and installing parts of ABS system on front and rear axles

5.1 Removing and installing parts of ABS system on front axle

1 - ABS speed sensor

- ❑ Before inserting sensor, clean inner surface of bore and coat with lubricating paste - G 000 650-
- ❑ Removing and installing ⇒ page 46

2 - Bolt

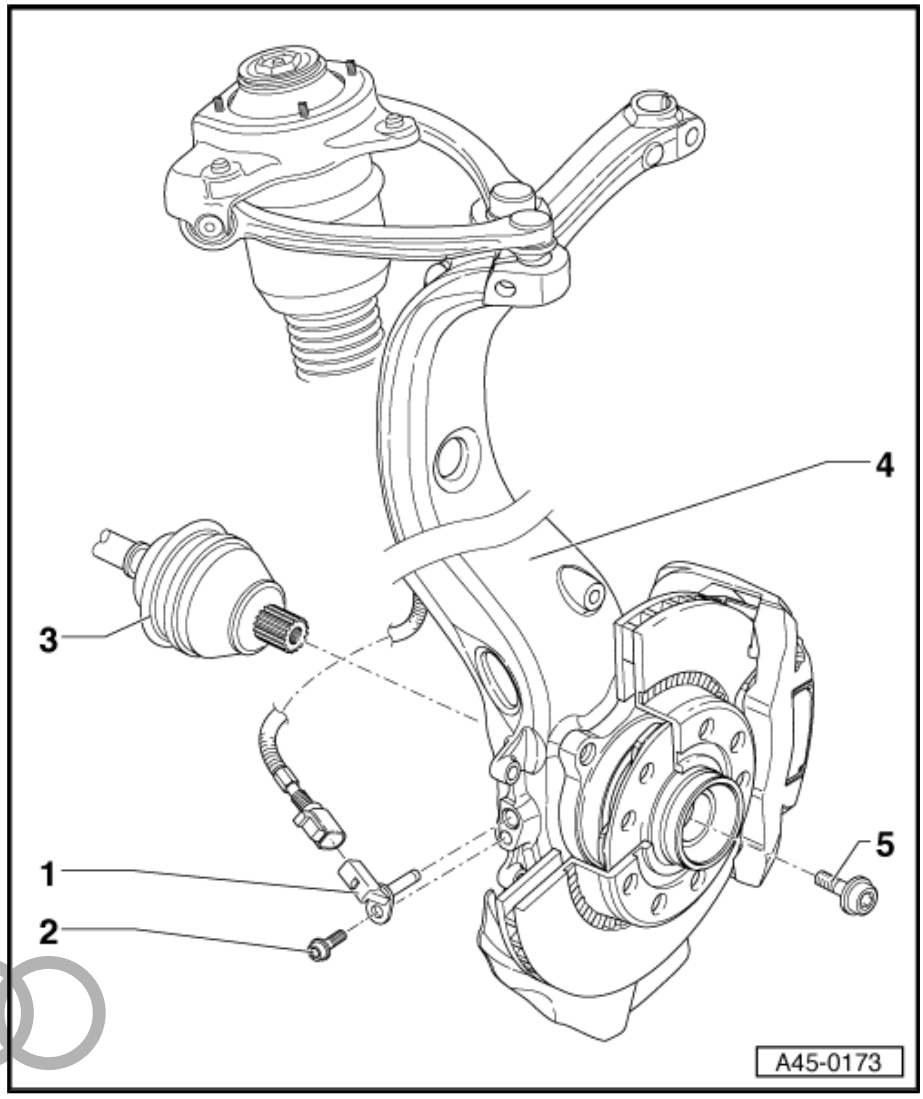
- ❑ 18 Nm

3 - Drive shaft

4 - Wheel hub with wheel bearing

5 - Bolt

- ❑ Always renew if removed ⇒ Rep. gr. 40 ; Servicing drive shaft



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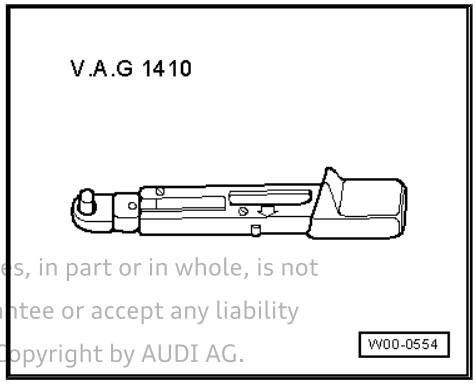
5.2 Removing and installing front wheel speed sensor

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1410-



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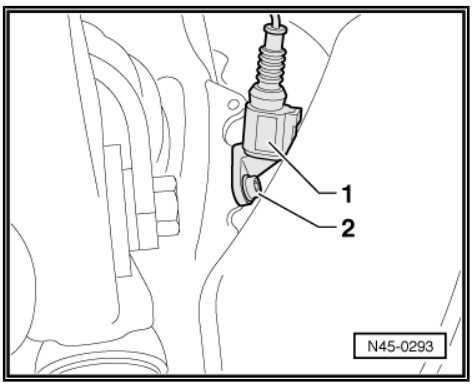
Removing

– Raise vehicle.
– Detach speed sensor wiring connector -1- from speed sensor.
– Remove bolt -2- from wheel bearing housing.
– Pull ABS speed sensor out of wheel bearing housing.



Installing

– Before inserting speed sensor, clean inner surface of fitting hole and coat speed sensor thoroughly with lubricating paste - G 000 650- .
– Insert speed sensor into drilling in wheel bearing housing and tighten bolt to 18 Nm.
– Connect speed sensor to speed sensor wiring.

5.3 Removing and installing parts of ABS system on rear axle

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1 - Bolt

- ❑ Always renew if removed ⇒ Rep. gr. 42 ; Servicing rear drive shaft

2 - Wheel bearing/wheel bearing unit

- ❑ The ABS sensor ring is installed in the wheel bearing

3 - ABS speed sensor

- ❑ Before inserting sensor, clean inner surface of bore and coat with lubricating paste - G 000 650-
- ❑ Removing and installing ⇒ page 49

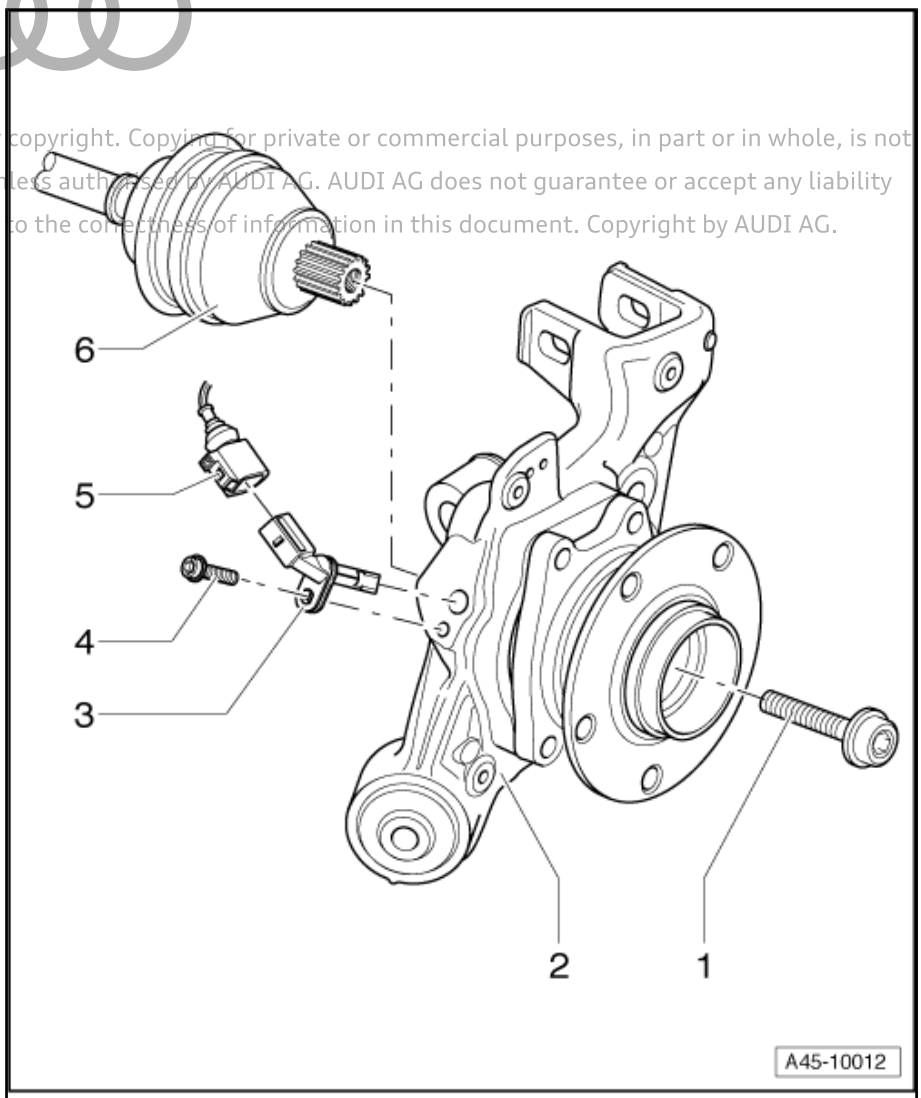
4 - Bolt

- ❑ 18 Nm

5 - Speed sensor wiring on vehicle

- ❑ For speed sensor wire

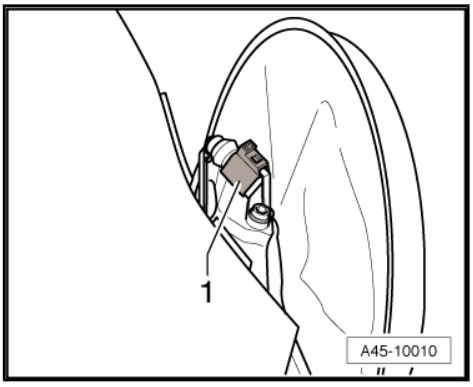
6 - Drive shaft



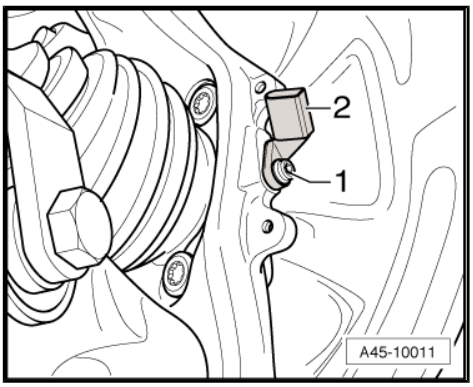
5.4 Removing and installing rear wheel speed sensor

Removing

– Raise vehicle.



– Detach speed sensor wiring connector -1- from speed sensor.
– Remove bolt -2- from wheel bearing housing.
– Pull ABS speed sensor out of wheel bearing housing.



Installing

– Before inserting speed sensor, clean inner surface of fitting hole and coat speed sensor thoroughly with grease - G 000 650- .
– Insert speed sensor into drilling in wheel bearing housing and tighten bolt to 18 Nm.
– Connect speed sensor to speed sensor wiring.

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6 Removing and installing parts of ESP system

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6.1 Removing and installing brake light switch

Note

- *The brake light switch must be removed in order to adjust it.*
- *To ensure a secure fit and reliable adjustment, the brake light switch may only be installed once.*

Removing

– Remove driver's storage compartment ⇒ Rep. gr. 68 .

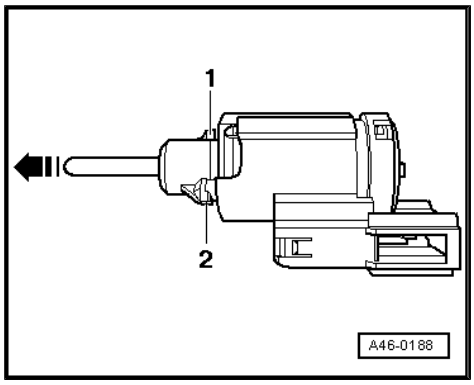
– Unplug electrical connector.

– Turn brake light switch anti-clockwise through 45° and remove.

Installing

Install in reverse sequence, paying attention to the following:

– Pull out plunger of brake light switch as far as it will go -arrow-.



Note

On some types it is not necessary to pull out the plunger prior to installation. The method of installation is the same.

– Fit retainer tabs -1- and -2- on switch into recesses in mounting hole.

Note

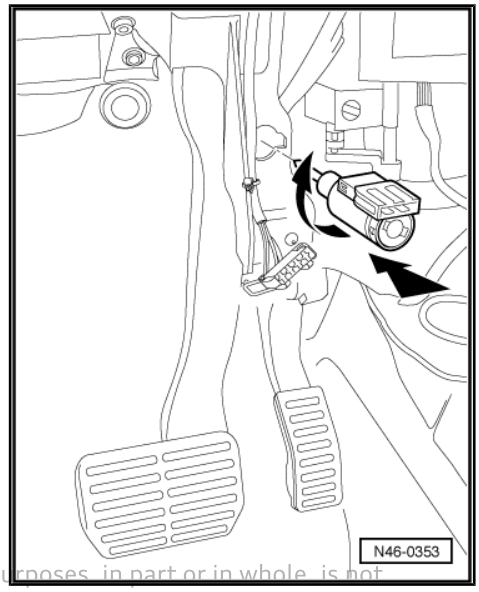
- *When installing, brake pedal must not be pressed.*
- *The plunger adjusts itself automatically when the brake light switch is inserted.*

– Guide switch through mounting hole, press against brake pedal and secure by turning 45° clockwise.

– Plug in electrical connector.

– Install driver's storage compartment ⇒ Rep. gr. 68 .

After adjusting the brake light switch check whether the brake pedal is on the end stop (rest position).



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6.2 Removing and installing brake light sensor

The brake light sensor is an improved version of the brake light switch.

Note

- *The brake light sensor can be re-used after it has been removed.*
- *The brake light sensor is self-adapting. Calibration is not required after installing the sensor.*

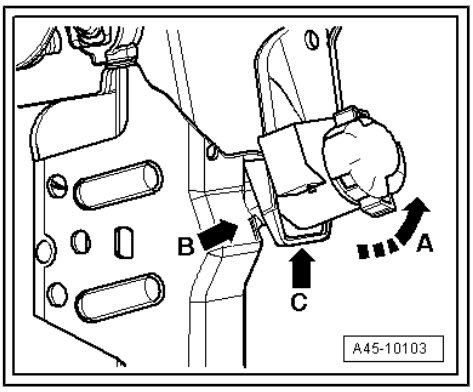
Removing

– Remove driver's storage compartment ⇒ Rep. gr. 68 .

– Unplug electrical connector on brake light sensor.

– Press plunger of brake light sensor -B- all the way in with one finger.

– With plunger still pressed in, turn coloured catch on brake light sensor fully anti-clockwise -arrow A- to release sensor.



Note

Keep the plunger pressed in while releasing the brake light sensor.

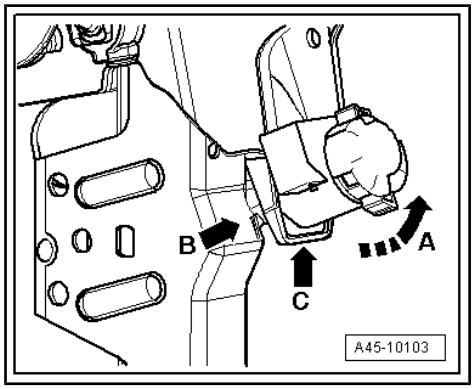
– Let go of plunger after releasing brake light sensor.

– Insert release tool - T40168- between brake pedal and plunger of brake light sensor.

The tapered part of the tool must face towards the driver's seat. The slot on the tool must correspond with the projection on the brake light sensor.

– Press release tool - T40168- against brake light sensor. This releases the three retaining tabs on the brake light sensor.

– Pull brake light sensor out of its mounting -C-.

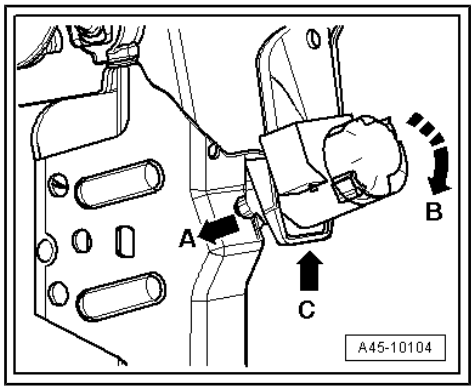


Installing

Note

- *The plunger adjusts itself automatically when the brake light sensor is inserted.*
- *The brake pedal must remain in the normal position during installation and must not be depressed.*
- *The brake pedal must be connected to the brake servo.*

– Fit brake light sensor in mounting -C- on brake pedal and press in lightly -arrow A-.



Note

- *All three retaining tabs on the brake light sensor must engage audibly.*
- *The sensor must not be rotated in the mounting on the brake pedal.*
- *The plunger adjusts itself automatically when the brake light sensor is inserted.*

– Turn coloured catch on brake light sensor all the way clockwise -arrow B- to secure sensor.

– Plug in electrical connector.

– Install driver's storage compartment ⇒ Rep. gr. 68 .

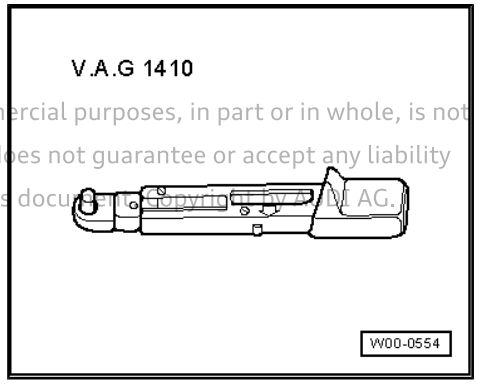
After installing the brake light sensor, check the function of the sensor before driving the vehicle.

6.3 Removing and installing ESP sensor unit - G419-

The ESP sensor unit - G419- is located at the front of the centre tunnel below the air conditioner.

Special tools and workshop equipment required

- Torque wrench - V.A.G 1410-



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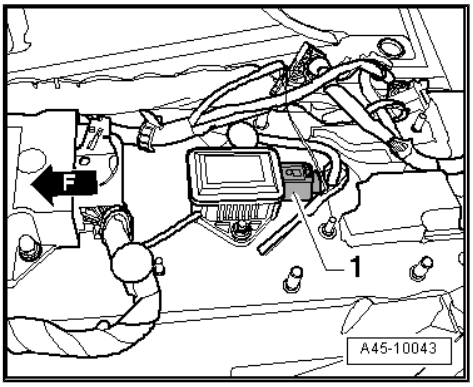
Removing

– Remove centre console extension ⇒ Rep. gr. 68

– Unplug electrical connector -1- from ESP sensor unit - G419- .

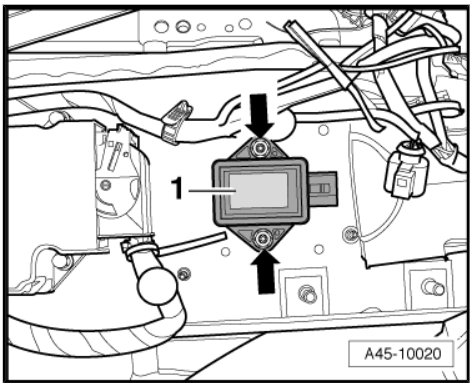
– -Arrow- points in direction of travel.



– Remove the two securing bolts -arrows-.
– Take out ESP sensor unit - G419- -1-.

Installing

> **WARNING**
>
> ***Severe shocks or jolts can irreparably damage the ESP sensor unit - G419- .***



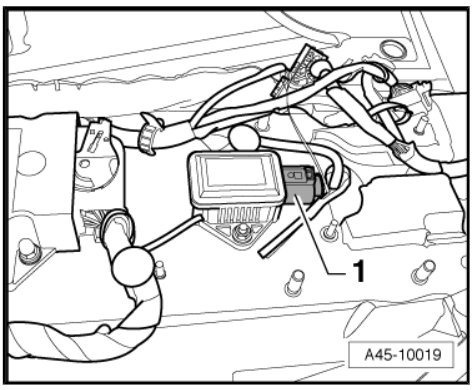
– Installation is carried out in reverse sequence.

When installing the ESP sensor unit - G419- , make sure it is correctly seated in its bracket and is free of stress.

Do NOT use the securing bolts to forcibly position the ESP sensor unit - G419- .

– Tighten securing bolts to 10 Nm.
– When renewing the control unit, select the function “Replace” for the relevant control unit in the “Guided Fault Finding”.

To do so, use the vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052- .



6.4 Removing and installing steering angle sender -G85-

The steering angle sender is located between the steering wheel and steering column switch.

Removing and installing

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– Remove return ring with slip ring ⇒ Rep. gr. 69 .

⇒ Rep. gr. 48 ⇒ Vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-

– Then perform zero compensation of -G85- .
– Connect vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052- and select “Function/component selection” with the "Go to" key.
– Then, under “Function” select “Replace steering angle sender” ⇒ page 28 .

6.5 Removing and installing parking brake contact switch - F321-

Removing

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– Remove rear centre console. ⇒ Rep. gr. 68
– Remove Climatronic control unit - J255- . ⇒ Rep. gr. 87
– Remove parking brake contact switch - F321- . ⇒ Rep. gr. 96

Installing

– Installation is carried out in reverse sequence.

6.6 Removing and installing brake pressure sender - G518- and brake pressure sender - G519-

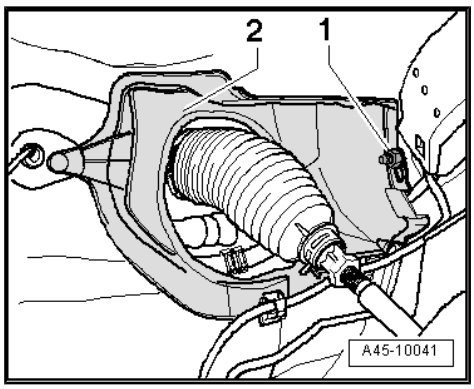
Removing

– Raise vehicle.

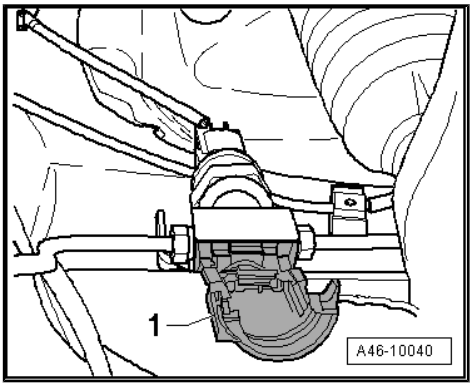
Note

- *The brake pressure sender (sensor) is attached to the brake pipe connector. The brake pipe connectors are located in the engine compartment (left and right).*
- *The brake pressure senders (sensors) can be renewed individually.*
- *The older version of the brake pressure senders (sensors) 1J0... ⇒ ETKA cannot be bled.*
- *In order to bleed the brake system completely, replace the old version with the new version.*
- *The new version of the brake pressure sender (sensor) can be identified by the Part No. 4F0... ⇒ ETKA .⇒*

– Remove wheels.
– Unscrew speed nut -1- and fold back cover to one side.
– Unclip wiring harness.

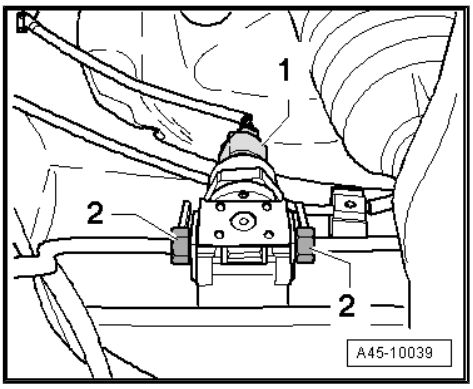


– Open plastic housing cover.
– Unplug electrical connector -1- on brake pressure sender.
– Detach brake pressure sender from pipe connector and unscrew.



Note

The brake line -2- only has to be disconnected in order to remove the brake pipe connector.



Installing

– Installation is carried out in reverse sequence.
– Tightening torque: 28 Nm ⇒ Item 18 (page 33)

The brake line -2- only has to be disconnected in order to remove the brake pipe connector.

– After installing brake pipe connector, reconnect brake line -2-. Tightening torque: 12 Nm
– Bleed brake system ⇒ page 154 .

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46 – Brakes - mechanism

1 Front brakes FN3 (PR 1LT)

⇒ “1.1 Servicing front brakes (PR 1LT)”, page 56

1.1 Servicing front brakes (PR 1LT)

Note

- *Install all parts supplied in repair kit.*
- *After renewing brake pads, depress brake pedal firmly several times with vehicle stationary so that the pads are properly seated in their normal operating position.*
- *To draw off brake fluid from brake fluid reservoir use a bleeder bottle which is used only for brake fluid. Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.*

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1 - Splash plate for brake disc

2 - Bolt
- ❑ 10 Nm

3 - Brake hose
- ❑ Do not disconnect brake hose when changing brake pads

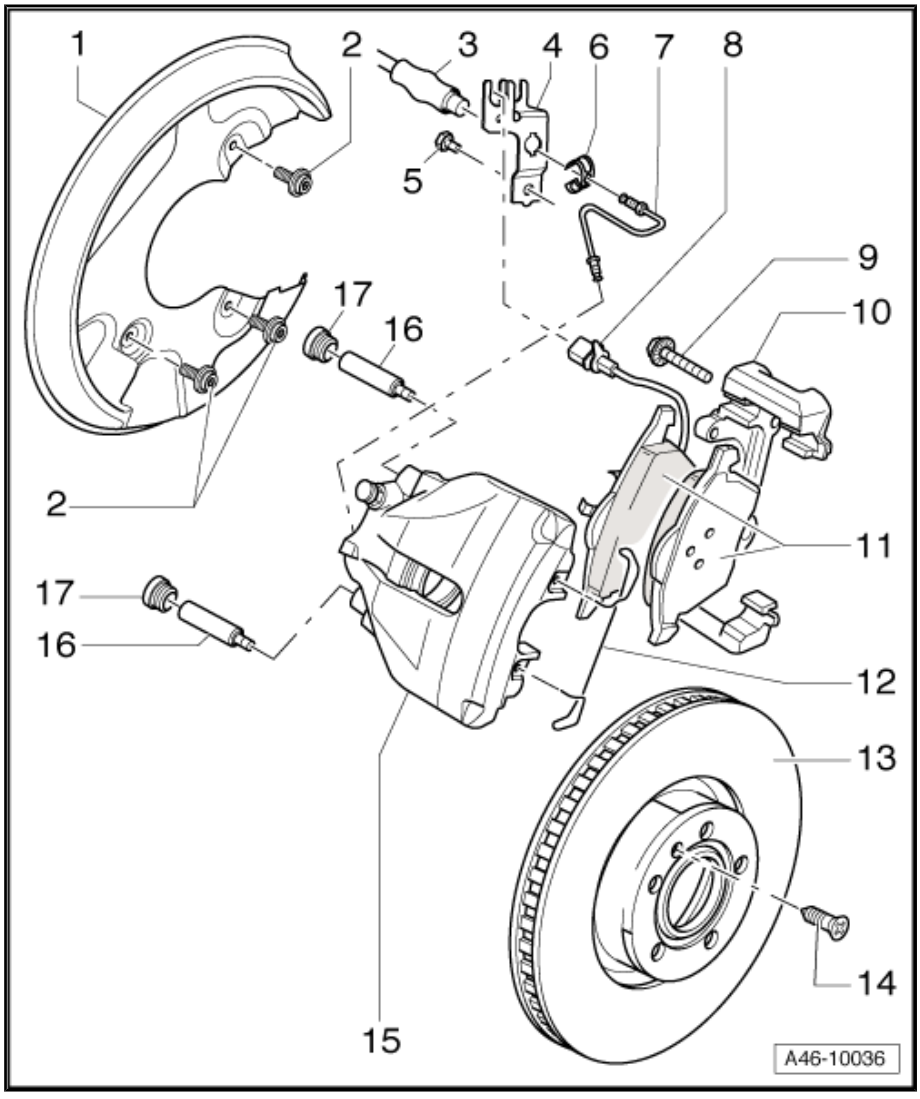
4 - Bracket
- ❑ Bolt to brake caliper housing

5 - Bolt
- ❑ 10 Nm

6 - Spring clip

7 - Brake line
- ❑ Tightening torque for brake line at bracket 17 Nm
- ❑ Tightening torque for brake line at brake caliper: 12 Nm
- ❑ Screw into brake caliper housing
- ❑ Screw into brake hose, counter hold on brake hose hexagon.
- ❑ Ensure that lugs are properly seated in grooves in bracket.

8 - Pad wear indicator wire
- ❑ When renewing pads, remove from bracket



⇒ Item 4 (page 56)

9 - Bolt

- ❑ Clean ribs if using again
- ❑ 190 Nm

10 - Brake carrier

- ❑ Bolt to wheel bearing housing

11 - Brake pads

- ❑ Wear limit ⇒ page 1

Note

The inner pad (with spring) has an arrow. The arrow must point in direction of brake disc rotation when moving forwards. May create noises if incorrectly installed.

- ❑ Before inserting pads, clean guide surfaces and apply a thin coating of polycarbamide grease - G 052 142 A2- .
- ❑ There is an adhesive foil on the backplates of the outer brake pads. Remove the protective foil before fitting pads.
- ❑ Brake pad wear indicator (front left and front right)
- ❑ Warning lamp in dash panel insert will light up when wear limit (3 mm) is reached
- ❑ Always renew on both sides of axle
- ❑ Removing and installing ⇒ page 58
- ❑ Checking pad thickness ⇒ Maintenance ; Booklet 405
- ❑ Different versions available ⇒ ETKA

Note

Clean the brake calipers thoroughly (grease-free) before inserting new brake pads. When doing this, make sure that all adhesive foil residue on the contact surfaces for the outer brake pad is removed.

12 - Retaining spring

- ❑ Before inserting pads, clean guide surfaces and apply a thin coating of polycarbamide grease - G 052 142 A2- .
- ❑ Insert in both holes in brake caliper housing

Note

The retaining spring must be pressed under the brake carrier after inserting into both holes. If incorrectly installed, the wear of the outer pad cannot be adjusted, and the pedal travel will be increased as a result.

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13 - Brake disc

- ❑ Wear limit ⇒ page 1
- ❑ Detach brake caliper prior to removing
- ❑ Thickness ⇒ page 1
- ❑ Allocation ⇒ page 1

WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

14 - Bolt

- ❑ Tightening torque: 5 Nm

15 - Wheel bolt

16 - Brake caliper housing

- ❑ Unscrew from brake carrier to renew brake pads
- ❑ Servicing brake caliper ⇒ page 130

17 - Guide pin

- ❑ 30 Nm

18 - Trim cap

Note

Detach protective cap before unscrewing guide pin. Fit protective cap after screwing in guide pin.

1.2 Removing and installing brake pads (1LT)

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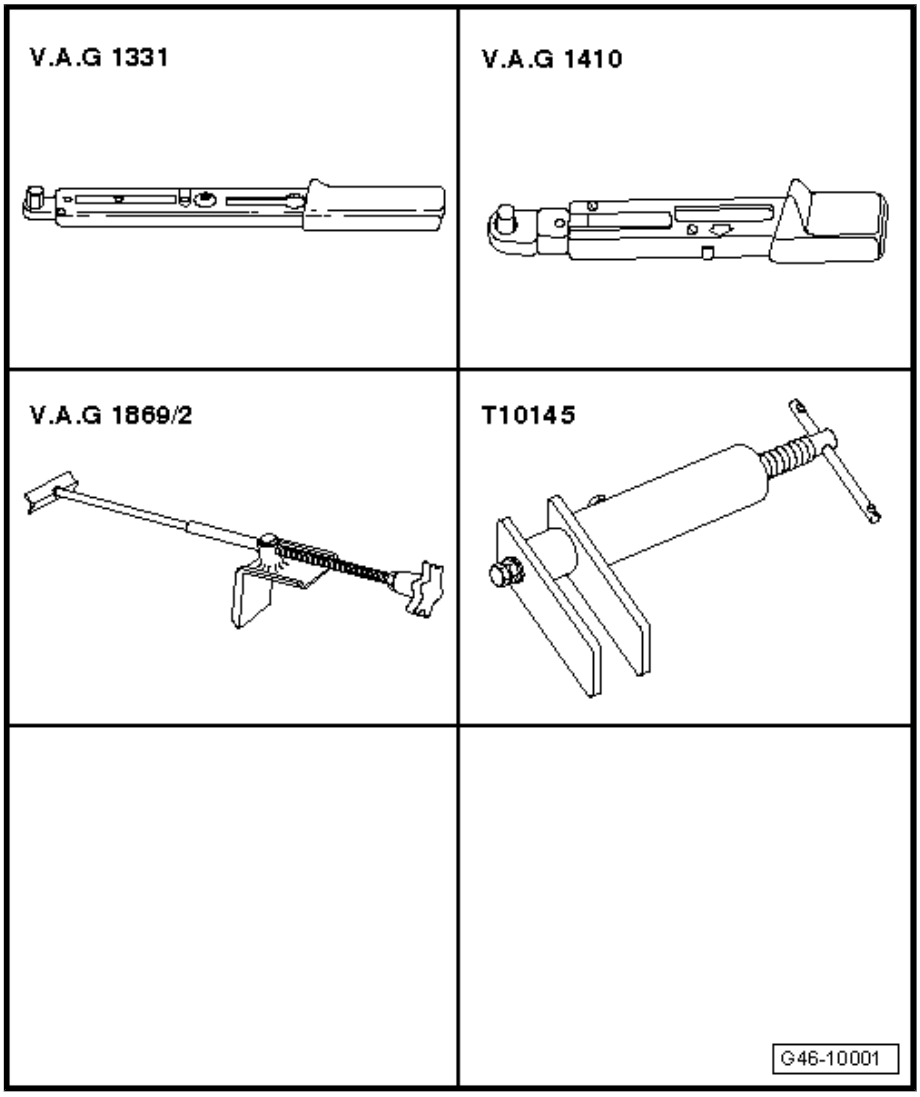
When renewing the brake pads, also check the brake disc for wear. Refer to wear limit for brake disc ⇒ "1.2 Brakes, technical data", page 1 .



Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-
- Torque wrench - V.A.G 1410-
- Torque wrench - V.A.G 1332-
- Brake pedal actuator - V.A.G 1869/2-
- Piston resetting appliance - T10145-

Removing

– Raise vehicle.

– Remove wheels.

Note

- *Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.*
- *The brake disc is secured with a cross-head screw.*

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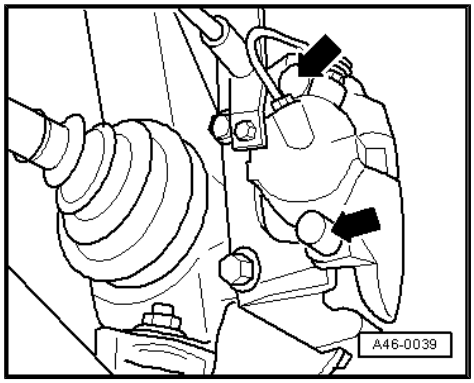
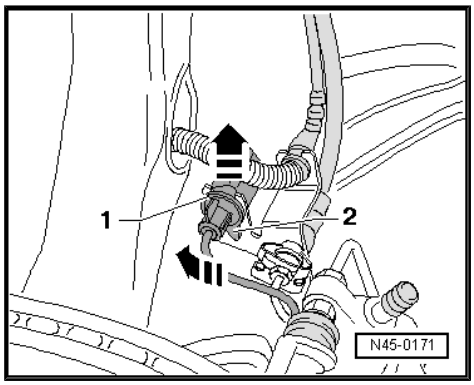
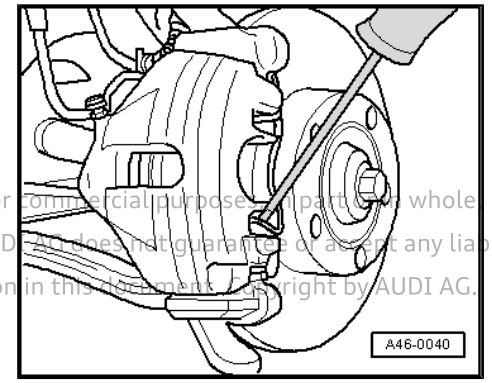
– Remove protective caps -arrows-.



– On vehicles equipped with a brake pad wear indicator, unplug connector -1-.
– Slightly lift up locating lug on lower part of connector -2- and turn 90°.
– Pull lower half of connector out of bracket.



– Lever brake pad retaining spring out of brake caliper housing with a screwdriver and remove.



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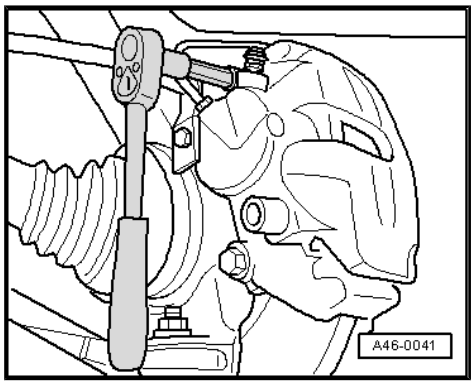
– Unscrew and remove both guide pins from brake caliper.
– Take off brake caliper housing and lay to one side so that the weight of the brake caliper does not stress or damage the brake hose.
– Take brake pads out of brake caliper housing or from brake carrier.

Installing

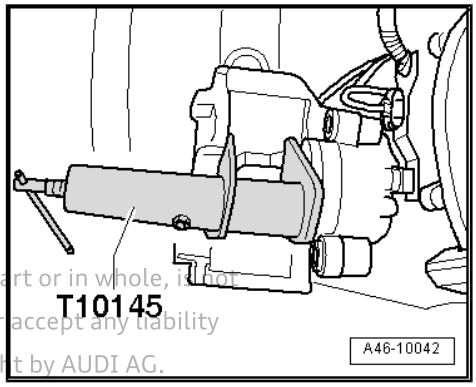
When renewing the brake pads, also check the brake disc for wear. Refer to wear limit for brake disc.

– Check brake disc ⇒ “1.2 Brakes, technical data”, page 1 .



– Press piston back.

Use only methylated spirits to clean the brake caliper housing.



Note

Before inserting new brake pads, press piston back into cylinder with resetting appliance. Before pressing the piston back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise, fluid can overflow and cause damage, particularly if the reservoir has been topped up.

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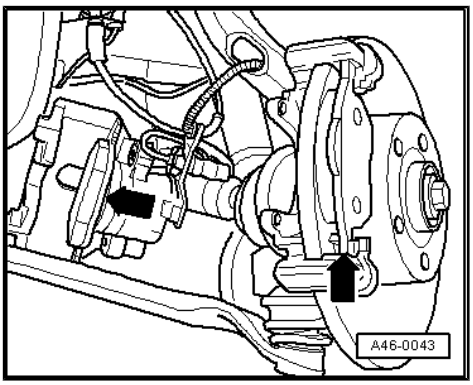
WARNING

Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.

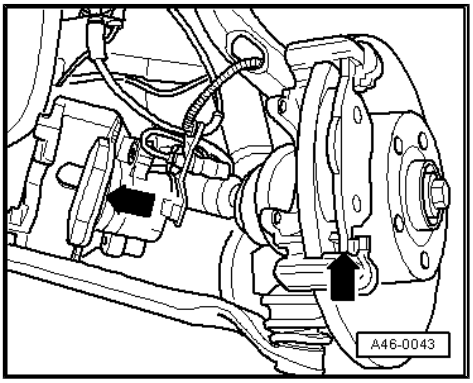
– Insert brake pad with retaining spring in brake caliper housing (piston).



Note

The inner pad (with spring) has an arrow. The arrow must point in direction of brake disc rotation when moving forwards. May create noises if incorrectly installed.

– Pull off protective foil on backplate of outer brake pad.
– Fit outer brake pad onto brake carrier.
– Secure brake caliper housing to brake carrier with both guide pins (tighten to 25 Nm).
– Fit both caps.
– Insert retaining spring into brake caliper housing.



Note

- *The retaining spring must be pressed under the brake carrier after inserting into both holes. If incorrectly installed, the wear of the outer pad cannot be adjusted, and the pedal travel will be increased as a result.*
- *After installing the brake pads, depress the pedal firmly several times with the vehicle stationary, so that the pads are properly seated in their normal operating position.*

– Check brake fluid level and top up if necessary.

Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

2 Front brakes FNR G60 (PR 1LG/1LD/ 1LH/1LV/1ZL)

⇒ "2.1 Servicing front brakes (PR 1LG/1LD/1LH/1LV/1ZL)", page 62

2.1 Servicing front brakes (PR 1LG/1LD/ 1LH/1LV/1ZL)

Note

- *Install all parts supplied in repair kit.*
- *After renewing brake pads, depress brake pedal firmly several times with vehicle stationary so that the pads are properly seated in their normal operating position.*
- *To draw off brake fluid from brake fluid reservoir use a bleeder bottle which is used only for brake fluid. Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.*
- *Check that the brake caliper moves freely by moving it from side to side.*

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1 - Brake pads

- ❑ Wear limit ⇒ page 1

Note

A wire for the wear indicator is fitted to the inner pad (with spring).

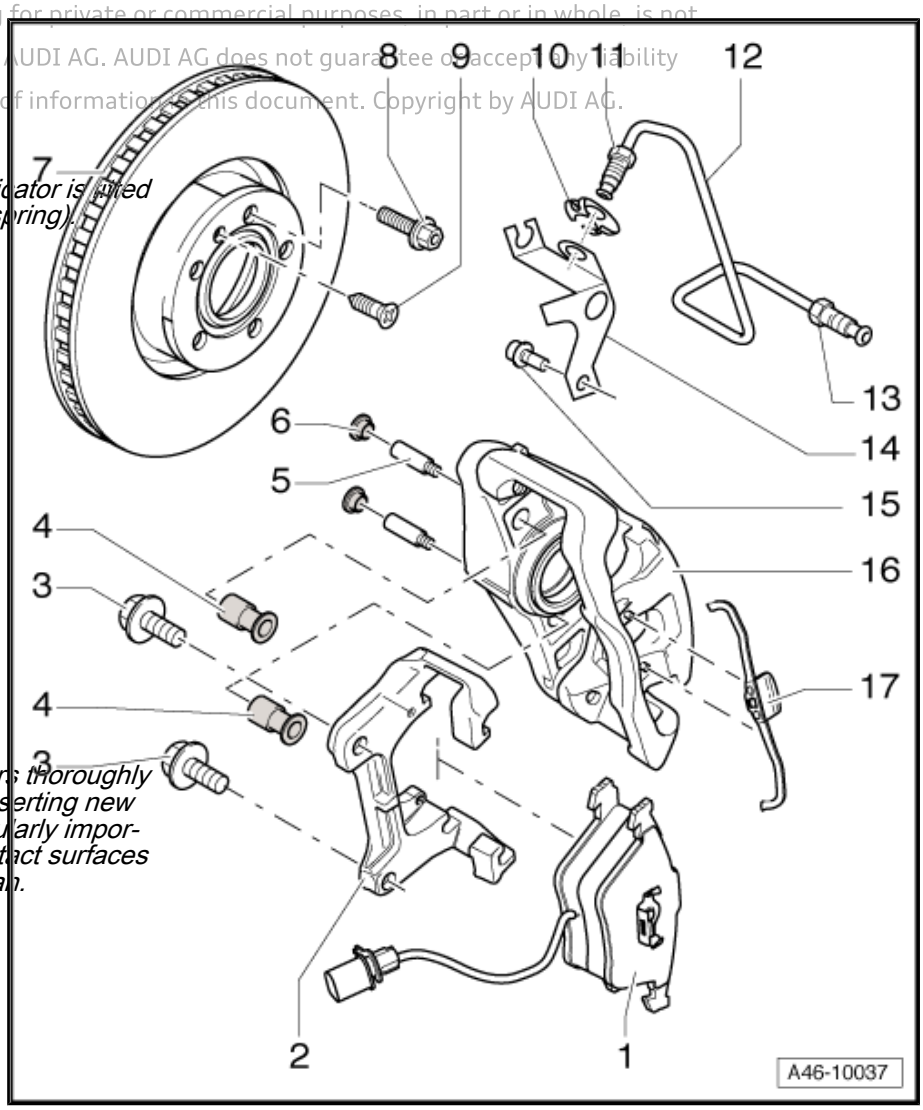
- ❑ Always renew on both sides of axle
- ❑ Before inserting pads, clean guide surfaces and apply a thin coating of polycarbamide grease - G 052 142 A2- .
- ❑ Removing and installing ⇒ page 64
- ❑ Checking pad thickness ⇒ Maintenance ; Booklet 405
- ❑ Different versions available ⇒ ETKA

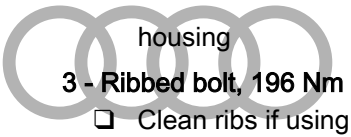
Note

Clean the brake calipers thoroughly (grease-free) before inserting new brake pads. It is particularly important to ensure that contact surfaces for brake pads are clean.

2 - Brake carrier

- ❑ Bolt to wheel bearing





housing

3 - Ribbed bolt, 196 Nm

- ❑ Clean ribs if using again
- ❑ M14 × 1.5 x 38

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4 - Bearing bush

- ❑ Insert into brake caliper housing

5 - Guide pins, 30 Nm

6 - Trim cap

- ❑ Take off
- ❑ Insert wear indicator wire in protective cap

7 - Brake disc

- ❑ Wear limit ⇒ page 1
- ❑ Detach brake caliper prior to removing
- ❑ Lubricate contact surfaces between brake disc and wheel hub with polycarbamide grease - G 052 142 A2- . ⇒ Wheels and tyres; Rep. gr. 44
- ❑ Allocation ⇒ page 1
- ❑ Thickness ⇒ page 1

WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

8 - Wheel bolts

- ❑ Fit wheels ⇒ Wheels and tyres; Rep. gr. 44 .

9 - Bolt

- ❑ Tightening torque: 5 Nm

10 - Spring clip

11 - Brake line connection to brake hose, 12 Nm

12 - Brake line

- ❑ Screw into brake caliper housing
- ❑ Screw into brake hose, counter hold on brake hose hexagon.
- ❑ Do not twist hose when fitting
- ❑ Ensure that lugs are properly seated in grooves in bracket.

13 - Brake line connection to brake caliper, 17 Nm

14 - Bracket

- ❑ Bolt to brake caliper housing
- ❑ Attach brake line

15 - Bolt

- ❑ Tightening torque: 25 Nm

16 - Brake caliper housing

- ❑ If assembly work is required, do not leave caliper hanging from brake hose but secure it to body with wire
- ❑ With the exception of “Renewing brake pads” ⇒ page 64 and “Servicing front brake caliper”, no repairs may be performed on the brake caliper.
- ❑ Do not twist hose when fitting

17 - Retaining spring

- ❑ Note correct installation position.

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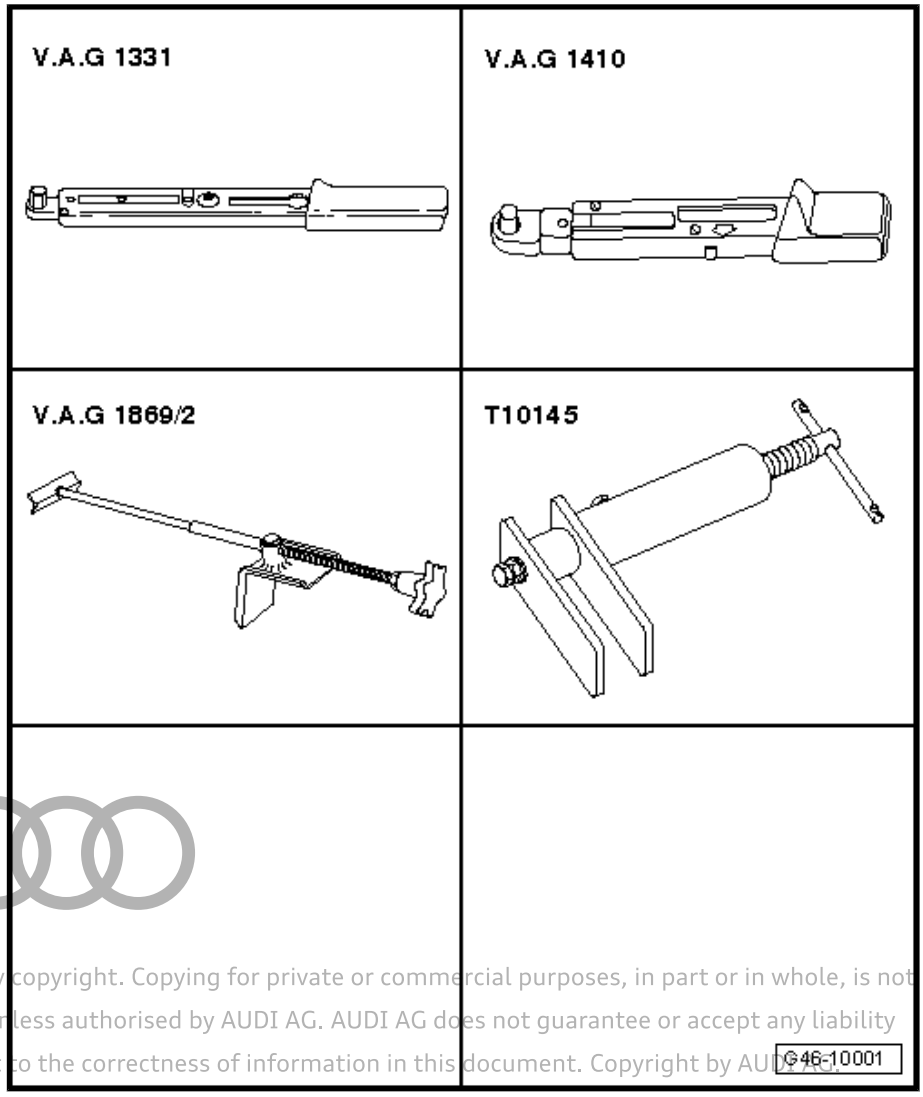
Note

The retaining spring must be pushed under the brake carrier after engaging onto both studs. If incorrectly installed, the wear of the outer pad cannot be adjusted, and the pedal travel will be increased as a result.

2.2 Removing and installing brake pads (PR 1LG/1LD/1LH/1LV/1ZL)

When renewing the brake pads, also check the brake disc for wear. Refer to wear limit for brake disc
⇒ “1.2 Brakes, technical data”, page 1 .



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Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-
- Torque wrench - V.A.G 1410-
- Torque wrench - V.A.G 1332-
- Brake pedal actuator - V.A.G 1869/2-
- Piston resetting appliance - T10145-

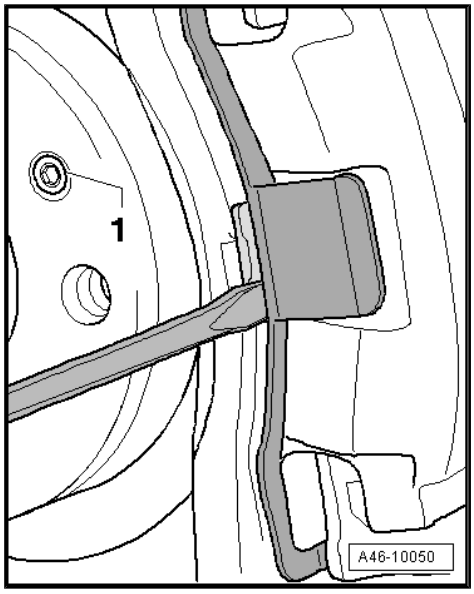
Removing

Note

- *Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.*
- *The brake disc is secured with a cross-head screw.*

– Raise vehicle.
– Remove wheels.
– The brake disc is secured with a bolt -1-.

– To lever out retaining spring, insert screwdriver between retaining spring and pad retaining spring.

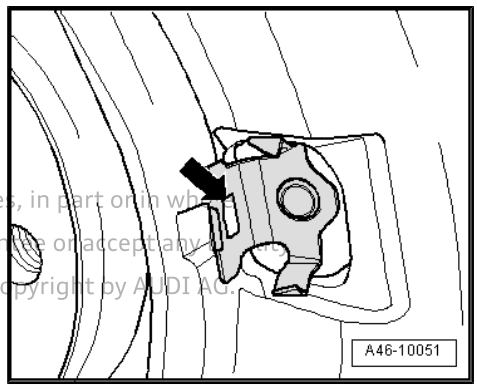


Note

The spring is under tension; hold your hand over the spring to avoid risk of injury.

– Take care not to scratch or otherwise damage the surface of the pad retaining spring.

– The retaining arrangement is indicated by the -arrow-
– Lever brake pad retaining spring out of brake caliper housing with a screwdriver and remove.



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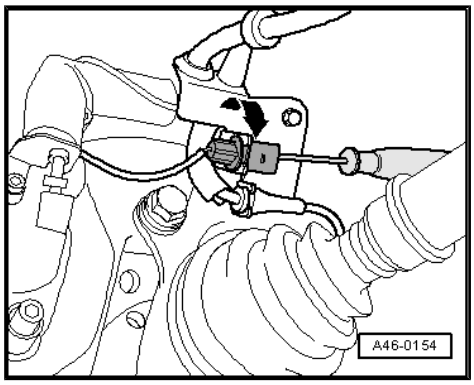
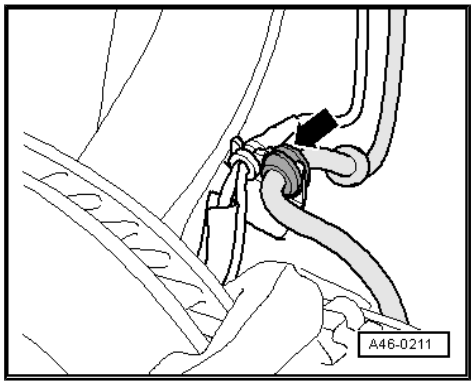
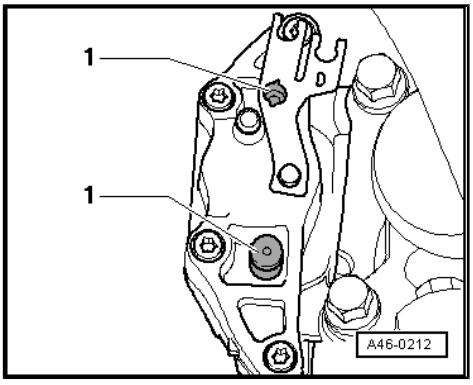
– Unplug connector for brake pad wear indicator.
– Turn connector 90° while using a screwdriver to release connector from bracket.
– Pull connector upwards out of bracket and detach wire.



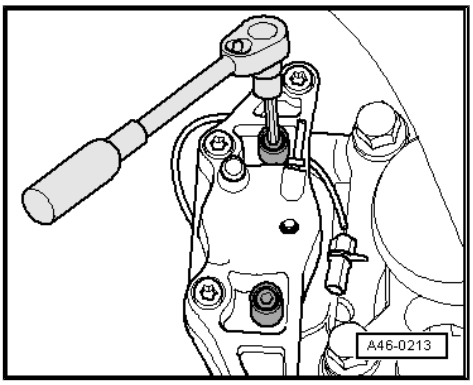
– Detach brake line from bracket.



– Remove protective caps -1-.



– Unscrew and remove both guide pins from brake caliper.
– Take off brake caliper housing and lay to one side so that the weight of the brake caliper does not stress or damage the brake hose.
– Take brake pads out of brake caliper housing or from brake carrier.



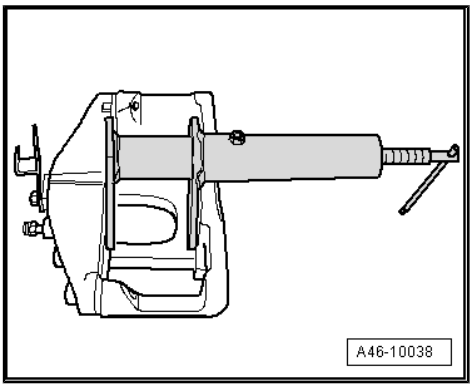
Use only methylated spirits to clean the brake caliper housing.

Installing

When renewing the brake pads, also check the brake disc for wear. Refer to wear limit for brake disc.

– Check brake disc ⇒ “1.2 Brakes, technical data”, page 1 .

– Press piston back.



Note

Before inserting new brake pads, press piston back into cylinder with resetting appliance. Before pressing the piston back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise, fluid can overflow and cause damage, particularly if reservoir has been topped up.

WARNING

Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.

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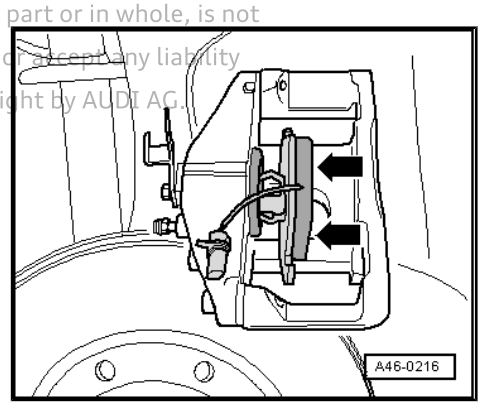
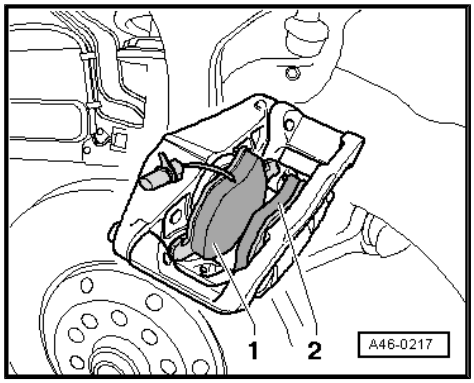
– Insert brake pad with retaining spring and wear indicator into brake caliper housing (piston).



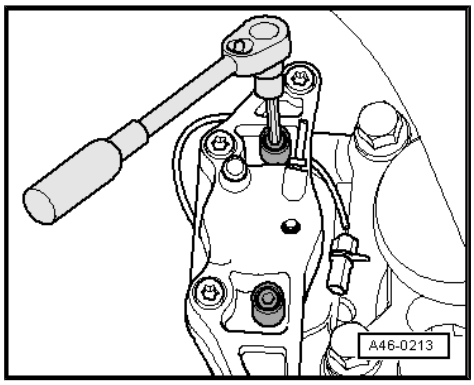
– Fit outer brake pad -2- in brake caliper.



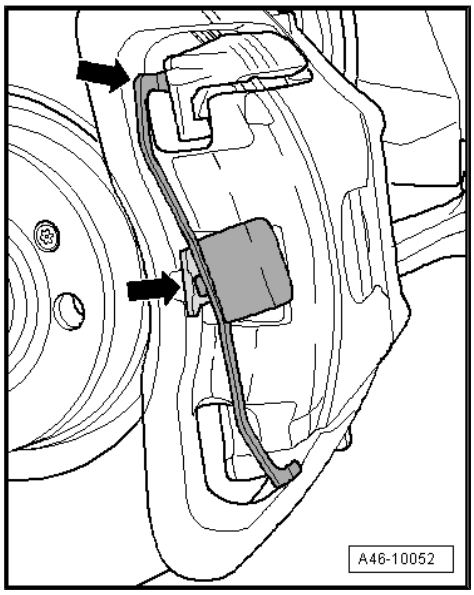
Note

Fit brake pads into brake caliper and install assembly on brake carrier/brake disc.

– Secure brake caliper housing to brake carrier with both guide pins (tighten to 30 Nm).
– Make sure not to twist the brake hose when installing.
– Fit both caps.



– Engage housing retaining spring at the top and at retaining tab on pad retaining spring -arrows- ...



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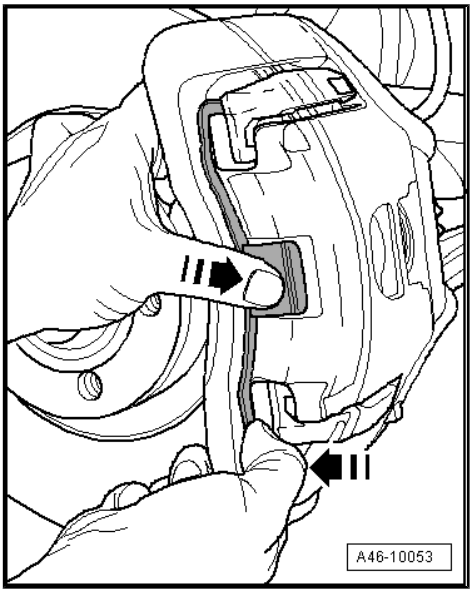
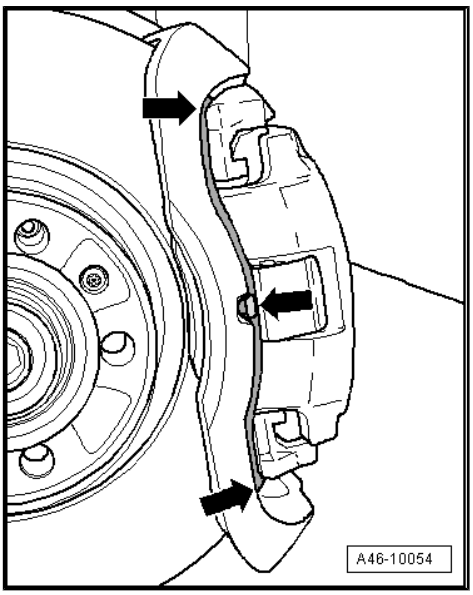
– ... then press on housing retaining spring at the bottom and at the same time press in pad retaining spring, as indicated by -arrows-.



– Check that housing retaining spring is engaged correctly on pad retaining spring and that top and bottom ends of housing retaining spring are engaged correctly in brake carrier.
– Attach brake line
– Connect wear indicator connector and insert wire in dust cap and protective cap.
– Fit wheels ⇒ Wheels and tyres; Rep. gr. 44 .



Note

- *The retaining spring must be pushed under the brake carrier after engaging onto both studs. If incorrectly installed, the wear of the outer pad cannot be adjusted, and the pedal travel will be increased as a result.*
- *After installing the brake pads, depress the pedal firmly several times with the vehicle stationary, so that the pads are properly seated in their normal operating position.*

– Check brake fluid level and top up if necessary.

Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

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3 Front brakes (PR 1LJ/1LL)

⇒ “3.1 Servicing front brakes (PR 1LJ/1LL)”, page 70

3.1 Servicing front brakes (PR 1LJ/1LL)

Note

- *Always install all parts supplied in repair kit.*
- *After renewing brake pads, depress brake pedal firmly several times with vehicle stationary so that the pads are properly seated in their normal operating position.*
- *To draw off brake fluid from brake fluid reservoir use a bleeder bottle which is used only for brake fluid. Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.*
- *Check that the brake caliper moves freely by moving it from side to side.*

1 - Brake pads

- ❑ Wear limit ⇒ page 1

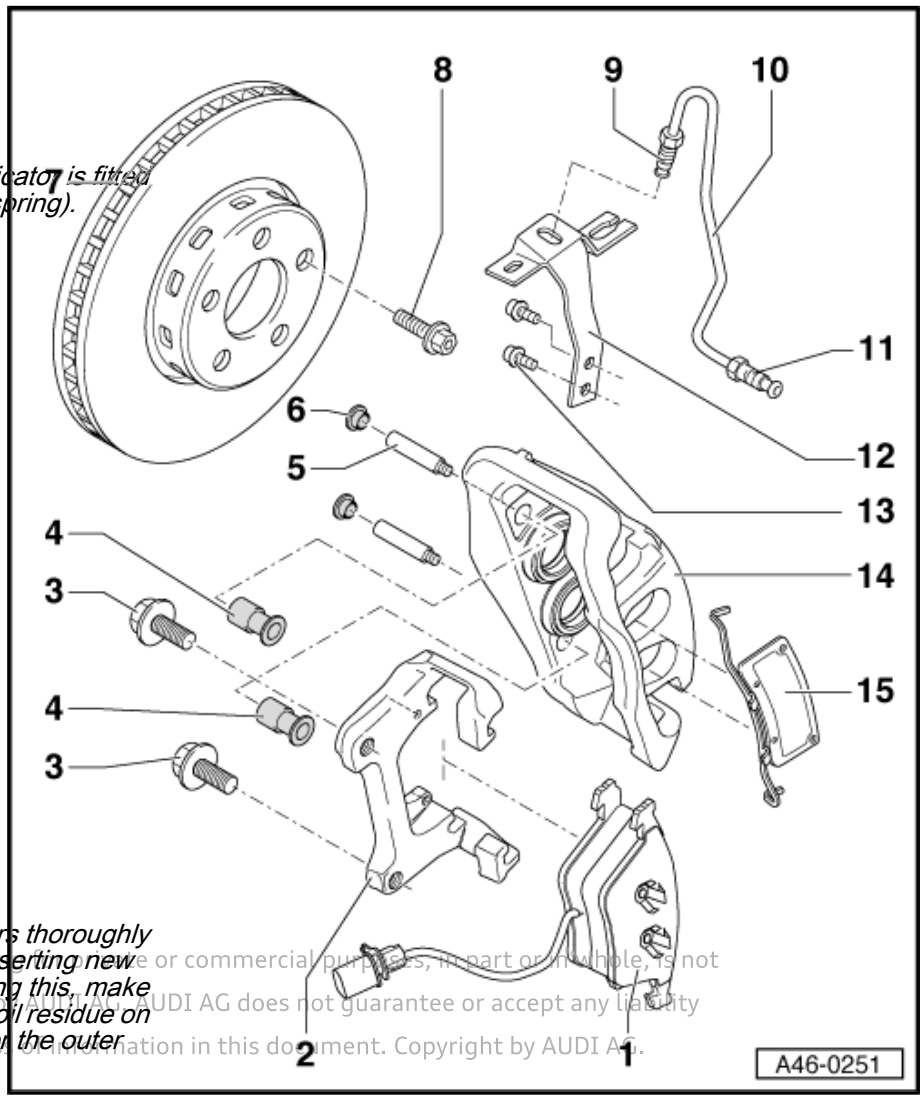
Note

A wire for the wear indicator is fitted to the inner pad (with spring).

- ❑ There is an adhesive foil on the backplates of the outer brake pads. Remove the protective foil before fitting pads.
- ❑ Before fitting pads, clean guide surfaces and apply a thin coating of polycarbamide grease ⇒ Parts catalogue
- ❑ Different versions available ⇒ Parts catalogue
- ❑ Always renew on both sides of axle
- ❑ Removing and installing ⇒ page 72
- ❑ Checking pad thickness ⇒ Maintenance ; Booklet 4E

Note

Clean the brake calipers thoroughly (grease-free) before inserting new brake pads. When doing this, make sure that all adhesive foil residue on the contact surfaces for the outer brake pad is removed.



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2 - Brake carrier

- ❑ Bolt to wheel bearing housing

3 - Ribbed bolt

- ❑ Tightening torque: 190 Nm
- ❑ Clean ribs if using again
- ❑ M14 × 1.5 x 38

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4 - Bearing bush

- ❑ Insert into brake caliper housing

5 - Guide pin

- ❑

Tightening torque: 30 Nm

6 - Trim cap

- ❑ Take off
- ❑ Insert wear indicator wire in protective cap

7 - Brake disc

- ❑ Wear limit ⇒ page 1
- ❑ Detach brake caliper prior to removing
- ❑ Lightly lubricate contact surfaces between brake disc and wheel hub with polycarbamide grease.

WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

8 - Wheel bolts

- ❑ Fitting wheels ⇒ Wheel/Tyre Guide

9 - Brake line connection to brake hose

- ❑ Tightening torque: 12 Nm

10 - Brake line

- ❑ Screw into brake caliper housing
- ❑ Screw into brake hose, counter hold on brake hose hexagon.
- ❑ Do not twist hose when fitting
- ❑ Ensure that lugs are properly seated in grooves in bracket.

11 - Brake line connection to brake caliper

- ❑ Tightening torque: 19 Nm

12 - Bracket

- ❑ Bolt to brake caliper housing
- ❑ Attach brake line

13 - Hexagon bolt M 8 x 16

- ❑ Tightening torque: 25 Nm

14 - Brake caliper housing

- ❑ If assembly work is required, do not leave caliper hanging from brake hose but secure it to body with wire
- ❑ With the exception of “Renewing brake pads” ⇒ page 72 and “Servicing front brake caliper”, no repairs may be performed on the brake caliper.
- ❑ Do not twist hose when installing

15 - Retaining spring

- ❑ Note correct installation position.

Note

The retaining spring must be pushed under the brake carrier after engaging onto both studs. If incorrectly installed, the wear of the outer pad cannot be adjusted, and the pedal travel will be increased as a result.

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3.2 Removing and installing brake pads (PR 1LJ/1LL)

When renewing the brake pads, also check the brake disc for wear. Refer to wear limit for brake disc ⇒ “1.2 Brakes, technical data”, page 1 .

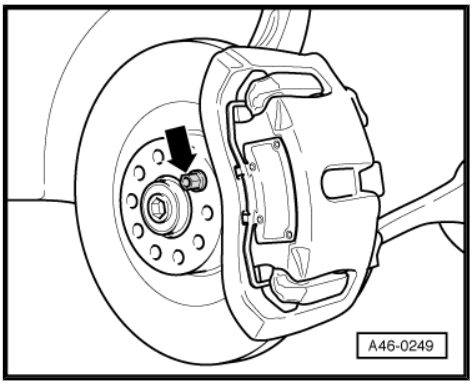
Removing

Note

- ♦
- ♦ *Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.*
- ♦ *When installing brake discs, note direction of travel -indicated by arrow on brake disc- and fitting location -left or right-.*

– Raise vehicle.

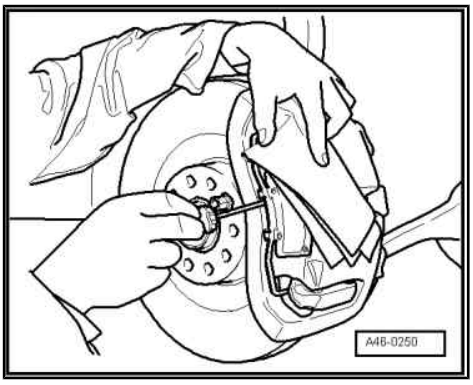
– Remove wheels.
– Secure brake disc with one wheel bolt see -arrow-.



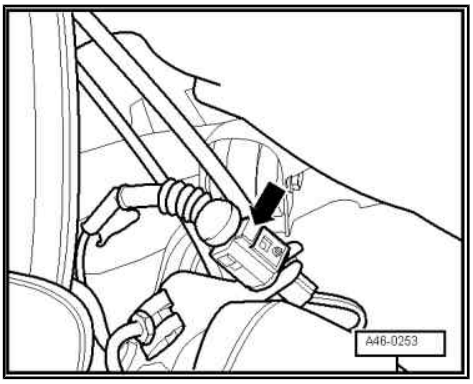
– Lever brake pad retaining spring out of brake caliper housing with a screwdriver and remove.

Note

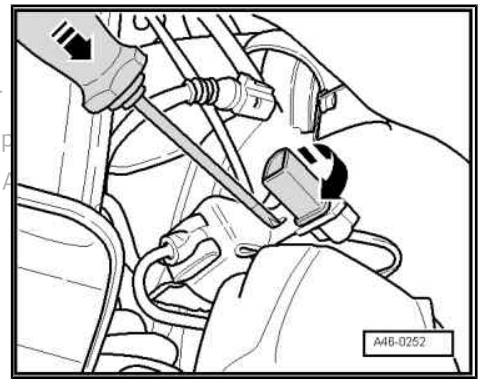
Spring is under tension, so protect yourself by holding a glove or cloth in front of spring.



– Unplug connector for brake pad wear indicator as shown in illustration.



– Turn connector 90° while using a screwdriver to release connector from bracket.
– Pull connector upwards out of bracket and detach wire.



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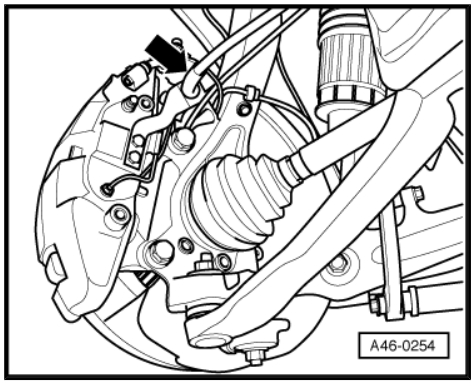
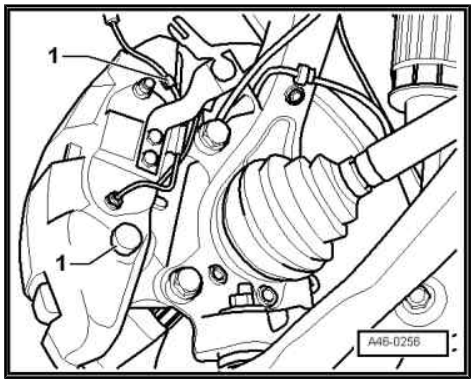
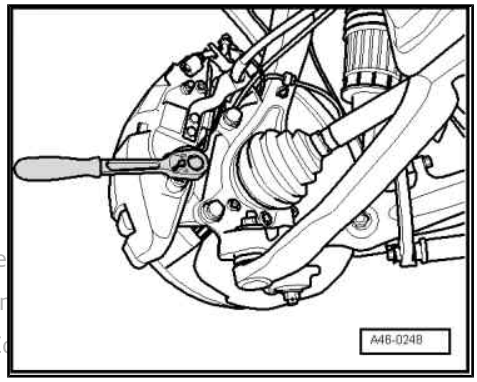
– Detach brake line from bracket.



– Remove protective caps -1-.



– Unscrew and remove both guide pins from brake caliper.
– Take off brake caliper housing and lay to one side so that the weight of the brake caliper does not stress or damage the brake hose.
– Take brake pads out of brake caliper housing or from brake carrier.



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Note

- *The brake pad with wear indicator is located on the inside.*
- *Remove brake caliper when renewing brake discs.*

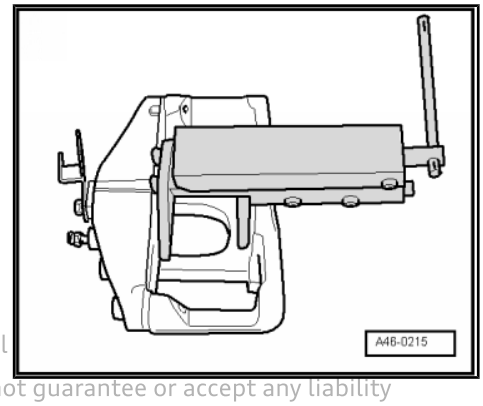
Use only methylated spirits to clean the brake caliper housing.

Installing

When renewing the brake pads, also check the brake disc for wear. Refer to wear limit for brake disc.

– Check brake disc ⇒ “1.2 Brakes, technical data”, page 1 .

– Press back both pistons.



Note

Before inserting new brake pads, press pistons back into cylinders with resetting appliance. Before pressing the piston back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise, fluid can overflow and cause damage, particularly if the reservoir has been topped up.

WARNING

Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.

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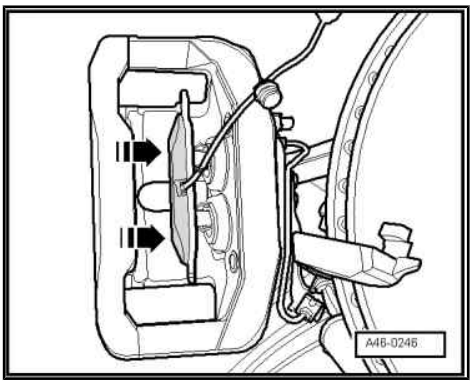
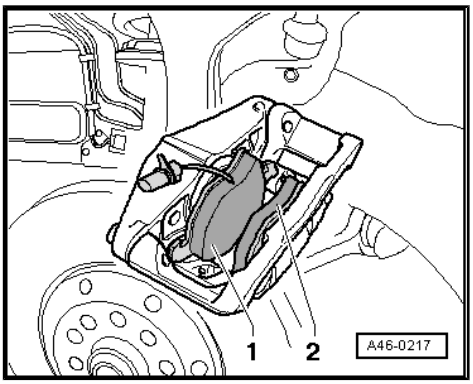
– Insert brake pad with retaining spring and wear indicator into brake caliper housing (piston).

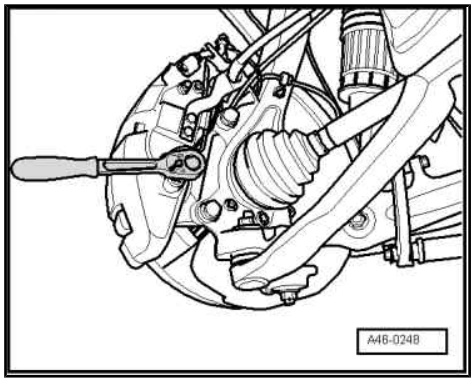


– Fit outer brake pad -2- in brake caliper.



Note

Fit brake pads into brake caliper and install assembly on brake carrier/brake disc.



- Secure brake caliper housing to brake carrier with both guide pins (tighten to 30 Nm).
- Fit both caps.
- Make sure not to twist the brake hose when installing.
- Insert retaining spring into brake caliper housing.
- Attach brake line
- Connect wear indicator connector and insert wire in dust cap and protective cap.
- Fit wheels ⇒ ELSA/ Wheel/Tyre Guide ⇒ Rep. gr. 44 .

Note

- *The retaining spring must be pushed under the brake carrier after engaging onto both studs. If incorrectly installed, the wear of the outer pad cannot be adjusted, and the pedal travel will be increased as a result.*
- *After installing the brake pads, depress the pedal firmly several times with the vehicle stationary, so that the pads are properly seated in their normal operating position.*

- Check brake fluid level and top up if necessary.

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Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

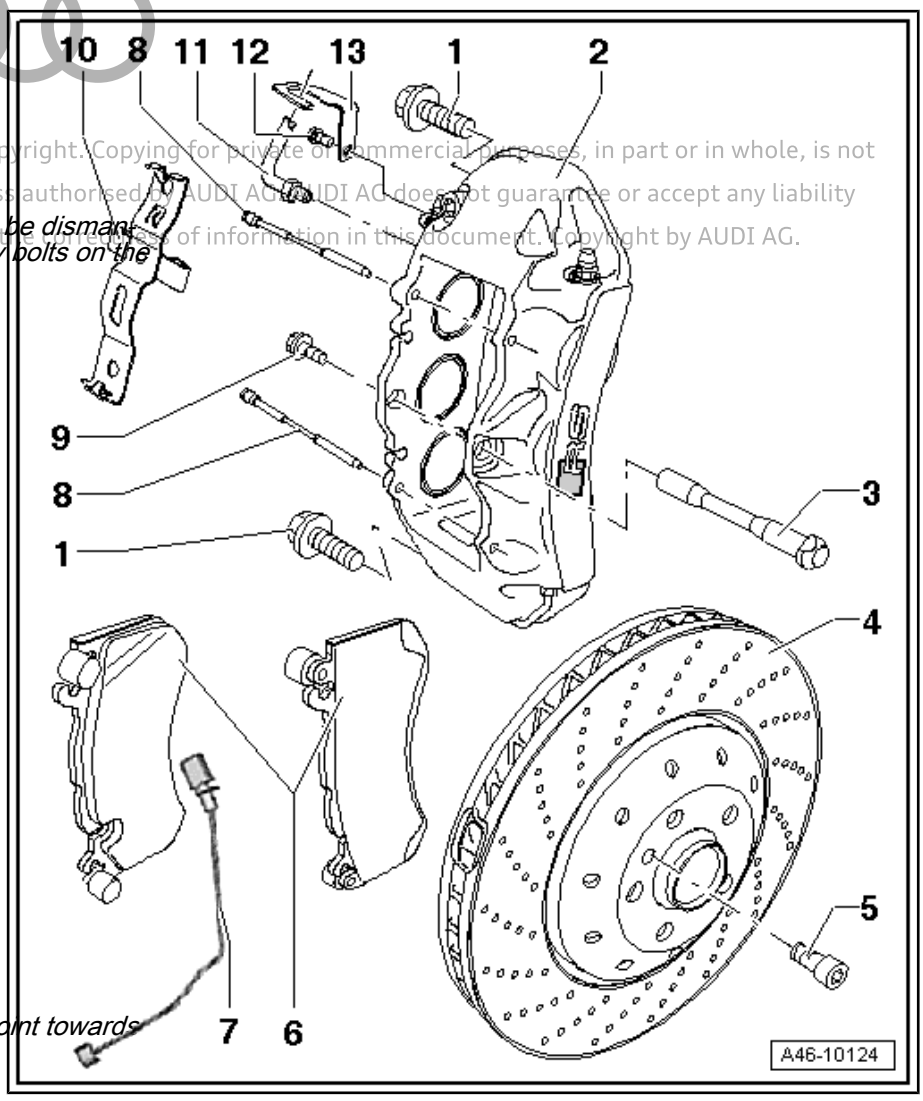
4 Front brakes (steel version) - RS 6

⇒ "4.1 Servicing front brakes (steel version) - RS 6", page 77

4.1 Servicing front brakes (steel version) - RS 6

Note

- *Always install all parts supplied in repair kit.*
- *After renewing brake pads, depress brake pedal firmly several times with vehicle stationary so that the pads are properly seated in their normal operating position.*
- *To draw off brake fluid from brake fluid reservoir use a bleeder bottle which is used only for brake fluid. Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.*
- *Check that the brake caliper moves freely by moving it from side to side.*



1 - Bolt

- ❑ 196 Nm

2 - Brake caliper

Note

Brake caliper must not be dismantled. Do not loosen any bolts on the brake caliper.

- ❑ Detaching and attaching ⇒ page 78
- ❑ Renewing ⇒ page 79

3 - Retaining pin

4 - Brake disc

- ❑ Allocation and wear limit ⇒ page 1
- ❑ Detaching and attaching ⇒ page 85
- ❑ Renewing ⇒ page 86

5 - Bolt

- ❑ 10 Nm

6 - Brake pads

- ❑ With pad wear indicator wire on inner brake pad
- ❑ Ensure correct installation position

Note

The damper weights point towards the brake disc.

- ❑ Allocation and wear limit ⇒ page 1
- ❑ Removing and installing ⇒ page 81

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7 - Pad wear indicator wire

- ❑ On left and right brake caliper
- ❑ On inner brake pad

8 - Pad retaining pins

- ❑ Ensure correct installation position
- ❑ Press through as far as possible from inside to outside

9 - Bolt

- ❑ For centre retaining pin
- ❑ 30 Nm
- ❑ Renew

10 - Pad retaining spring

- ❑ Ensure correct installation position

11 - Brake line connection to brake caliper

- ❑ Tightening torque: 19 Nm
- ❑ Do not loosen unless renewing brake caliper

12 - Bolt

- ❑ For bracket for brake line
- ❑ 10 Nm

13 - Bracket

- ❑ Bolt to brake caliper housing
- ❑ Attach brake line

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4.2 Detaching and attaching front brake caliper - RS 6

Always use new bolts ⇒ ETKA .

Detaching

Special tools and workshop equipment required

- ♦ Torque wrench - V.A.G 1332-
- ♦ Ratchet - V.A.G. 1332/1-
- ♦ Piston resetting appliance - T10145-

– Raise vehicle.

– Remove wheels.

– Unclip brake hose from retainer on wheel bearing housing.

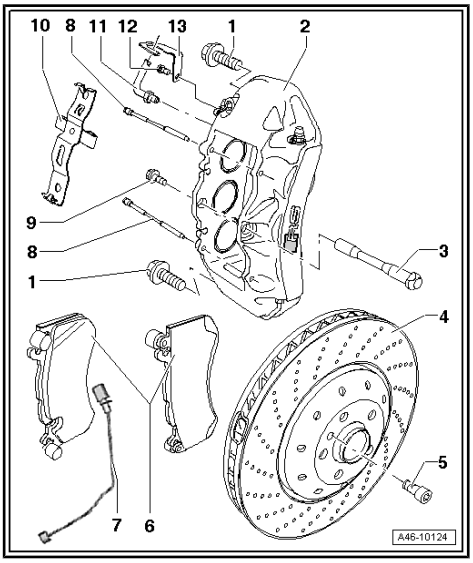
– Unclip pad wear indicator wire.

Note

It might be necessary to press the brake pads back with the piston resetting appliance - T10145- . To do so, position the tool at the backing plates of the installed brake pads and press the brake pads back carefully.

– Remove bolts -1-.

– Carefully detach brake caliper with brake pads installed.



Note

Brake caliper must not be dismantled. Do not loosen any bolts on the brake caliper.

Do not leave brake caliper and brake carrier hanging from brake hose but secure them to bodywork using a suitable cable tie or wire. Take care that brake hose is not damaged by weight of brake components.

WARNING

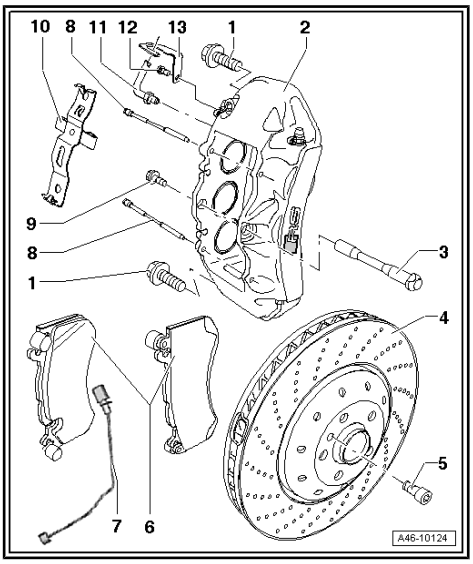
Do not apply brake when brake caliper is removed.

Installing

Always use new bolts ⇒ ETKA .

– Carefully press brake caliper and brake carrier (with brake pads fitted) over brake disc.

Always use new bolts -1- ⇒ ETKA .



– Secure brake caliper with new bolts -1- (196 Nm).

– Clip brake hose into retainer on wheel bearing housing.

– Clip in pad wear indicator wire.

Note

After installing brake caliper, firmly depress brake pedal several times with vehicle stationary, so that the brake pads are properly seated in their normal operating position.

– Fit wheels.

Tightening torque for wheel bolts ⇒ Rep. gr. 44

– Lower vehicle.

Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

4.3 Renewing front brake caliper (RS 6)

Removing

Special tools and workshop equipment required

- Torque wrench - V.A.G 1332-
- Ratchet - V.A.G. 1332/1-
- Brake pedal actuator - V.A.G 1869/2-
- Piston resetting appliance - T10145-

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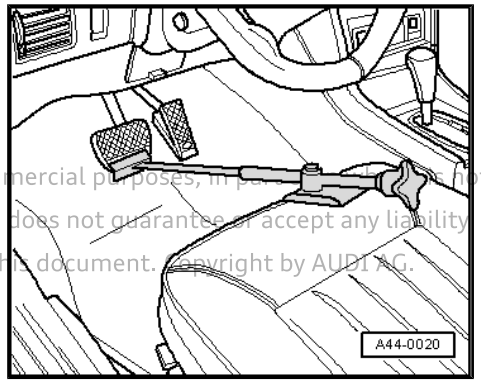
– Insert brake pedal actuator -V.A.G 1869/2- between brake pedal and driver's seat (depress brake pedal at least 60mm). This closes the valves in the brake master cylinder and stops the brake fluid reservoir from running empty.



– Raise vehicle.
– Remove wheels.
– Connect hose of bleeder bottle to bleeder screw of front brake caliper.
– Open bleeder screw on front brake caliper to release pressure from brake system.
– Close bleeder screw.

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Note

Do not remove brake pedal actuator -V.A.G 1869/2- .

– Remove brake pads ⇒ page 81 .

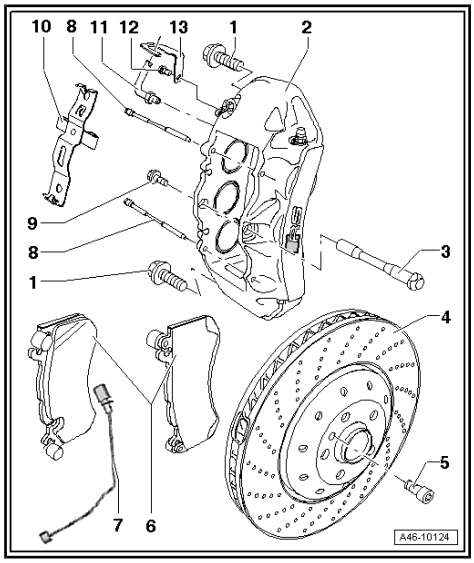
Note

- *Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.*
- *The brake disc is secured with a bolt.*

– Disconnect brake line -11-.
– Remove bolts -1-.
– Remove brake caliper from vehicle.

Installing

– Install brake caliper.



Always use new bolts -1- ⇒ ETKA .

– Secure brake caliper with new bolts -1- (196 Nm).

– Connect brake line -11- to brake caliper and tighten connection.

Brake line -11- must be seated in bracket.

– Clip in pad wear indicator wire.

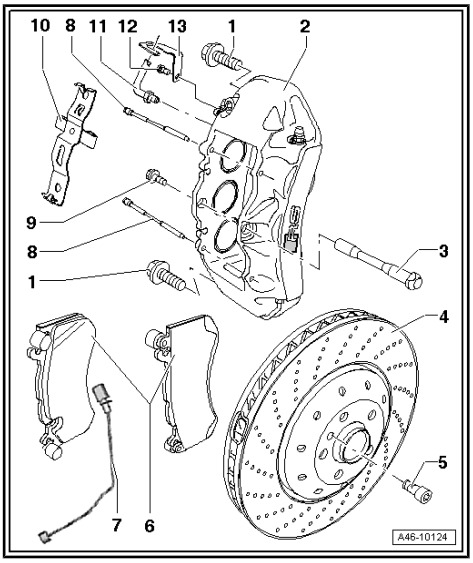
– Install brake pads ⇒ page 81 .

– Bleed brake system ⇒ page 154 .

– Fit wheels.

Tightening torque for wheel bolts ⇒ Rep. gr. 44

– Lower vehicle.



Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

4.4 Removing and installing front brake pads - RS 6

When renewing the brake pads, also check the brake disc for wear. Refer to wear limit for brake disc
⇒ "1.2 Brakes, technical data", page 1 .

Removing

Special tools and workshop equipment required

♦ Piston resetting appliance - T10145-

Note

♦

♦ *Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.*

♦ *When installing brake discs, note direction of travel -indicated by arrow on brake disc- and fitting location -left or right-.*

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– Raise vehicle.

– Remove wheels.

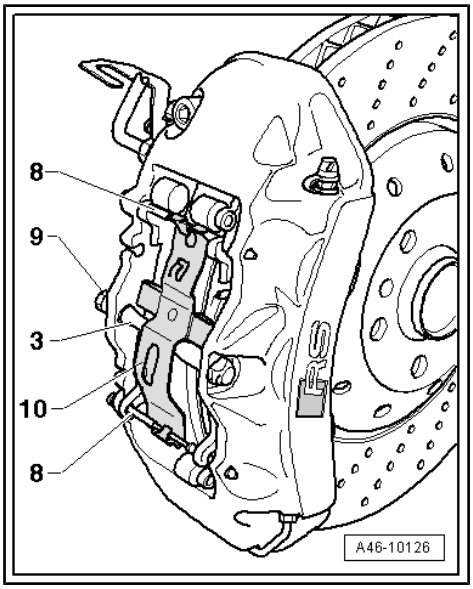
Do not remove the brake caliper to remove the brake pads.

– Unplug electrical connector for pad wear indicator wire.

– Unclip pad wear indicator wire.

– Remove bolt -9-.
– Pull retaining pin -3- out of brake caliper.
– Press back brake pistons with brake pads installed using piston resetting appliance - T10145- .

To do so, position tool -T10145- at backing plates of installed brake pads and carefully press brake pads back into brake caliper.



Note

Before pressing the piston back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise, fluid can overflow and cause damage, particularly if the reservoir has been topped up.

WARNING

Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.

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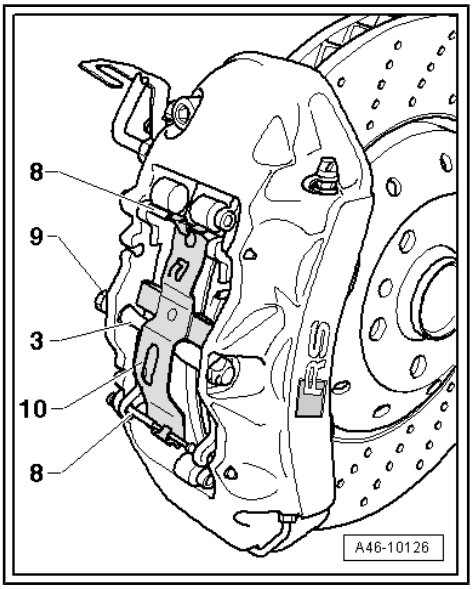
– Press one pad retaining pin -8- out of brake caliper from outside to inside with a punch.



Note

Make sure that paint on brake caliper is not scratched or damaged.

Caution

The pad retaining spring is under tension. Place hand in front of it for protection.

– Use a suitable punch to press second pad retaining pin -8- inwards out of brake caliper

Note

Make sure that paint on brake caliper is not scratched or damaged.

– Take brake pads out of brake caliper.

WARNING

Never press the brake pedal with the brake pads removed.

– Clean brake caliper.

Use only methylated spirits to clean the brake caliper housing.

Installing

When renewing the brake pads, also check the brake disc for wear. Refer to wear limit for brake disc.

– Check brake disc ⇒ “1.2 Brakes, technical data”, page 1 .

Note

Before inserting new brake pads, press piston back into cylinder with piston resetting appliance - T10145- . Before pressing the piston back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise, fluid can overflow and cause damage, particularly if the reservoir has been topped up.

To do so, position tool -T10145- at backing plates of old brake pads (installed) and carefully press brake pads back into brake caliper.

– If fitted, pull protective foil off pad backplates.

– Insert brake pads into brake caliper.

Note

The brake pad with the wear indicator wire is located on the inside.

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Note

The damper weights point towards the brake disc.

– Insert pad retaining spring -10-.

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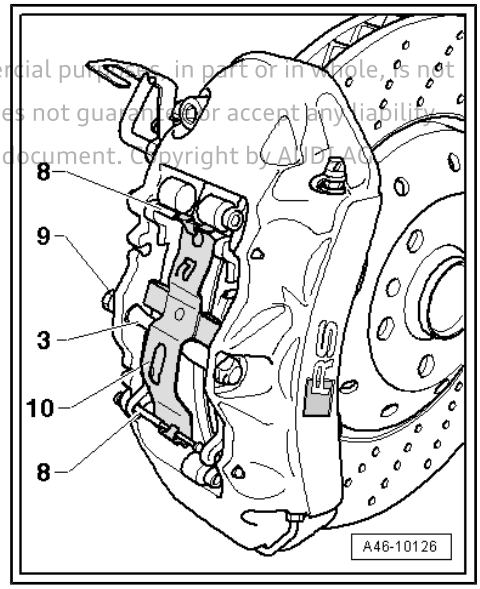
Note

Ensure that pad retaining spring is seated correctly.

– Push one pad retaining pin -8- through hole in brake caliper from inside to outside. If necessary, use punch to press pad retaining pin as far as stop.



Note

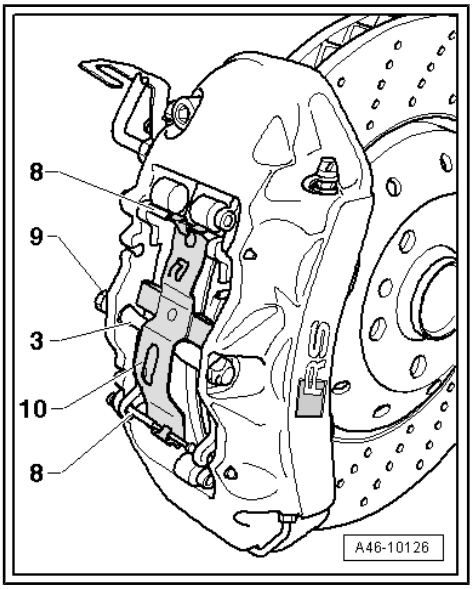
- *The pad retaining spring is located under the pad retaining pin. The spring at the end of the pad retaining pin holds the pad retaining pin in place in the brake caliper.*
- *Make sure that paint on brake caliper is not scratched or damaged.*

– Press second pad retaining pin -8- through hole in brake caliper from inside to outside. While doing so, press down pad retaining spring. If necessary, use punch to press pad retaining pin as far as stop.

Note

- *The pad retaining spring is located under the pad retaining pin. The spring at the end of the pad retaining pin holds the pad retaining pin in place in the brake caliper.*
- *Make sure that paint on brake caliper is not scratched or damaged.*

– Slide retaining pin -3- through brake caliper from outside to inside.



Note

Make sure that the projections on the retaining pin and on the brake caliper coincide. The retaining pin must be pressed through as far as stop.

Note

The pad retaining spring -10- is located above the retaining pin -3-.

– Renew bolt -9-.
– Fit bolt -9- and tighten to 30 Nm.
– Connect pad wear indicator wire.
– Clip in pad wear indicator wire.
– Fit wheels ⇒ ELSA/ Wheel/Tyre Guide ⇒ Rep. gr. 44 .

Note

After installing the brake pads, depress the pedal firmly several times with the vehicle stationary, so that the pads are properly seated in their normal operating position.

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– Check brake fluid level and top up if necessary.

Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

4.5 Detaching and attaching front brake disc - RS 6

Detaching

– Raise vehicle.
– Remove wheels.
– Detach brake caliper ⇒ page 78 .

Do not leave brake caliper and brake carrier hanging from brake hose but secure them to bodywork using a suitable cable tie or wire. Take care that brake hose is not damaged by weight of brake components.

– Remove locating bolt -5- from brake disc, holding brake disc in position.

– Take brake disc off wheel hub.

Note

Take care to keep the brake disc straight when taking it off the wheel hub.

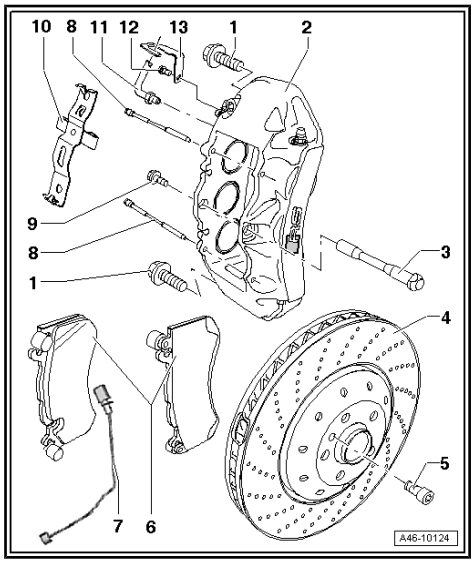
Installing

– Clean contact surfaces of wheel hub and brake disc and remove corrosion.

– Fit brake disc onto wheel hub.

Note

Take care to keep the brake disc straight when fitting it onto the wheel hub.

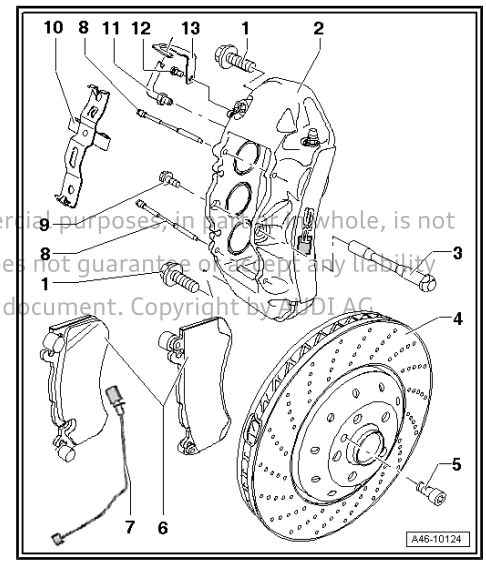


– Screw in locating bolt -5- and tighten to 10 Nm.

– Attach brake caliper ⇒ page 78 .

– Fit wheels.

Tightening torque for wheel bolts ⇒ Rep. gr. 44



Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

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4.6 Renewing front brake disc - RS 6

WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

Removing

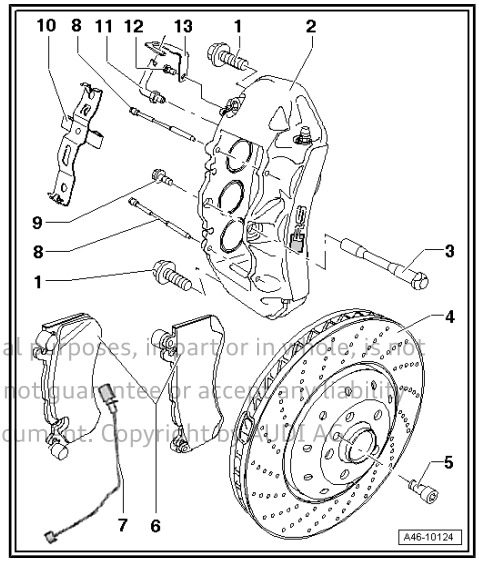
– Raise vehicle.

– Remove wheels.

– Remove brake pads ⇒ page 81 .

– Detach brake caliper ⇒ page 78 .

Do not leave brake caliper hanging from brake hose but secure it to bodywork using a suitable cable tie or wire. Take care that brake hose is not damaged by weight of brake components.



– Remove locating bolt -5- from brake disc, holding brake disc in position.
– Take brake disc off wheel hub.

Note

Take care to keep the brake disc straight when taking it off the wheel hub.

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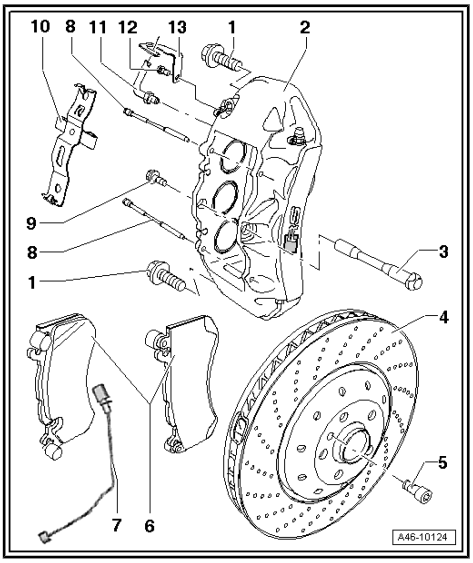
Installing

– Clean contact surfaces of wheel hub and remove corrosion.
– Fit brake disc onto wheel hub.

Note

Take care to keep the brake disc straight when fitting it onto the wheel hub.



– Screw in locating bolt -5- and tighten to 10 Nm.
– Attach brake caliper ⇒ page 78 .
– Install brake pads ⇒ page 81 .
– Fit wheels.

Tightening torque for wheel bolts ⇒ Rep. gr. 44

Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

5 Ceramic front brakes

⇒ “5.1 Servicing ceramic front brakes”, page 88

WARNING

The brake disc rotor and the brake disc hub are bolted together and must NOT be separated. DO NOT slacken the bolted connection on the brake disc hub.

5.1 Servicing ceramic front brakes

The ceramic brake discs must always be checked for damage and wear when renewing the brake pads.

- ⇒ “2 Assessment of ceramic brake discs”, page 6
- ⇒ “3 Assessing degree of wear on ceramic brake discs”, page 10

Note

- *Install all parts supplied in repair kit.*
- *After renewing brake pads, depress brake pedal firmly several times with vehicle stationary so that the pads are properly seated in their normal operating position.*
- *To draw off brake fluid from brake fluid reservoir use a bleeder bottle which is used only for brake fluid. Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.*

Illustration shows front left brake caliper.

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1 - Brake caliper

Illustration: Front left brake caliper

Note

Brake caliper must not be dismantled. Do not loosen any bolts on the brake caliper.

- ❑ Detaching and attaching ⇒ page 90
- ❑ Renewing ⇒ page 92

2 - Bleeder screws

- ❑ 2x on each brake caliper

Note

Bleed at each bleeder screw.

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3 - Bolts

- ❑ 196 Nm
- ❑ Always use new bolts

4 - Bracket

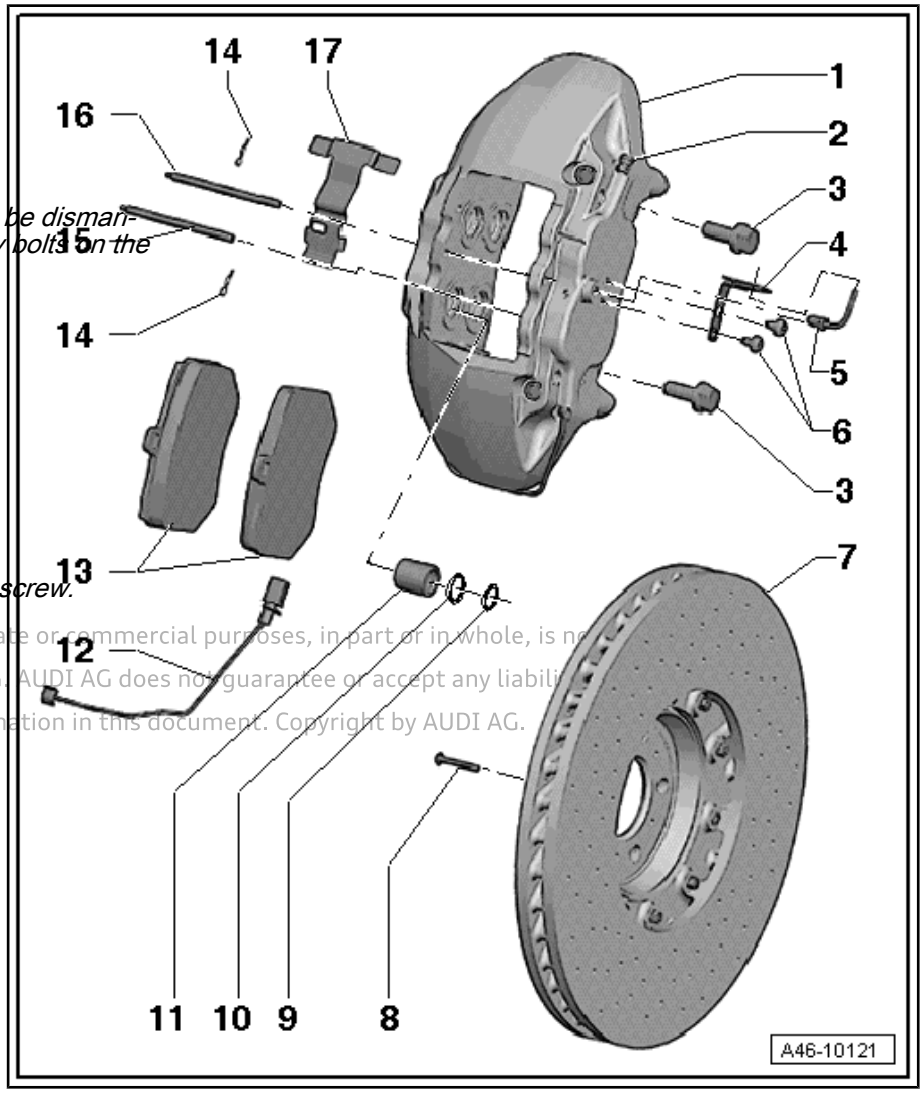
- ❑ For brake line

5 - Brake line connection to brake caliper

- ❑ 19 Nm

6 - Bolts

- ❑ For bracket for brake line
- ❑ 10 Nm



7 - Brake disc

- ❑ Allocation and wear limit ⇒ page 1
- ❑ Wear characteristics ⇒ page 10
- ❑ Detaching and attaching ⇒ page 100
- ❑ Renewing ⇒ page 101

8 - Bolt

- ❑ 10 Nm

9 - Seal

10 - Seal

11 - Brake piston

12 - Pad wear indicator wire

- ❑ On left and right brake caliper
- ❑ On inner brake pad

13 - Brake pads

- ❑ With pad wear indicator wire on inner brake pad
- ❑ Ensure correct installation position
- ❑ Allocation and wear limit ⇒ page 1
- ❑ Removing and installing ⇒ page 95

14 - Securing clip

Note

Lock each retaining pin with a securing clip

15 - Pin for pad retaining spring

- ❑ Ensure correct installation position
- ❑ Press through as far as possible from inside to outside

Note

Lock each retaining pin with a securing clip

16 - Brake pad retaining pin

- ❑ Ensure correct installation position
- ❑ Press through as far as possible from inside to outside

Note

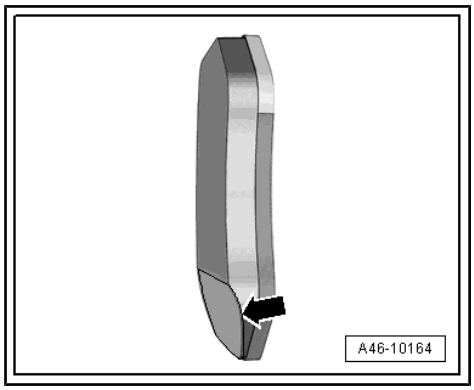
Lock each retaining pin with a securing clip

17 - Brake pad retaining spring

- ❑ Ensure correct installation position

New-generation brake pads

Make sure the brake pads are installed in the correct position. The brake pad with wear indicator is located on the inside. The chamfered side of the brake pad -arrow- faces downwards when installed.



5.2 Detaching and attaching front brake caliper (ceramic brakes)

Always use new bolts ⇒ ETKA .

Detaching

Special tools and workshop equipment required

- ♦ Torque wrench - V.A.G 1332-
- ♦ Ratchet - V.A.G. 1332/1-
- ♦ Piston resetting appliance - T10145-

– Raise vehicle.

– Remove wheels.

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Caution

On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins (from vehicle tool kit) into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.

– Unclip brake hose from retainer on wheel bearing housing.

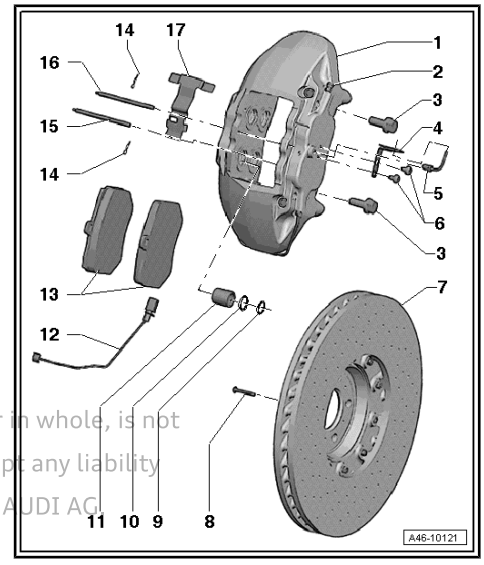
– Unclip pad wear indicator wire.

Note

It might be necessary to press the brake pads back with the piston resetting appliance - T10145- . To do so, position the tool at the backing plates of the installed brake pads and press the brake pads back carefully.

– Remove bolts -3-.

Illustration: Front left brake caliper



– Carefully detach brake caliper with brake pads.

Note

Brake caliper must not be dismantled. Do not loosen any bolts on the brake caliper.

Do not leave brake caliper and brake carrier hanging from brake hose but secure them to bodywork using a suitable cable tie or wire. Take care that brake hose is not damaged by weight of brake components.

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WARNING

Do not apply brake when brake caliper is removed.

Installing

Always use new bolts ⇒ ETKA .

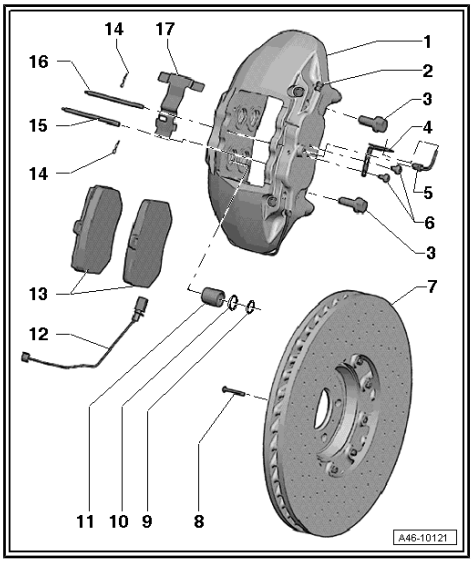
– Carefully press brake caliper and brake carrier (with brake pads fitted) over brake disc.

Always use new bolts -1- ⇒ ETKA .

– Secure brake caliper with new bolts -3- (196 Nm).

– Clip brake hose into retainer on wheel bearing housing.

– Clip in pad wear indicator wire.



Note

After installing brake caliper, firmly depress brake pedal several times with vehicle stationary, so that the brake pads are properly seated in their normal operating position.

– Fit wheels.

Tightening torque for wheel bolts ⇒ Rep. gr. 44

– Lower vehicle.

Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

5.3 Renewing front brake caliper (ceramic brakes)

Note

- *Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.*
- *After replacing brake pads, depress brake pedal firmly several times with vehicle stationary so that the pads are properly seated in their normal operating position.*

Removing

Special tools and workshop equipment required

- Torque wrench - V.A.G 1332-
- Ratchet - V.A.G. 1332/1-
- Brake pedal actuator - V.A.G 1869/2-
- Piston resetting appliance - T10145-

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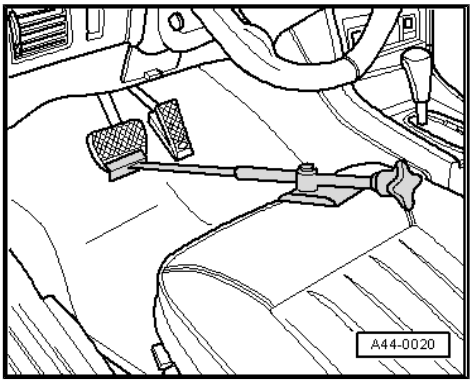
– Insert brake pedal actuator -V.A.G 1869/2- between brake pedal and driver's seat (depress brake pedal at least 60mm). This closes the valves in the brake master cylinder and stops the brake fluid reservoir from running empty.
– Raise vehicle.
– Remove wheels.



Caution

On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins (from vehicle tool kit) into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.

– Connect hose of bleeder bottle to bleeder screw of front brake caliper.
– Open bleeder screw on front brake caliper to release pressure from brake system.
– Close bleeder screw.

Note

Do not remove brake pedal actuator -V.A.G 1869/2- .

– Remove brake pads ⇒ page 95 .

Note

- *Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.*
- *The brake disc is secured with a bolt.*

– Disconnect pad wear indicator wire.
– Detach brake line.

Illustration: Front left brake caliper

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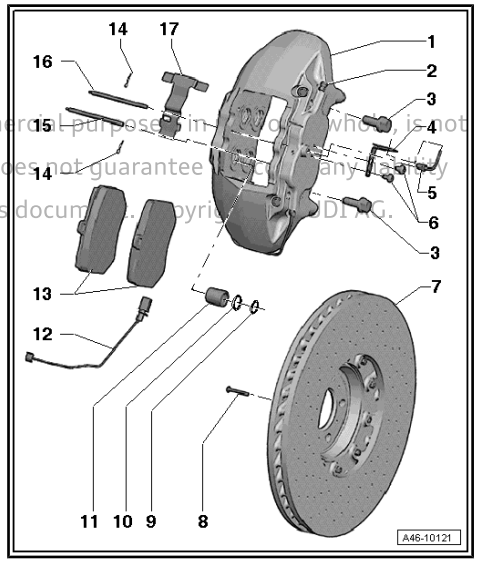
– Remove bolts -3-.
– Remove brake caliper from vehicle.

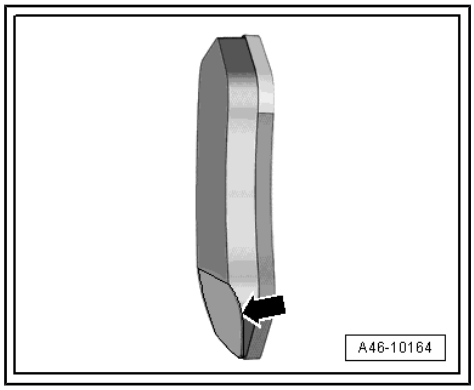
Installing

New-generation brake pads



Make sure the brake pads are installed in the correct position. The brake pad with wear indicator is located on the inside. The chamfered side of the brake pad -arrow- faces downwards when installed.

– Install brake caliper.



– Secure brake caliper with new bolts -3- (196 Nm).

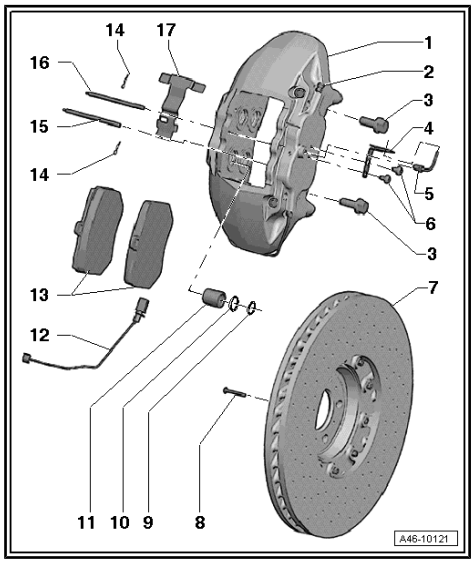
Always use new bolts -3- ⇒ ETKA .

– Connect brake line to brake caliper and tighten connection (19 Nm).

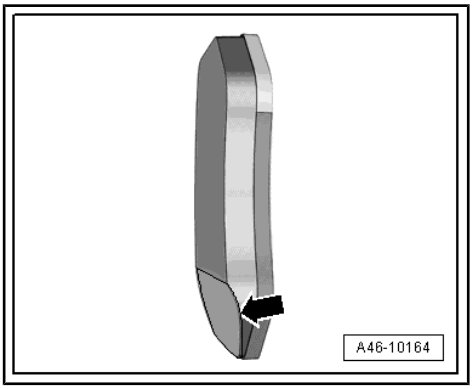
Brake line -5- must be seated in bracket.

– Connect and clip in pad wear indicator wire.
– Install brake pads ⇒ page 95 .

New-generation brake pads



Make sure the brake pads are installed in the correct position. The brake pad with wear indicator is located on the inside. The chamfered side of the brake pad -arrow- faces downwards when installed.



– Bleed brake system ⇒ page 154 .

– Fit wheels.

Tightening torque for wheel bolts ⇒ Rep. gr. 44

– Lower vehicle.

Caution

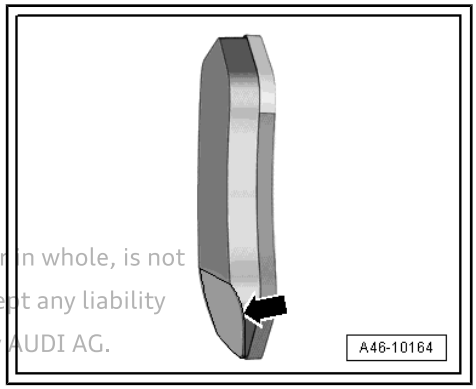
Make sure that the brakes work properly before the vehicle is driven on the road.

5.4 Removing and installing front brake pads (ceramic brakes)

The ceramic brake discs must always be checked for damage and wear when renewing the brake pads.

- ⇒ “2 Assessment of ceramic brake discs”, page 6
- ⇒ “3 Assessing degree of wear on ceramic brake discs”, page 10

Make sure the brake pads are installed in the correct position. The brake pad with wear indicator is located on the inside. The chamfered side of the brake pad -arrow- faces downwards when installed.



Note

Brake caliper must not be dismantled. Do not loosen any bolts on the brake caliper.

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Removing

Special tools and workshop equipment required

- Piston resetting appliance - T10145-

Note

- *Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.*
- *After replacing brake pads, depress brake pedal firmly several times with vehicle stationary so that the pads are properly seated in their normal operating position.*

– Raise vehicle.

– Remove wheels.

Caution

On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins (from vehicle tool kit) into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.

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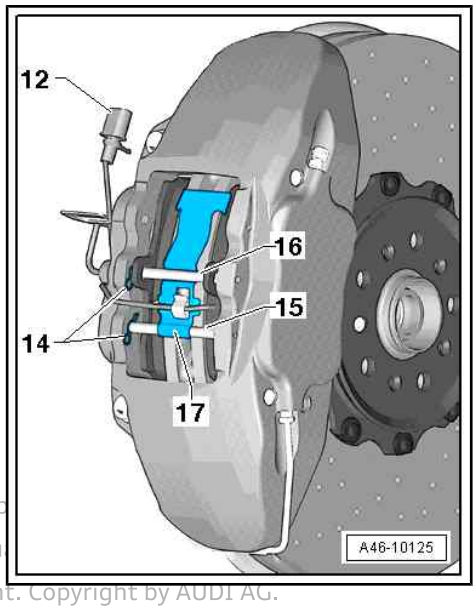
Do not remove the brake caliper to remove the brake pads.

Illustration: Front left brake caliper



– Unplug electrical connector for pad wear indicator wire -12-.
– Unclip pad wear indicator wire.
– Pull securing clips -14- out of pin for pad retaining spring -15- and pad retaining pin -16-.
– Press pin for pad retaining spring -15- through brake caliper from outside to inside.
– Pull pad retaining pin -16- out of brake caliper from outside to inside.

WARNING

Pad retaining spring is under tension; hold your hand over the spring to avoid risk of injury.

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– Remove pad retaining spring.
– Press back brake pistons with brake pads installed using piston resetting appliance - T10145-.

To do so, position tool -T10145- at backing plates of installed brake pads and carefully press brake pads back into brake caliper.

Note

Before pressing the piston back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise, fluid can overflow and cause damage, particularly if the reservoir has been topped up.

WARNING

Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.

WARNING

Do not apply brake when brake pads are removed.

– Clean brake caliper.

Use only methylated spirits to clean the brake caliper housing.

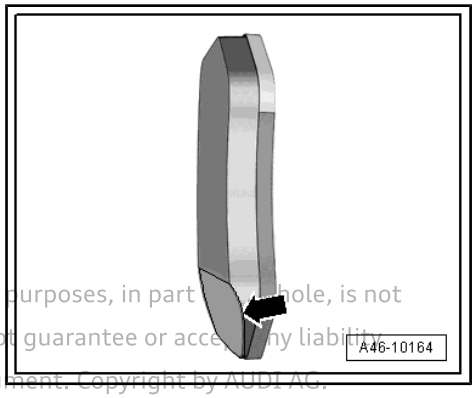
Installing

The ceramic brake discs must always be checked for damage and wear when renewing the brake pads.

- ⇒ “2 Assessment of ceramic brake discs”, page 6
- ⇒ “3 Assessing degree of wear on ceramic brake discs”, page 10

– Check brake disc.

Make sure the brake pads are installed in the correct position. The brake pad with wear indicator is located on the inside. The chamfered side of the brake pad -arrow- faces downwards when installed.



Note

Before inserting new brake pads, press pistons back into cylinder with piston resetting appliance - T10145- . Before pressing the piston back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise, fluid can overflow and cause damage, particularly if the reservoir has been topped up.

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To do so, position tool -T10145- at backing plates of old brake pads (installed) and carefully press brake pads back into brake caliper.

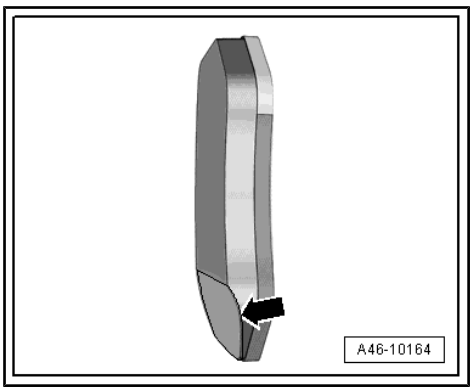
– If fitted, pull protective foil off pad backplates.

– Insert brake pads into brake caliper.

Ensure correct installation position

New-generation brake pads

Make sure the brake pads are installed in the correct position. The brake pad with wear indicator is located on the inside. The chamfered side of the brake pad -arrow- faces downwards when installed.



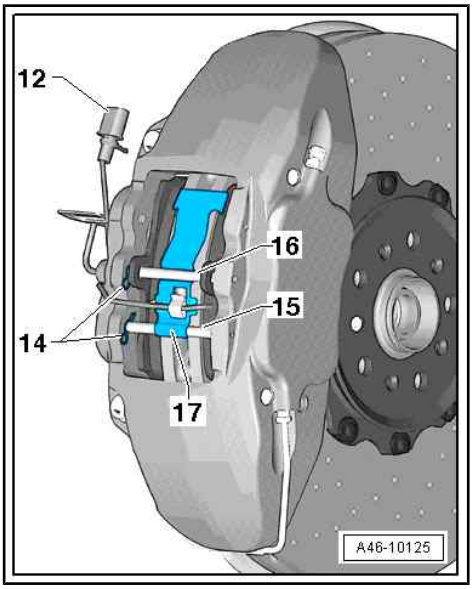
Note

The pad with the wear indicator wire is located on the inside.

– Insert pad retaining spring -17- into brake caliper and hold in position.

Ensure correct installation position

– Slide pad retaining pin -16- through brake caliper and brake pads from inside to outside as far as stop. If necessary, use punch to press pin as far as stop.



Note

Make sure that paint on brake caliper is not scratched or damaged.

Note

The hole for the securing clip is located on the inside of the brake caliper.

– Slide pin -15- for pad retaining spring through brake caliper from inside to outside as far as stop. If necessary, use punch to press pin as far as stop.

Note

Make sure that paint on brake caliper is not scratched or damaged.

Note

The hole for the securing clip is located on the inside of the brake caliper.

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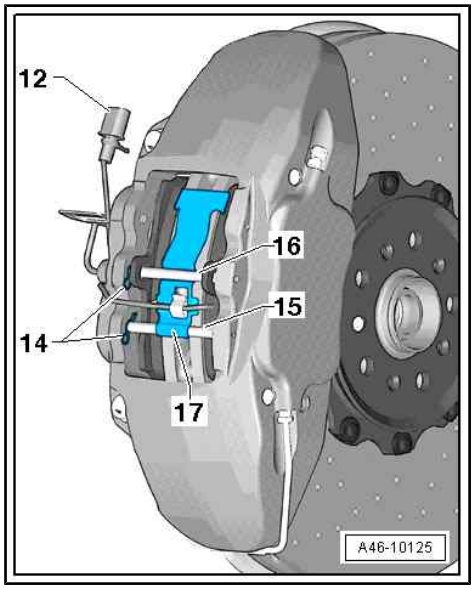
Note

The pad retaining spring must be under tension. The pad retaining spring -17- must be seated underneath the pad retaining pin -16- and above the pin for the pad retaining spring -15-.



- Lock each retaining pin with a clip -14-.
- Connect pad wear indicator wire.
- Clip in pad wear indicator wire.
- Fit wheels ⇒ ELSA/ Wheel/Tyre Guide ⇒ Rep. gr. 44 .
- Lower vehicle.

Note

After replacing brake pads, depress brake pedal firmly several times with vehicle stationary so that the pads are properly seated in their normal operating position.

- Check brake fluid level and top up if necessary.

Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

5.5 Detaching and attaching front brake disc (ceramic brakes)

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WARNING

The brake disc rotor and the brake disc hub are bolted together and must NOT be separated. DO NOT slacken the bolted connection on the brake disc hub.

- Raise vehicle.
- Remove wheels.

Caution

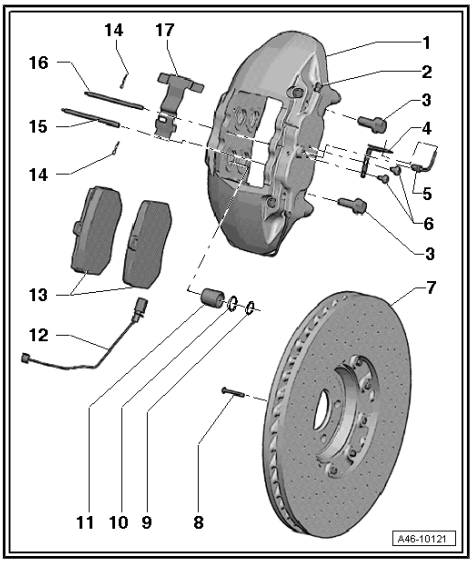
On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins (from vehicle tool kit) into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.

- Detach brake caliper ⇒ page 90 .

Do not leave brake caliper and brake carrier hanging from brake hose but secure them to bodywork using a suitable cable tie or wire. Take care that brake hose is not damaged by weight of brake components.

– Remove locating bolt -8- from brake disc, holding brake disc in position.

– Take brake disc off wheel hub.



Note

Take care to keep the brake disc straight when taking it off the wheel hub.

Installing

– Clean contact surfaces of wheel hub and brake disc and remove corrosion.

– Fit brake disc onto wheel hub.

Note

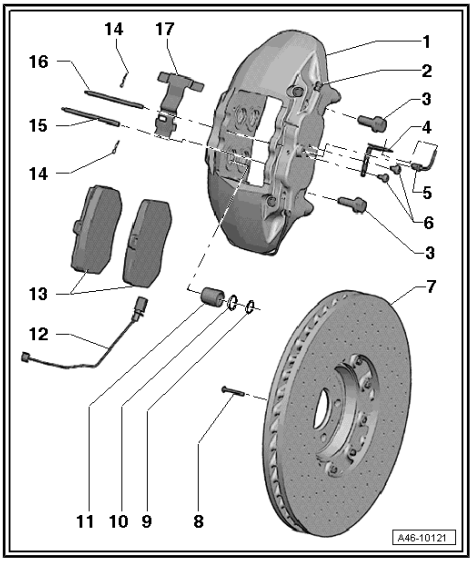
Take care to keep the brake disc straight when fitting it onto the wheel hub.

– Screw in locating bolt -8- and tighten to 10 Nm.

– Attach brake caliper ⇒ page 90 .

– Fit wheels.

Tightening torque for wheel bolts ⇒ Rep. gr. 44



Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

5.6 Renewing front brake disc (ceramic brakes)

WARNING

The brake disc rotor and the brake disc hub are bolted together and must NOT be separated. DO NOT slacken the bolted connection on the brake disc hub.

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WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

Removing

– Raise vehicle.

– Remove wheels.

Caution

On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins (from vehicle tool kit) into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.

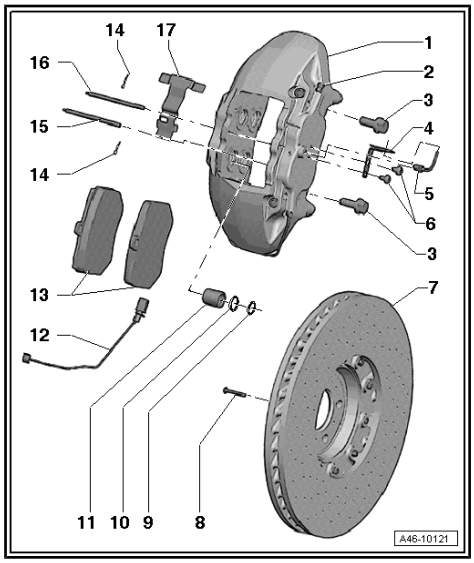
– Remove brake pads ⇒ page 95 .

– Detach brake caliper ⇒ page 90 .

Do not leave brake caliper hanging from brake hose but secure it to bodywork using a suitable cable tie or wire. Take care that brake hose is not damaged by weight of brake components.

– Remove locating bolt -8- from brake disc, holding brake disc in position.

– Take brake disc off wheel hub.



Note

Take care to keep the brake disc straight when taking it off the wheel hub.

Installing

– Clean contact surfaces of wheel hub and remove corrosion.

– Fit brake disc onto wheel hub.

Note

Take care to keep the brake disc straight when fitting it onto the wheel hub.

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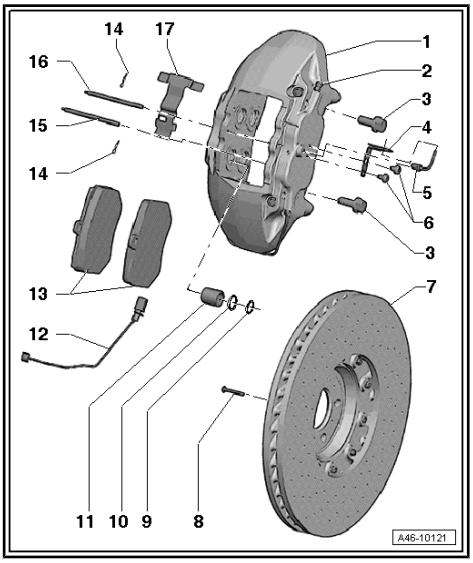
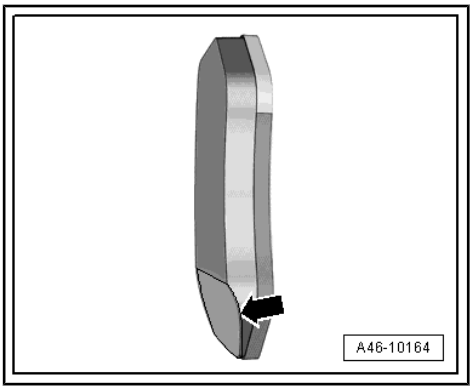
– Screw in locating bolt -8- and tighten to 10 Nm.
– Attach brake caliper ⇒ page 90 .
– Install brake pads ⇒ page 95 .

New-generation brake pads



Make sure the brake pads are installed in the correct position. The brake pad with wear indicator is located on the inside. The chamfered side of the brake pad -arrow- faces downwards when installed.



– Fit wheels.

Tightening torque for wheel bolts ⇒ Rep. gr. 44

Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

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6 Rear brakes, electronic parking brake and handbrake (EPB)

⇒ “6.1 Servicing rear brakes (including ceramic brakes) - all models”, page 104

6.1 Servicing rear brakes (including ceramic brakes) - all models

Steel version brakes:

When renewing the brake pads, also check the brake disc for wear. Refer to wear limit for brake disc
⇒ “1.2 Brakes, technical data”, page 1 .

Ceramic brakes:

The ceramic brake discs must always be checked for damage and wear when renewing the brake pads.

- ⇒ “2 Assessment of ceramic brake discs”, page 6
- ⇒ “3 Assessing degree of wear on ceramic brake discs”, page 10

Rear brakes with automatic adjustment

Note

Install all parts supplied in repair kit.

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1 - Self-locking bolt (Torx 30), tightening torque 12 Nm

2 - Actuator motor for electronic parking brake and handbrake

- ❑ Removing and installing control unit for electronic parking brake and handbrake ⇒ page 125
- ❑ Removing and installing actuator motor ⇒ page 126

3 - Seal

- ❑ Always renew

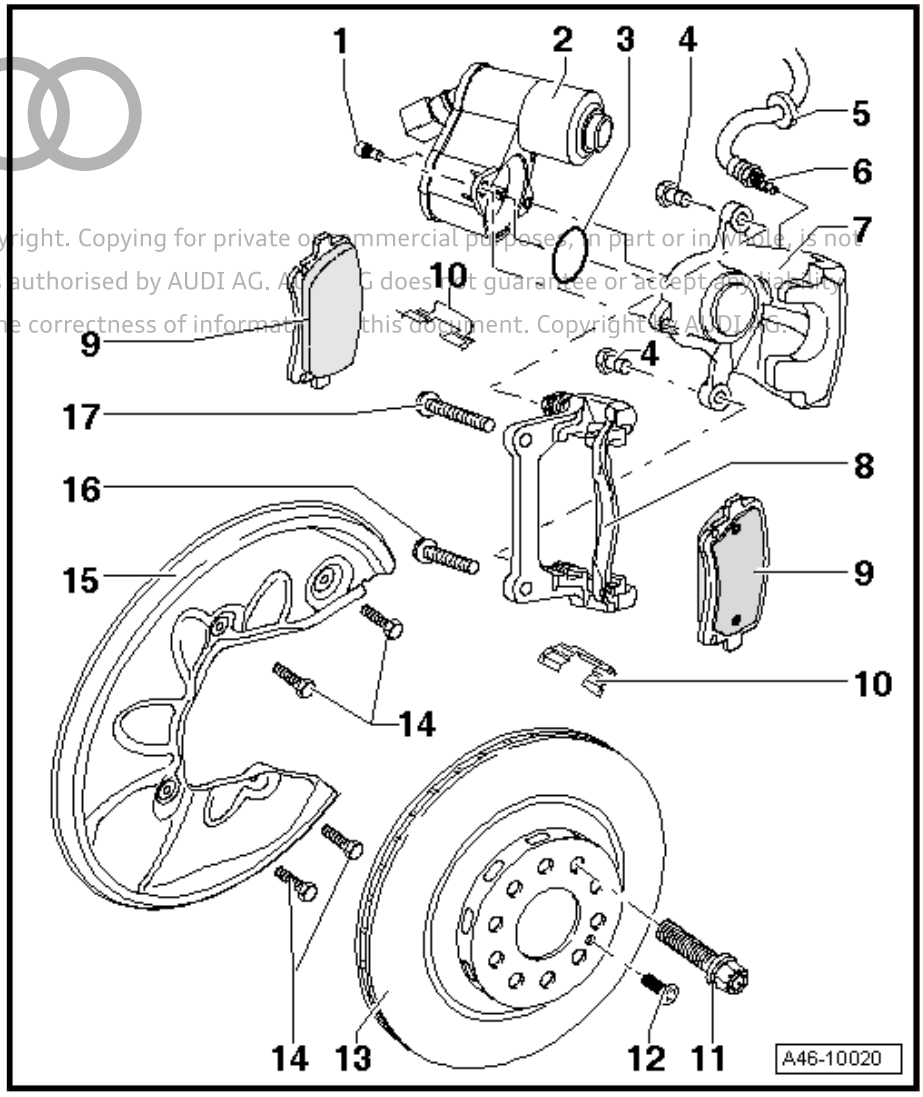
4 - Self-locking bolt, 35 Nm

- ❑ Always renew
- ❑ Counter-hold guide pin when loosening and tightening

5 - Spacer

6 - Brake hose

- ❑ To brake caliper, tightening torque 12 Nm
- ❑ Do not disconnect brake line when changing brake pads
- ❑ Make sure that the locking lugs are fitted properly in the bracket
- ❑ Do not twist hose when



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installing

7 - Brake caliper housing

- ❑ Do not disconnect brake hose when changing brake pads
- ❑ Servicing brake caliper ⇒ page 150
- ❑ The brake carrier can be mounted together with the brake caliper

8 - Brake carrier with guide pins and protective caps

- ❑ Replacement carriers are supplied assembled and with sufficient grease on guide pins
- ❑ If protective caps or guide pins are damaged, renew using repair kit. Use grease sachet supplied to lubricate guide pins.
- ❑ The brake carrier can be mounted together with the brake caliper

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9 - Brake pads

- ❑ Wear limit ⇒ page 1
- ❑ Always renew on both sides of axle
- ❑ Removing and installing ⇒ page 107
- ❑ Checking pad thickness ⇒ Maintenance ; Booklet 405
- ❑ The brake carrier can be mounted together with the brake caliper

10 - Pad retainer

- ❑ Always renew when changing pads

11 - Wheel bolts

- ❑ Fit wheels ⇒ Wheels and tyres; Rep. gr. 44 .

12 - Cross-head bolt

- ❑ Tightening torque: 5 Nm

13 - Brake disc

- ❑ Wear limit ⇒ page 1
- ❑ On vehicles with a 16" brake system, the brake carrier must be removed prior to removing the brake discs
- ❑ Detach brake caliper prior to removing
- ❑ Allocation of brake discs ⇒ page 1

WARNING

If one brake disc is damaged or worn, the other discs must also be checked for damage and wear.

14 - Hexagon bolts, 10 Nm

15 - Splash plate for brakes

16 - Ribbed bolts

- ❑ M 12 x 1.5 x 60
- ❑ Always renew
- ❑ For bottom bolt: set torque wrench - V.A.G 1332- to 115 Nm to tighten the bottom bolt. This tightening torque only applies when using interchangeable head - T40065- on the left side and interchangeable head - T40066- on the right side.

17 - Ribbed bolts

- ❑ M 12 x 1.5 x 60
- ❑ Always renew
- ❑ Tightening torque for top bolt: 140 Nm

6.2 Removing and installing brake pads

Steel version brakes:

When renewing the brake pads, also check the brake disc for wear. Refer to wear limit for brake disc
⇒ “1.2 Brakes, technical data”, page 1 .

Ceramic brakes:

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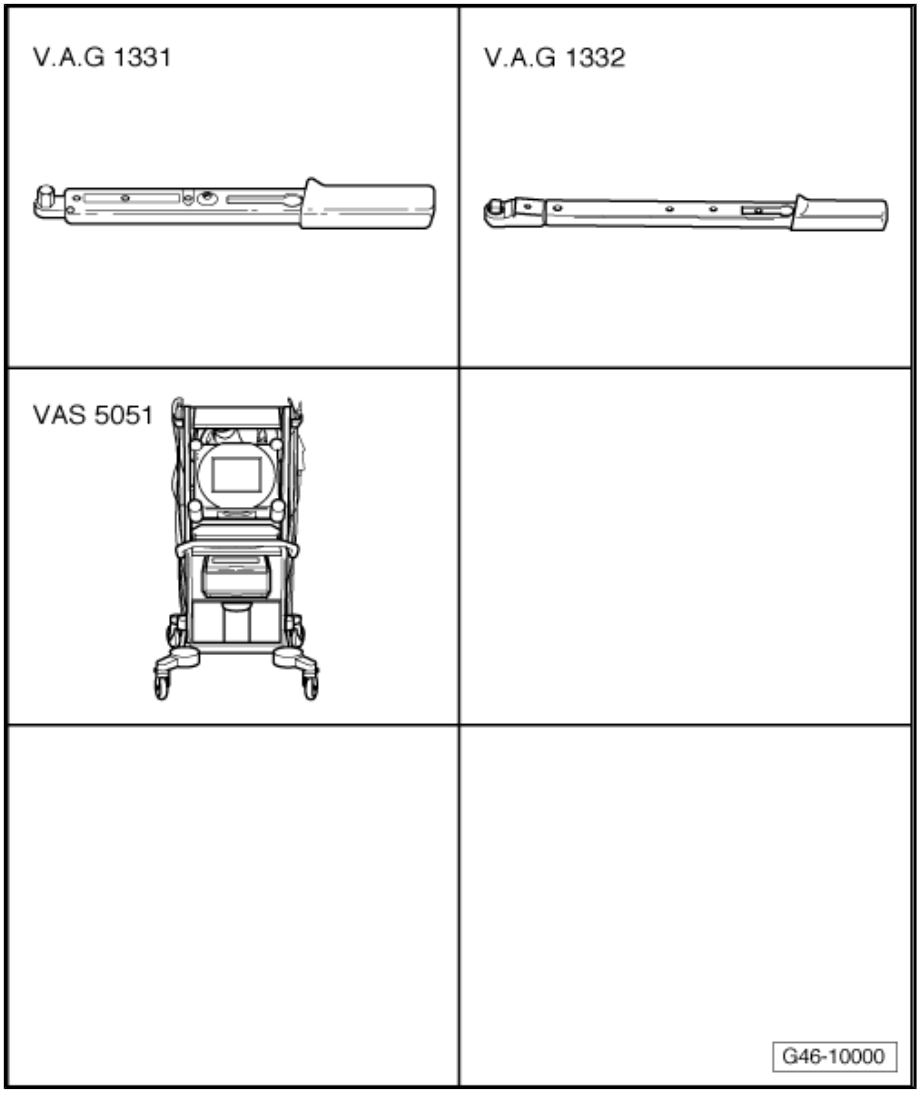
The ceramic brake discs must always be checked for damage and wear when renewing the brake pads.

- ⇒ “2 Assessment of ceramic brake discs”, page 6
- ⇒ “3 Assessing degree of wear on ceramic brake discs”, page 10

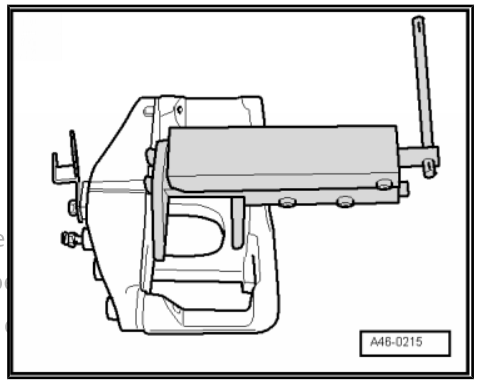
Special tools and workshop equipment required



- Torque wrench - V.A.G 1331-
- Torque wrench - V.A.G 1332-
- Vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-
- Tool insert - T40065-
- Tool insert - T40066-

Special tools and workshop equipment required

- Piston resetting appliance - T10145-



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Removing

Note

- *Mark brake pads when removing them if they are to be reinstalled. Fit in same position when installing otherwise uneven braking will be caused.*
- *It is recommended to apply the electronic parking brake again after driving long distances.*
- *The clearance between brake disc and brake pad is adjusted automatically approx. every 1000 km, unless the EPB is operated while covering this distance.*
- *The brake disc is secured with a cross-head screw.*

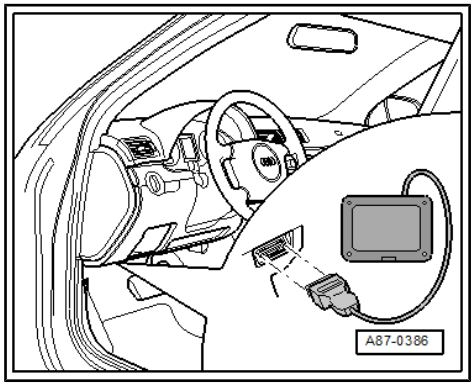
– Raise vehicle.

– Remove wheels.

Caution

On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.

– With ignition switched off, connect vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052- to 16-pin diagnostic connector in vehicle and select parking brake with “address word” 53.

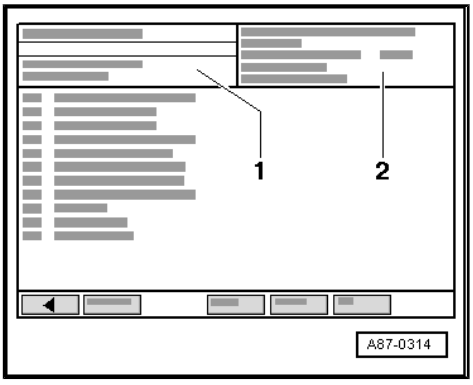


Note

- *Ignition on*
- *Release parking brake.*
- *Coding checked and rectified if necessary*
- *Event memory interrogated, indicated faults eliminated and memory erased.*

Indicated on display of VAS 5051:

– Select function “53 - Parking brake”.
– Select function “04 - Basic setting”.

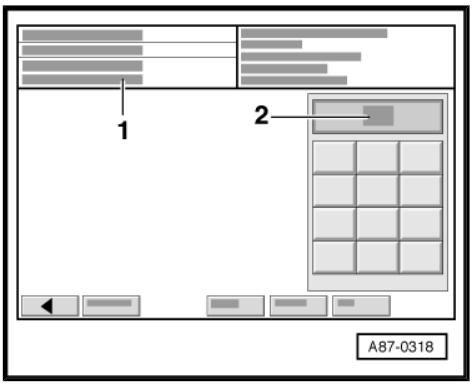


Indicated on display of VAS 5051:

- The prompt to enter a display group appears in display zone -1-.
- Display zone -2- shows a keypad.

When installing new or used brake pads

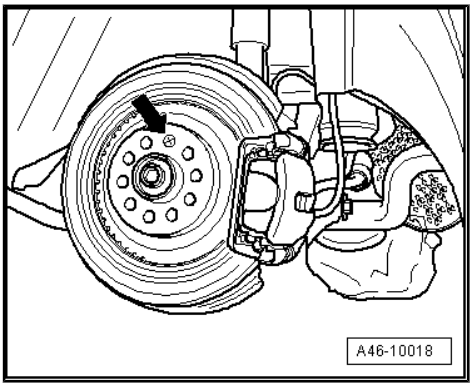
– Enter “7” as “display group number” via the keypad in display zone -2- and confirm entry with the "Q key" (resetting piston).
– Press the green arrow button (bottom left) to exit from the input mask.



Note

- *Ignition off*
- *The brake disc is secured with a cross-head screw -arrow-.*

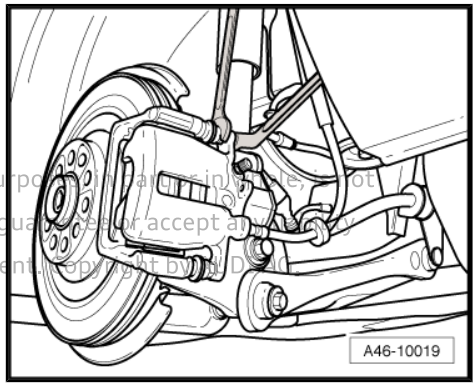
– Remove wheels.



– Remove securing bolts from brake caliper housing, when doing this counter-hold on guide pins.

Note

- *Do not unplug connection of actuator motor or brake system, otherwise a fault will be registered in the memory.*
- *Do not apply tension on brake hose or electrical wiring.*



– Move brake caliper clear to one side or tie up on body.
– Remove brake pads.
– Remove guide clips.
– Press brake piston back.

Special tools and workshop equipment required

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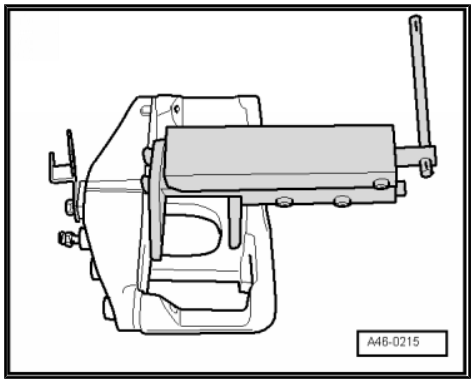
- Piston resetting appliance - T10145-

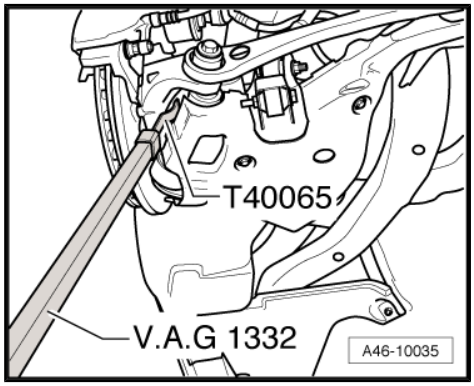


Note

- *On vehicles with a 16" brake system, the brake carrier must be removed prior to removing the brake discs*
- *Check brake discs and renew if necessary.*

Removing the brake carrier:

– To remove the bottom bolt connection of the brake carrier use interchangeable head - T40065- on the left side and interchangeable head - T40066- on the right side.



Installing

Steel version brakes:

When renewing the brake pads, also check the brake disc for wear. Refer to wear limit for brake disc.

– Check brake disc ⇒ “1.2 Brakes, technical data”, page 1 .

Ceramic brakes:

The ceramic brake discs must always be checked for damage and wear when renewing the brake pads.

- ⇒ “2 Assessment of ceramic brake discs”, page 6
- ⇒ “3 Assessing degree of wear on ceramic brake discs”, page 10

– Check brake disc.

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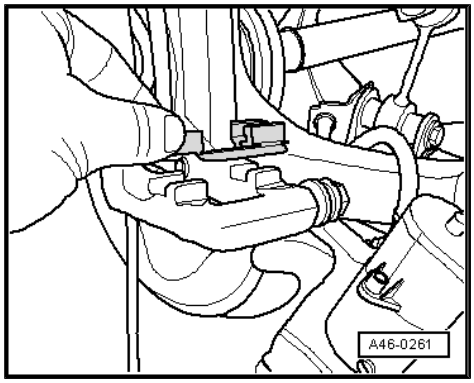
All vehicles (continued):

Use only methylated spirits to clean the brake caliper housing.

– Insert pad retaining springs.



– Fit brake pads.

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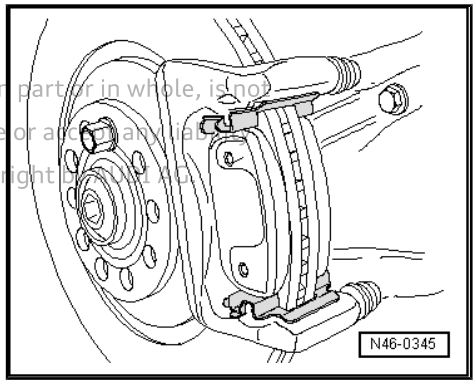
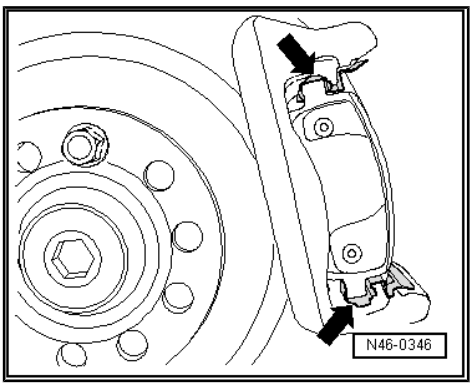


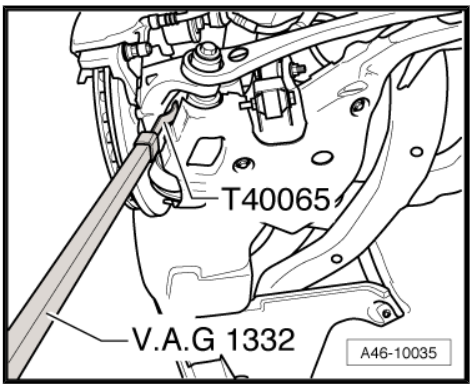
– Ensure that the brake pads are located correctly in the pad retainers -arrows-.



Note

The next work step only applies to vehicles on which the brake carrier needed to be removed.

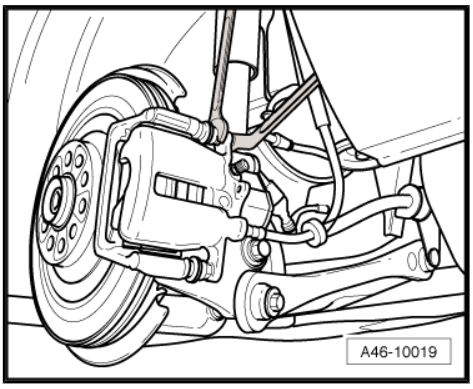
– Use interchangeable head - T40065- or interchangeable head - T40066- to install the lower bolt connection.



– Secure brake caliper housing with new self-locking bolts.

Note

The repair kit includes four self-locking hexagon bolts which must be installed in all cases.

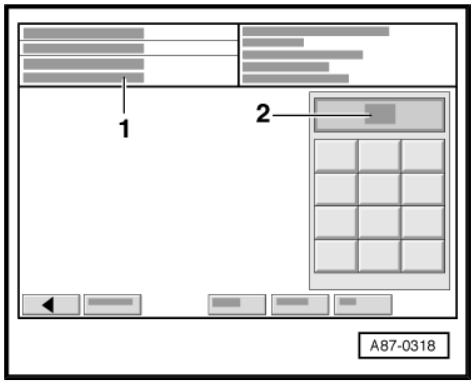


Indicated on display of VAS 5051:

- The prompt to enter a display group appears in display zone -1-.
- Display zone -2- shows a keypad.

– Enter “6” as “display group number” via the keypad in display zone -2- and confirm entry with the “Q” key (moves piston to original position).

– Press the green arrow button (bottom left) to exit from the input mask.



Caution

On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.

– Fit wheels ⇒ Wheels and tyres; Rep. gr. 44 .

– Check brake fluid level and top up if necessary.

Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

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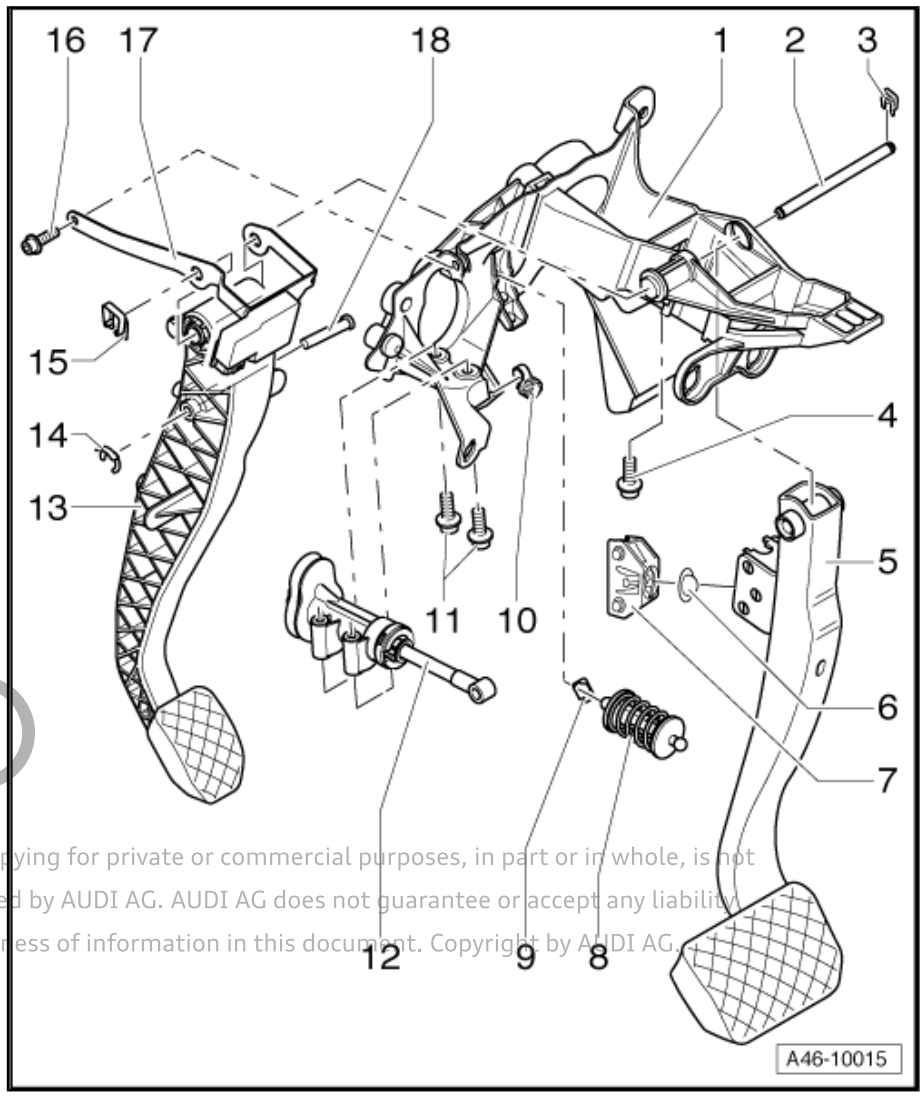
7 Exploded view - brake pedal, left-hand drive vehicles with manual gearbox

WARNING

The brake pedal travel must not be restricted by additional floor coverings.

♦ Lubricate all bearings and contact surfaces with grease - G 000 450 02- .



1 - Mounting bracket for pedal cluster

- ❑ Illustration for manual gearbox

2 - Pin

3 - Retaining clip (spring steel)

⇒ ETKA

4 - Hexagon socket head flange bolt, 10 Nm

5 - Brake pedal

- ❑ Removing and installing ⇒ page 114

6 - Bearing shell (is pressed into mounting)

7 - Mounting

- ❑ For ball head of brake servo push rod

8 - Compression spring or over-centre spring

- ❑ Note when installing: white spring mounting faces pedal bracket, black spring mounting faces clutch pedal

9 - Bush

10 - Limit stop for clutch pedal

- ❑ Different versions of limit stops
- ❑ Black: 2.4 ltr. petrol engines (140 mm)
- ❑ White: remaining engine types (150 mm)

⇒ ETKA

11 - Hexagon socket head flange bolt, 10 Nm

12 - Clutch master cylinder

13 - Clutch pedal

14 - Retaining clip (spring steel)

⇒ ETKA

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15 - Retaining clip (spring steel)

⇒ ETKA

16 - Hexagon socket head flange bolt, 10 Nm

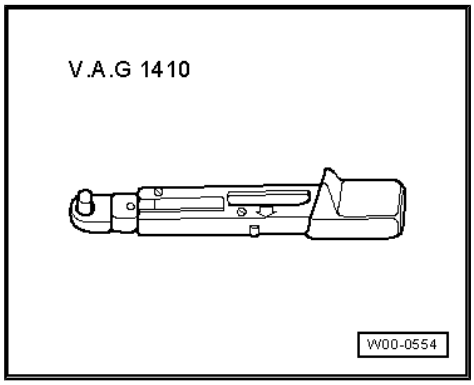
17 - Bracket for clutch sensor

18 - Pin

7.1 Removing and installing brake pedal - left-hand drive vehicles

Special tools and workshop equipment required

- Torque wrench - V.A.G 1410-



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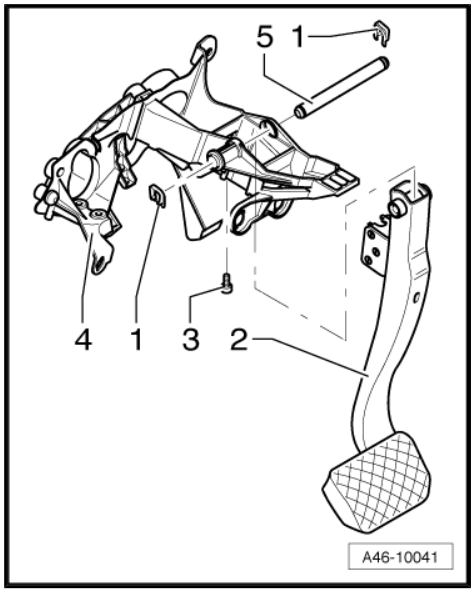
Removing

– Remove driver's storage compartment. ⇒ Rep. gr. 68
– Remove brake light switch ⇒ page 50 .
– Remove brake light sensor ⇒ page 51 .
– Separate brake pedal from brake servo ⇒ page 118 .
– Remove hexagon socket head flange bolt -3-.
– Loosen retaining clip -1- on the right side and pull out pin -5-.
– Take out brake pedal.



Installing

Install in reverse sequence, paying attention to the following:

Attaching brake pedal to brake servo

– Hold ball head of push rod in front of mounting and push brake pedal towards brake servo so that ball head audibly locks into place.
– Install brake light switch ⇒ page 50 .
– Install brake light sensor ⇒ page 51 .

Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

8 Exploded view - brake pedal, left-hand drive vehicles with automatic gearbox

WARNING

The brake pedal travel must not be restricted by additional floor coverings.

♦ Lubricate all bearings and contact surfaces with grease - G 000 450 02- .

1 - Mounting bracket for pedal cluster

- ❑ Illustration for automatic gearbox

2 - Retaining clip

3 - Pin

4 - Brake pedal

- ❑ Removing and installing ⇒ page 114

5 - Bearing shell in mounting

6 - Mounting

- ❑ For ball head of brake servo push rod

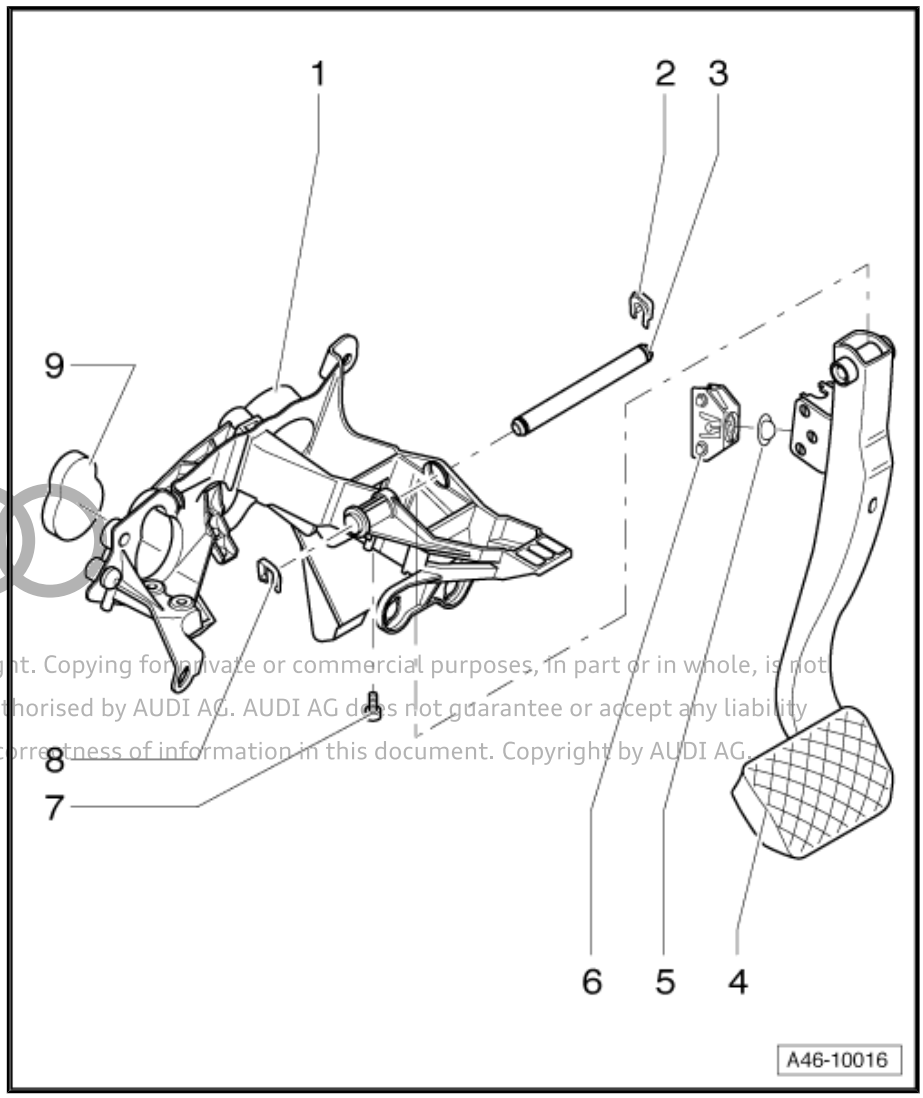
7 - Hexagon socket head flange bolt, 10 Nm

- ❑ Do not tighten bolt until retaining clips have been fitted.

8 - Retaining clip

9 - Plug

- ❑ Strong side facing bulk-head



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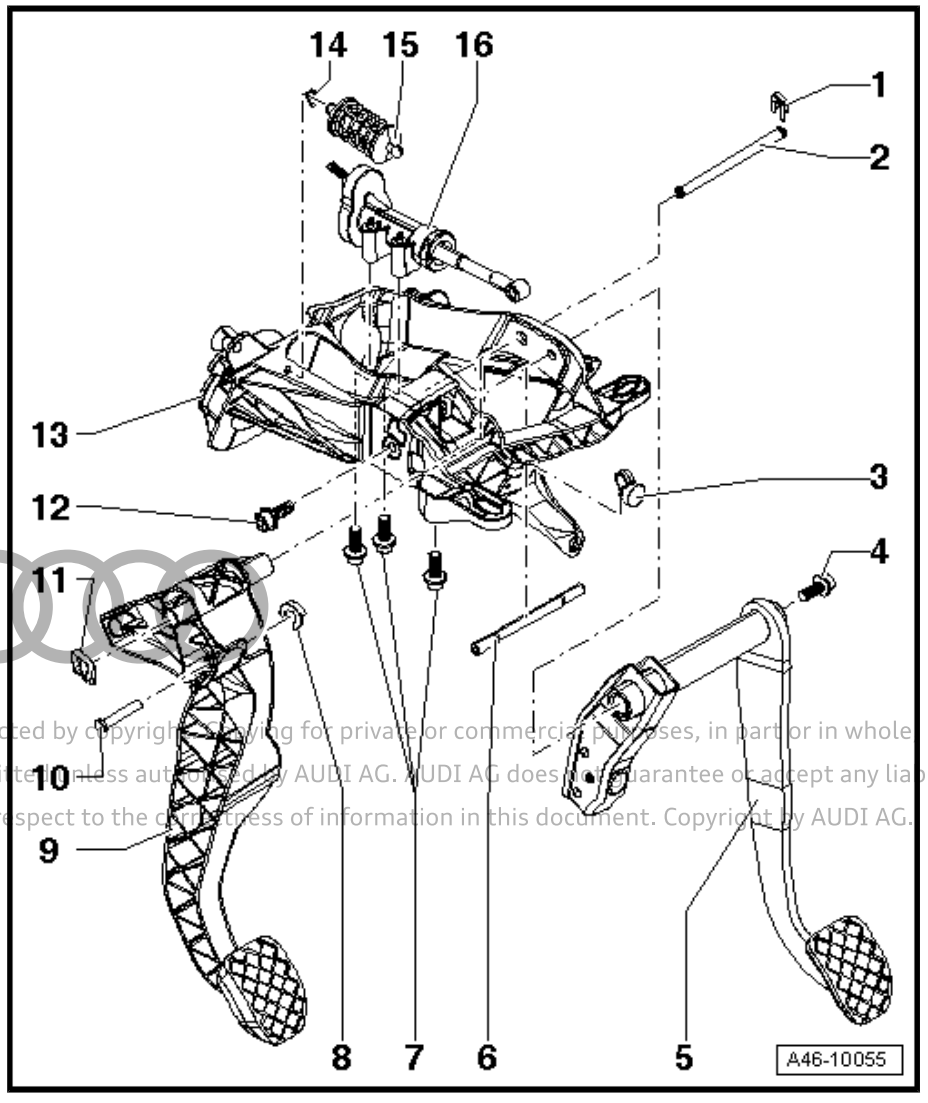
9 Exploded view - brake pedal, right-hand drive vehicles

WARNING

The brake pedal travel must not be restricted by additional floor coverings.

♦ Lubricate all bearings and contact surfaces with grease - G 000 450 02- .



1 - Retaining clip (spring steel)

⇒ ETKA

2 - Pin

3 - Limit stop

- ❑ Different versions of limit stops
- ❑ Black: 2.4 ltr. petrol engines
- ❑ White: all other engine types

⇒ ETKA

4 - Hexagon socket head flange bolt, 10 Nm

5 - Brake pedal

- ❑ Removing and installing ⇒ page 117

6 - Pin

7 - Hexagon socket head flange bolt, 10 Nm

8 - Retaining clip (spring steel)

⇒ ETKA

9 - Clutch pedal

10 - Pin

11 - Retaining clip (spring steel)

⇒ ETKA

12 - Hexagon socket head flange bolt, 25 Nm

13 - Mounting bracket for pedal cluster

14 - Bush

15 - Compression spring or over-centre spring

- ❑ Note when installing: white spring mounting faces pedal bracket, black spring mounting faces clutch pedal

16 - Clutch master cylinder

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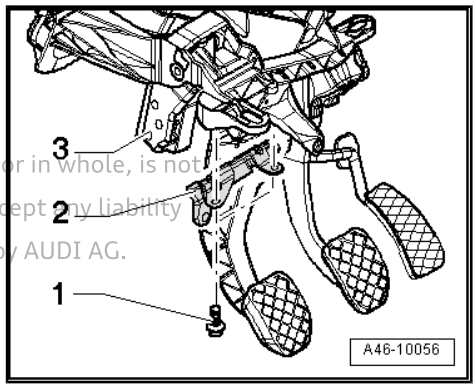
Installation of bracket for brake light switch

– Socket head bolt -1-, tightening torque: 9 Nm
– Item -2-: Bracket
– Item -3-: Pedal bracket

Installation of brake pedal (automatic gearbox)

– Socket head bolt -1-, tightening torque: 25 Nm
– -2- Brake pedal (right-hand drive vehicles)
– -3- Pivot pin



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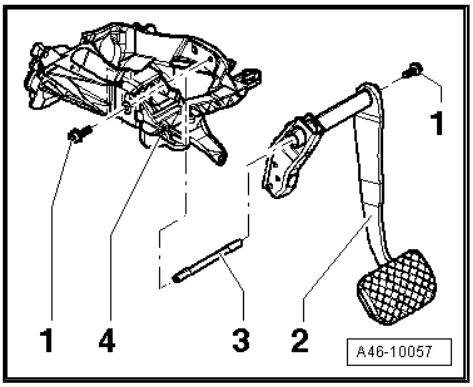
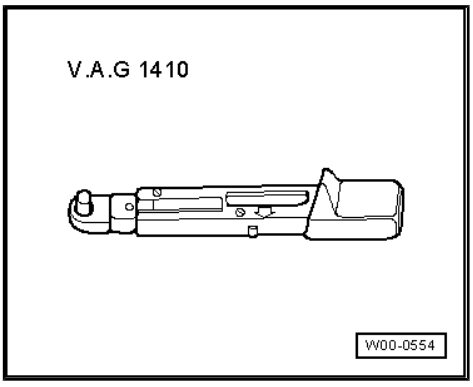
– -4- Pedal bracket



9.1 Removing and installing brake pedal - right-hand drive vehicles

Special tools and workshop equipment required

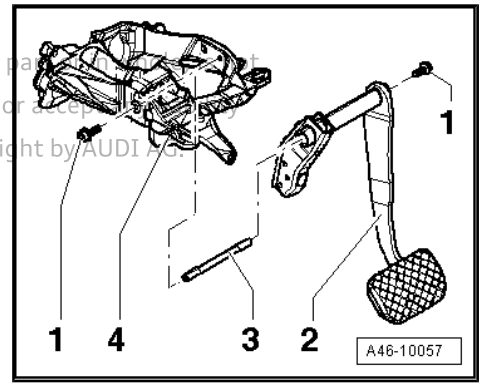
♦ Torque wrench - V.A.G 1410-



Removing

– Remove driver's storage compartment. ⇒ Rep. gr. 68
– Remove brake light switch ⇒ page 50 .
– Remove brake light sensor ⇒ page 51 .
– Separate brake pedal from brake servo ⇒ page 118 .
– Remove hexagon socket head flange bolt -1-.

– Pull out pin -3-.
– Take out brake pedal.



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Installing

Install in reverse sequence, paying attention to the following:

Attaching brake pedal to brake servo

– Hold ball head of push rod in front of mounting and push brake pedal towards brake servo so that ball head audibly locks into place.
– Install brake light switch ⇒ page 50 .
– Install brake light sensor ⇒ page 51 .

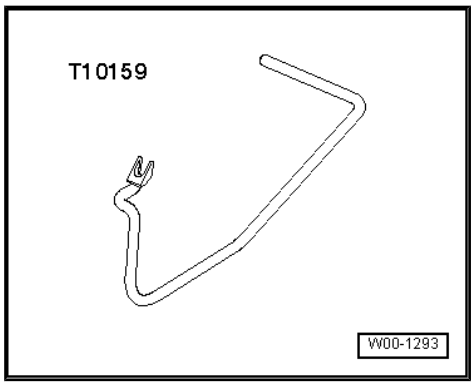
Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

9.2 Separating brake pedal from brake servo

Special tools and workshop equipment required

◆ Release tool - T10159-



– Remove driver's storage compartment. ⇒ Rep. gr. 68
– Remove brake light switch ⇒ page 50 .
– Remove brake light sensor ⇒ page 51 .

– First press brake pedal in direction of brake servo and hold.

1 - Brake pedal

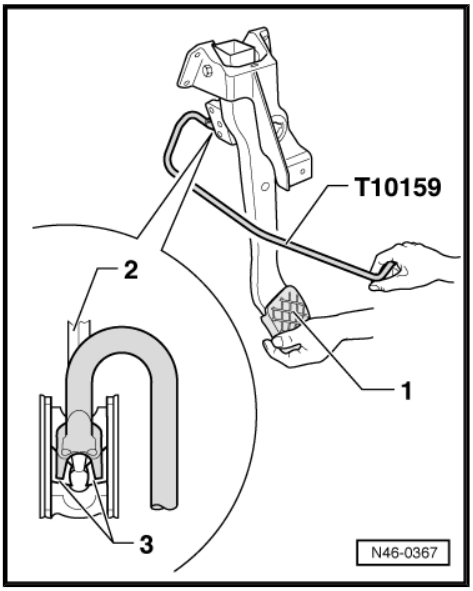
2 - Push rod

3 - Retaining lugs

– Insert release tool - T10159- and pull towards driver's seat, at the same time holding brake pedal in position (the pedal must not move towards the rear). This will press the retaining lugs -3- of the mounting off the ball head of the push rod -2-.

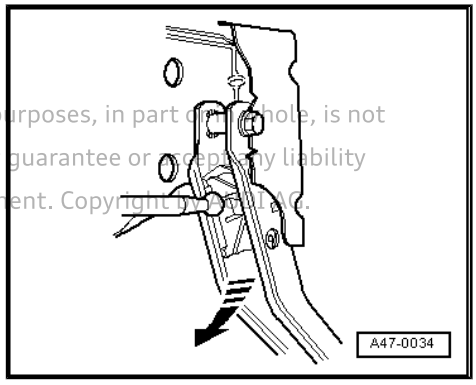
For illustration purposes, the method of separating the brake pedal from the brake servo is shown with the pedal cluster removed.

– Pull release tool - T10159- and brake pedal together towards driver seat. (This will pull the brake pedal off the ball head of the push rod).



Attaching brake pedal to brake servo

– Hold ball head of push rod in front of mounting and push brake pedal towards brake servo so that ball head audibly locks into place.



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The remaining installation steps are carried out in the reverse sequence.

– Install brake light switch ⇒ page 50 .

– Install brake light sensor ⇒ page 51 .

Caution

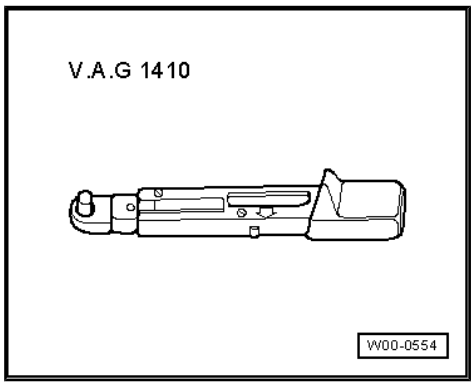
Make sure that the brakes work properly before the vehicle is driven on the road.

10 Removing and installing mounting bracket

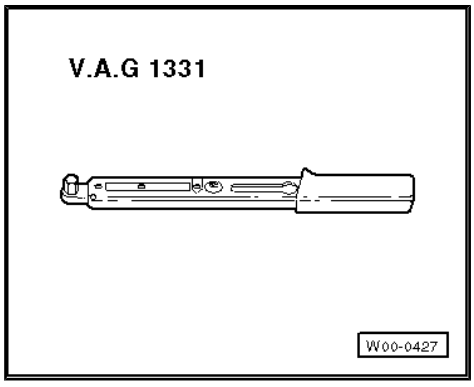
10.1 Removing and installing mounting bracket

Special tools and workshop equipment required

- Torque wrench - V.A.G 1410-

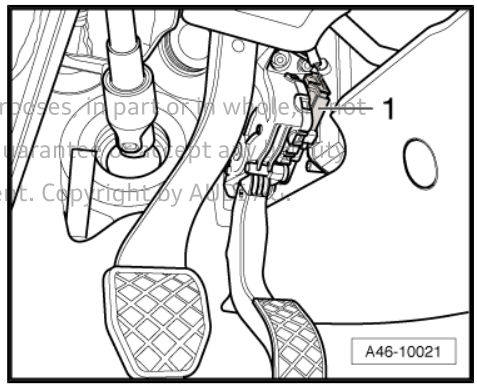


- Torque wrench - V.A.G 1331-



Removing

– Remove driver's storage compartment. ⇒ Rep. gr. 68
– Move adjustable steering column all the way out (opposite to direction of travel)
– Unplug connection -1- for accelerator module
– Remove brake light switch -2- ⇒ page 50 .
– Remove brake light sensor -2- ⇒ page 51 .



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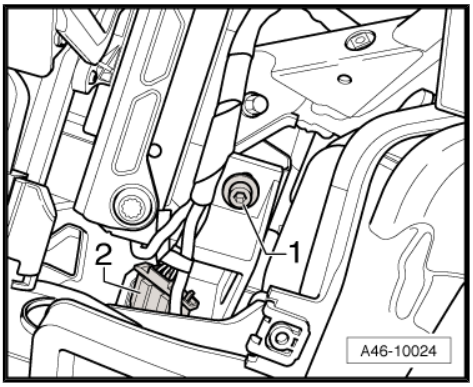
– Separate brake pedal from brake servo ⇒ page 118 .



– Unplug connection -1- for clutch pedal switch - F36-

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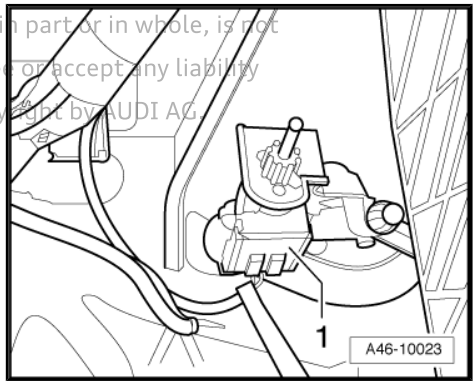
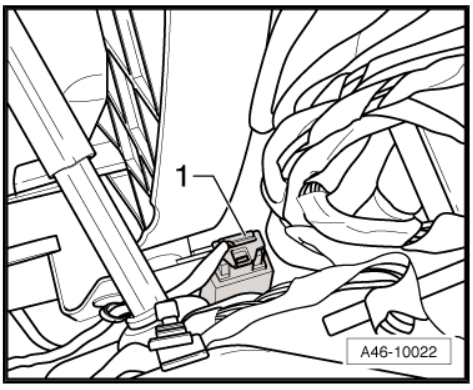
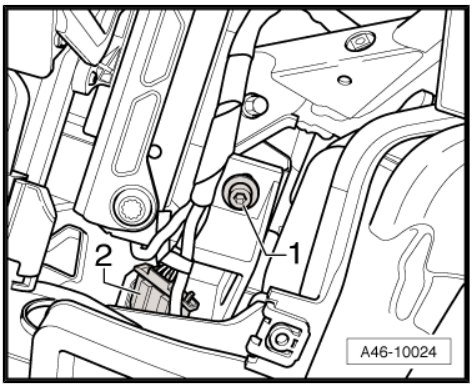


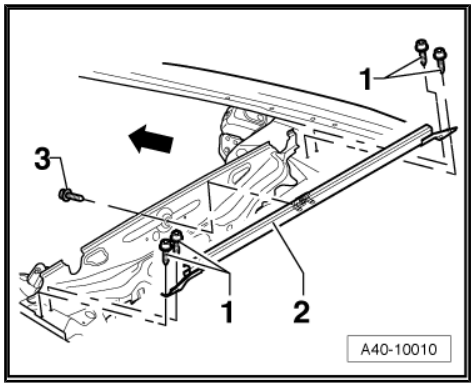
– Unplug connection -1- from clutch pedal switch - F194-



– Unscrew multi-point socket head bolts -1-.
– Unscrew multi-point socket head bolts -1- and -3-.



Allocation of multi-point socket head bolts ⇒ ETKA , tightening torque: 25 Nm.



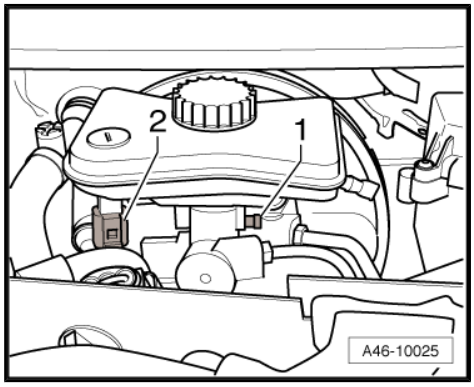
– Take out body brace -2-.

Note

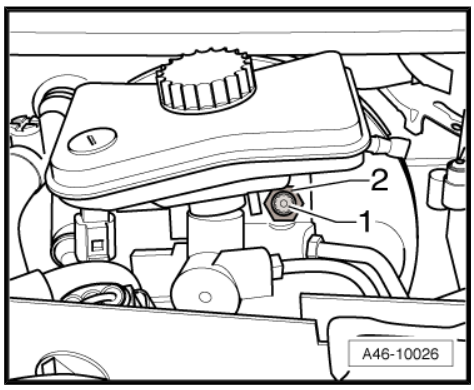
Do not remove brake fluid reservoir.

– Unscrew securing bolt -1- for brake fluid reservoir.

– Unplug connector -1-.



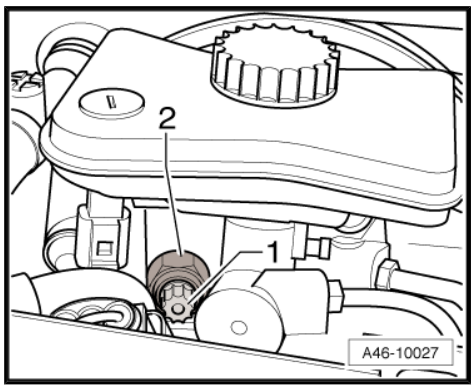
– Press reservoir aside and unscrew bolt connections -1-.



– Press reservoir aside and unscrew bolt connections -1-.

Note

Applies only to vehicles with manual gearbox.



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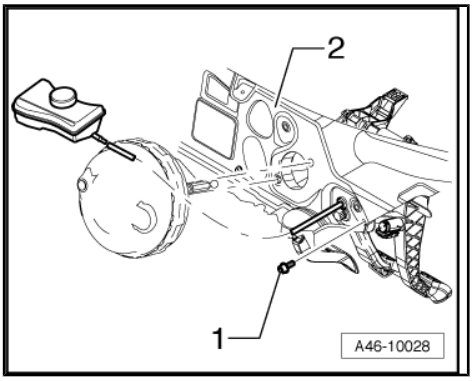
– Unscrew hexagon socket head bolt -1-, tightening torque 25 Nm.
– Remove mounting bracket.

Remove accelerator pedal.

Installing

Install in reverse sequence, paying attention to the following:

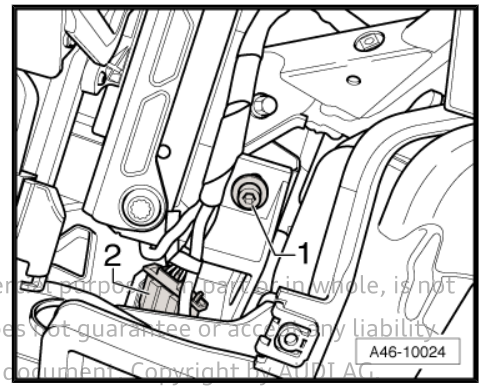
– First insert mounting pins in mounting bracket and bolt on brake servo...



– ... then screw on multi-point socket head bolts -1-

Attaching brake pedal to brake servo ⇒ page 118

– Hold ball head of push rod in front of mounting and push brake pedal towards brake servo so that ball head audibly locks into place.
– Install brake light switch ⇒ page 50 .
– Install brake light sensor ⇒ page 51 .



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Caution

Make sure that the brakes work properly before the vehicle is driven on the road.

11 Overview of components - electronic parking brake and handbrake (EPB)

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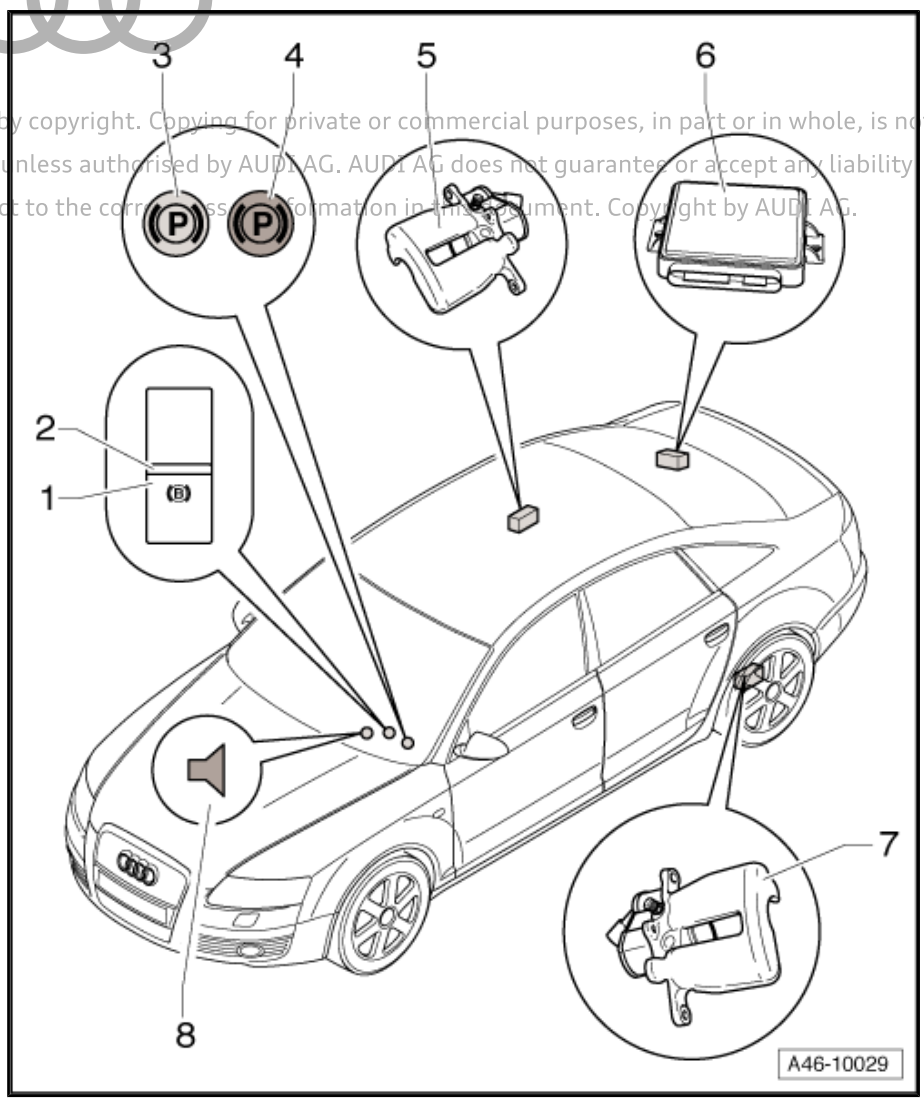

1 - Parking brake contact switch - F321-

- ❑ Pull switch ⇒ to apply brake
- ❑ Push switch ⇒ to release brake
- ❑ Fitting location: in centre console
- ❑ Removing and installing ⇒ page 54

2 - LED – light-emitting diode (indicates parking brake applied)

3 - EPB system fault warning lamp (yellow)

- ❑ In case of malfunction of the parking brake the yellow symbol in the instrument cluster display lights up additionally and the warning: Parking brake! is displayed.

4 - Electromechanical parking brake

- ❑ Indication of achieved clamping force and dynamic deceleration
- ❑ The lamp lights up with parking brake applied and ignition switched on.
- ❑ The lamp stays on for approx. 30 seconds after the ignition is switch-

ed off.

- ❑ If the parking brake is applied with ignition switched off, the lamp lights up for approx. 30 seconds.
- ❑ The lamp should go out when the parking brake is released.
- ❑ If the warning lamp flashes continuously after applying the parking brake, the brake force is not sufficient to prevent the vehicle from accidental movement. Note the following:
- ❑ If the gradient of the hill is too steep for parking, a warning is displayed. Warning: Vehicle parked too steep.
- ❑ In case of malfunction of the parking brake the yellow symbol in the instrument cluster display lights up additionally and the warning: Parking brake! is displayed.

5 - Left parking brake motor - V282-

- ❑ Removing and installing ⇒ page 149
- ❑ Removing and installing control unit for electronic parking brake and handbrake ⇒ page 125
- ❑ Removing and installing actuator motor for electronic parking brake and handbrake ⇒ page 126

6 - Control unit for electromechanical parking brake - J540-

- ❑ Installation position: in rear right side panel below tool kit.
- ❑ Removing and installing ⇒ page 36

7 - Right parking brake motor - V283-

- ❑ Removing and installing ⇒ page 150

8 - Acoustic signal

- ❑ Warning signal if parking brake is operated while vehicle is in motion
- ❑ Warning signal if a fault is detected in the system

11.1 Removing and installing electric park and handbrake control unit - J540-

Special tools and workshop equipment required

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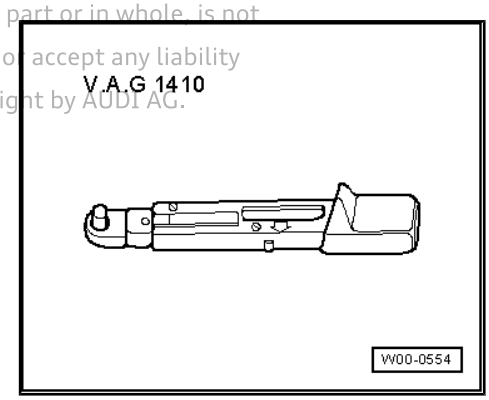
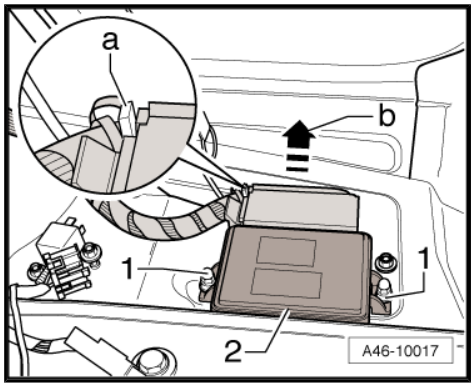
♦ Torque wrench - V.A.G 1410-



Removing

– Remove side trim at rear of luggage compartment (right-side) ⇒ Rep. gr. 70 .

– Unscrew nuts -1-; tightening torque 10 Nm.
– Remove EPB control unit with connection -item 2-.
– Move locking slide -a- in direction of arrow -b- and unplug connector.



Installing

Install in reverse sequence, paying attention to the following:

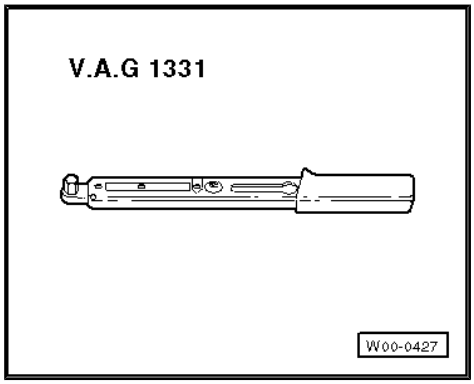
– When renewing the control unit, select the function “Replace” for the relevant control unit in the “Guided Fault Finding”.

Vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-

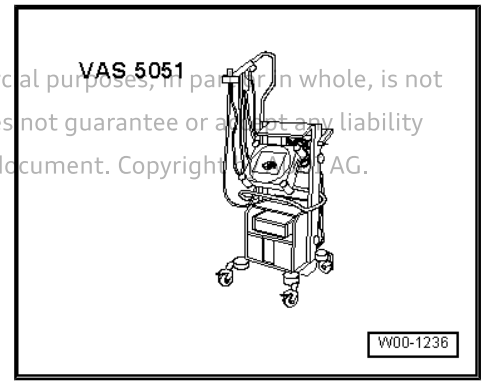
11.2 Removing and installing actuator motor for electronic parking brake and hand-brake

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-



♦ Vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-



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Removing

Note

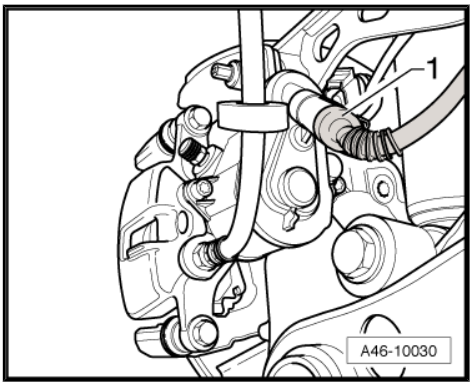
♦ *Ignition on*
♦ *Release parking brake.*
♦ *Coding checked and rectified if necessary*
♦ *Event memory interrogated, indicated faults eliminated and memory erased.*
♦ *Ignition off*

– Raise vehicle.

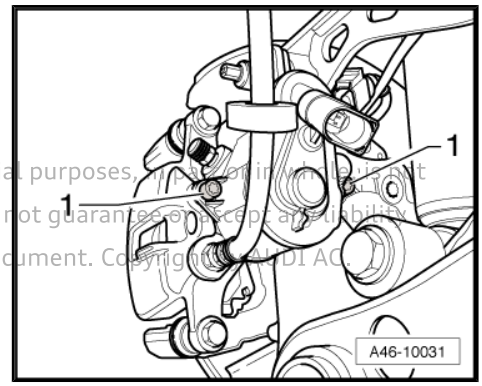
– Remove wheels.

Note

- *Ignition must be switched off at least 30 sec. before unplugging connector.*
- *Clean whole area around connector and actuator motor/brake caliper.*
- *Unplug connector -1- of actuator motor.*



– Unscrew both securing bolts -1- on actuator motor.



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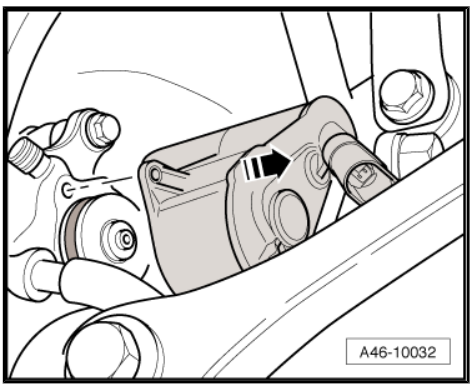
– Detach actuator motor in direction of arrow



– Remove seal with suitable tool.

Make sure you do not damage annular groove for seal and contact surface on actuator motor.

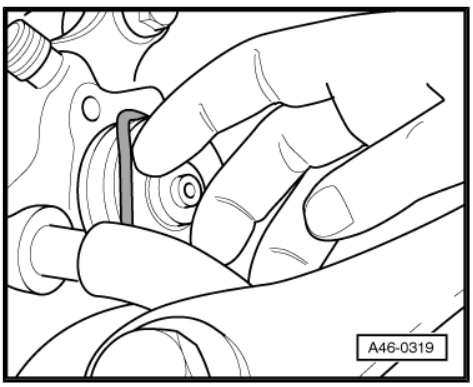
Note

Do not use tools with sharp edges.

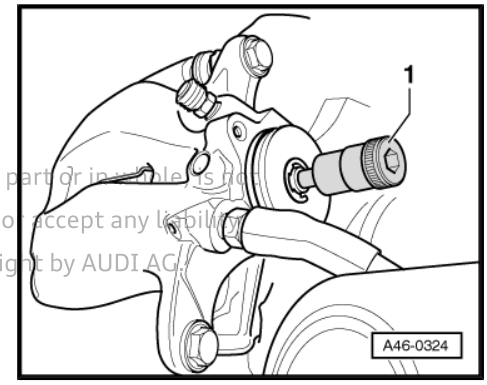
– If necessary clean annular groove and contact surfaces. Only use brake cleaner.

Installing

– Fit new seal.



– Turn adjusting screw on brake caliper back slightly.



Note

This makes it easier to install the actuator motor.

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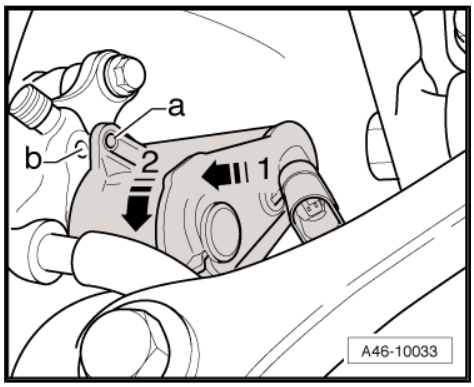
– Fit actuator motor as shown in illustration (item -1-).

Note

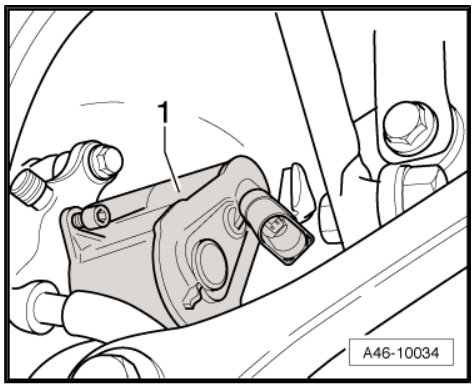
Ensure that seal is fitted correctly.

– Then turn actuator motor in such a way (item -2-) that bolt hole -a- and thread in brake caliper housing -b- are aligned.



Make sure that the actuator motor is flush with the brake caliper housing.

– Fit both securing bolts on actuator motor. Tightening torque: 12 Nm



Important: Bolts must be fitted and screwed in several turns by hand. If the thread is damaged the complete brake caliper has to be renewed.

Note

- *To avoid any damage to connector only fit it by hand.*
- *Make sure that the connections on vehicle wiring and actuator motor are clean and undamaged.*

– Fit connector.

– Fit wheels ⇒ Wheels and tyres; Rep. gr. 44 .

After renewing actuator motor you must use vehicle diagnostic tester to perform basic setting 10 in EPB function.

To do so, use the vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052- .

– Either select basic setting 10 ⇒ page 28 under “Function” or

– under Running gear (repair group 01: 34-65)

– Brake system (repair group 01: 45-46)

– 01 - Self-diagnosis compatible systems

– 53- Parking brake

– J540- Control unit for electromechanical parking brake

– J540- Basic setting (3 Function test: electronic parking brake and handbrake)

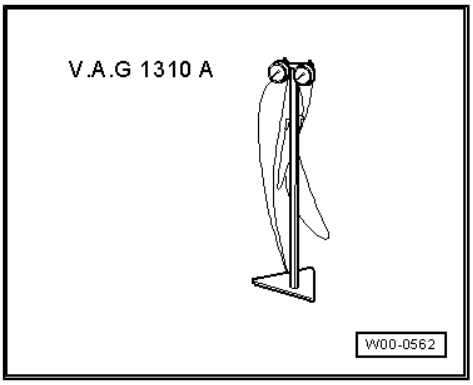
47 – Brakes - hydraulics

1 Pressurised leak test

1.1 Pressurised leak test

Special tools and workshop equipment required

- Tester for brake pressure regulator - V.A.G 1310A-



1.2 High-pressure and low-pressure tests

Before starting:

Make sure that the brake system (master cylinder, brake hoses, brake lines and brake calipers) works properly and is free of leaks.

High-pressure test:

– Remove bleeder screw at one of the front brake calipers. Connect tester for brake pressure regulator - V.A.G 1310A- and bleed tester.

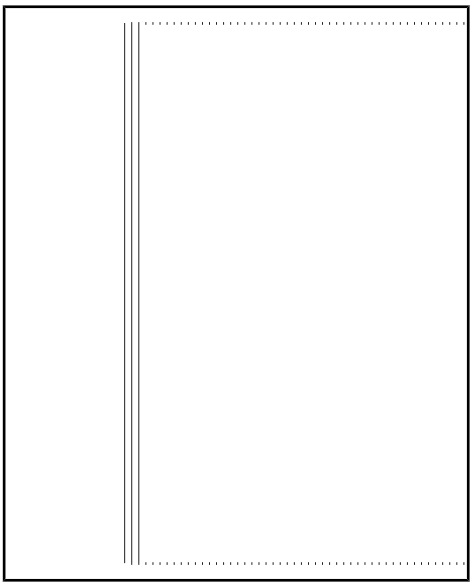
– Insert brake pedal depressor between brake pedal and driver's seat. Apply pressure to brake pedal until the gauge indicates a pressure of 50 bar. The pressure must not drop by more than 4 bar during the test period of 45 seconds. Renew hydraulic unit if drop in pressure exceeds the above figure.

Low-pressure test:

– Move the brake pedal depressor back until the pressure gauge indicates a pressure of 6 bar.

– The pressure should not drop by more than 1 bar within the test period of 3 minutes.

Renew hydraulic unit if drop in pressure exceeds the above figure.



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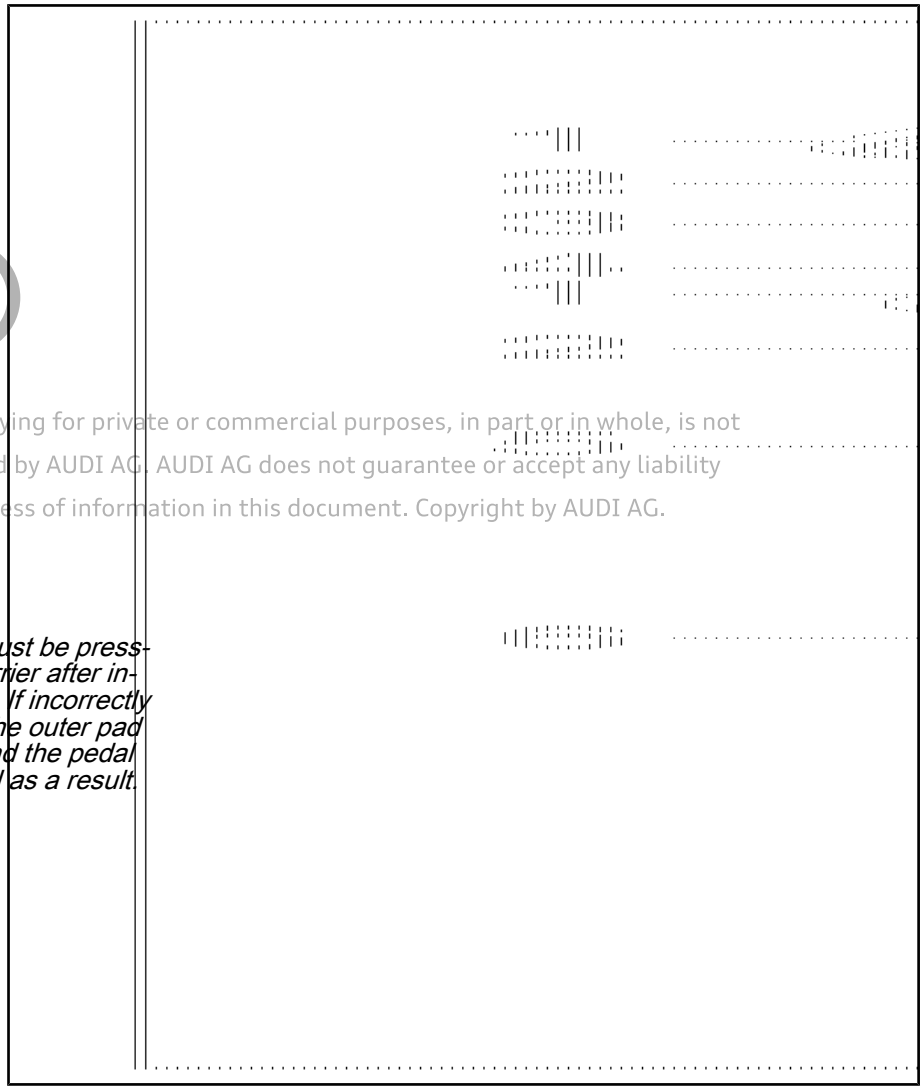
2 Brake caliper FN3

2.1 Servicing brake calipers

Note

- *Install complete repair kit when servicing.*
- *New brake calipers are filled with brake fluid and are pre-bled.*
- *Apply a thin coat of assembly paste - G 052 150 A2- to brake cylinder, piston and seal.*
- *After servicing and installing brake caliper, bleed brake system* *⇒ page 154* .



1 - Caps
- ❑ Insert into bearing bush

2 - Guide pins, 30 Nm

3 - Bleeder valve, 10 Nm
- ❑ Before screwing in, grease thread with thin coat of assembly paste - G 052 150 A2- .

4 - Protective cap
- ❑ Push onto bleeder valve

5 - Brake caliper housing

6 - Retaining spring
- ❑ Insert with both ends in the holes in brake caliper housing

Note

The retaining spring must be pressed under the brake carrier after inserting into both holes. If incorrectly installed, the wear of the outer pad cannot be adjusted, and the pedal travel will be increased as a result.

7 - Bearing bush
- ❑ Insert into brake caliper housing

8 - Brake carrier
- ❑ Bolt to brake caliper housing

9 - Seal

10 - Piston
- ❑ Apply a thin coat of assembly paste - G 052 150 A2- to piston before inserting

11 - Protective cap
- ❑ Do not damage when inserting piston

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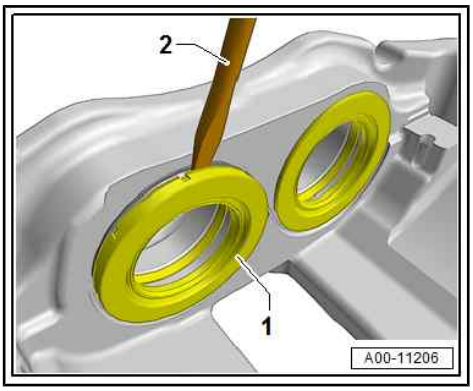
2.2 Removing and installing piston for front brake caliper

Special tools and workshop equipment required

- Assembly paste - G 052 150 A2-
- Removal tool - T 40338-
- Carefully lever protective cap -1- and seal out of brake caliper with gentle movements using removal tool - T 40338- -2-; take care not to damage groove for protective cap in brake caliper.



- Removal wedge - 3409-

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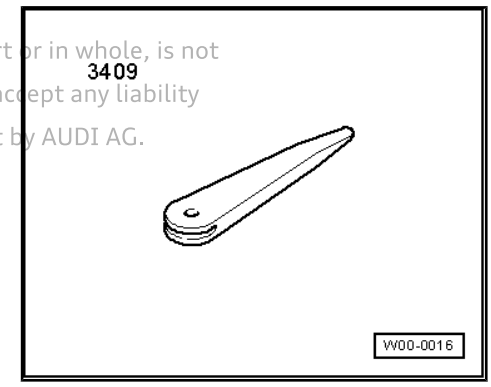
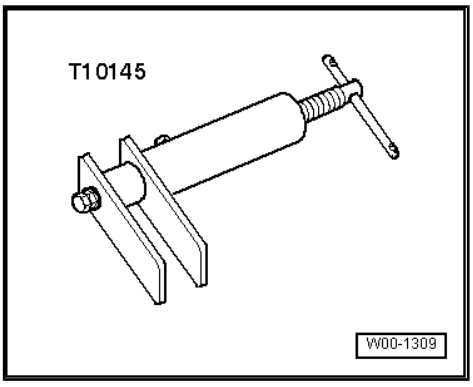
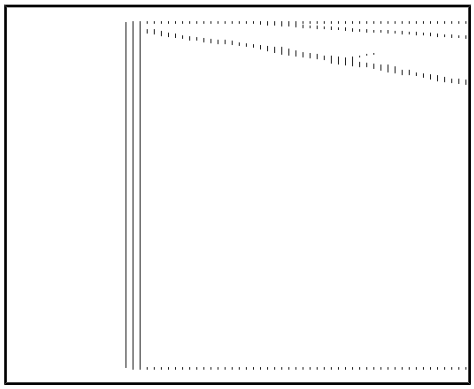


- Piston resetting appliance - T10145-



Removing

– Force piston out of brake caliper housing using compressed air.

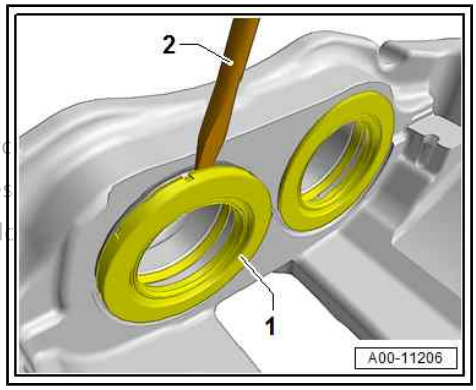


Note

Place a piece of wood in the recess to prevent damaging the piston.

Removal tool - T 40338-

– Carefully lever protective cap -1- and seal out of brake caliper with gentle movements using removal tool - T 40338- -2-; take care not to damage groove for protective cap in brake caliper.



– Take out seal.

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with respect to the correctness of information in this d

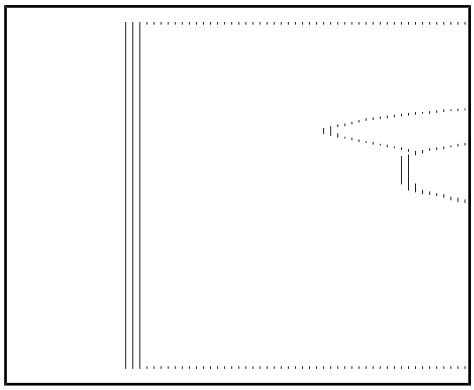
Note

When removing ensure that the bore of the cylinder is not damaged.

Installing

– Insert seal.

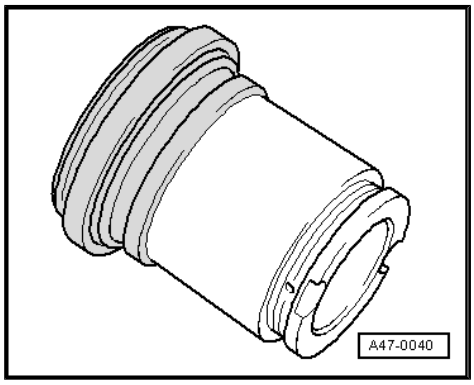
– To do so, use removal wedge - 3409- .



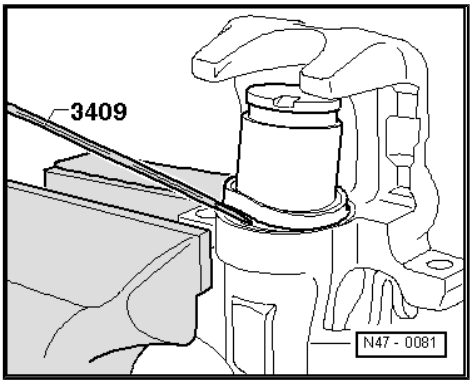
– Place outer sealing lip of protective cap on piston.

– The surface of the piston and seal should be cleaned using only methylated spirits and then dried.

– Apply a thin coat of assembly paste - G 052 150 A2- to piston and seal before inserting.



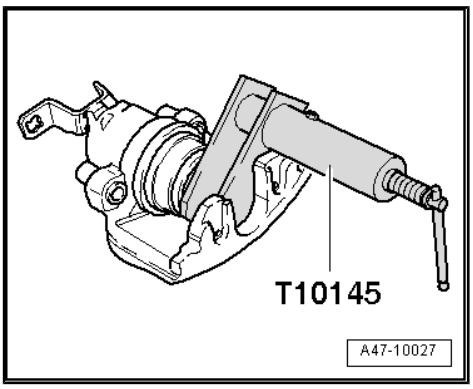
– Using removal wedge - 3409- , insert inner sealing lip into groove of cylinder.



Note

When doing this hold piston in front of caliper housing.

– Press piston into the brake caliper housing using piston resetting tool - T10145- .



Note

The outer sealing lip of the protective cap will then locate in the groove on the piston.

Note

After servicing and installing brake caliper, bleed brake system *⇒ page 154* .

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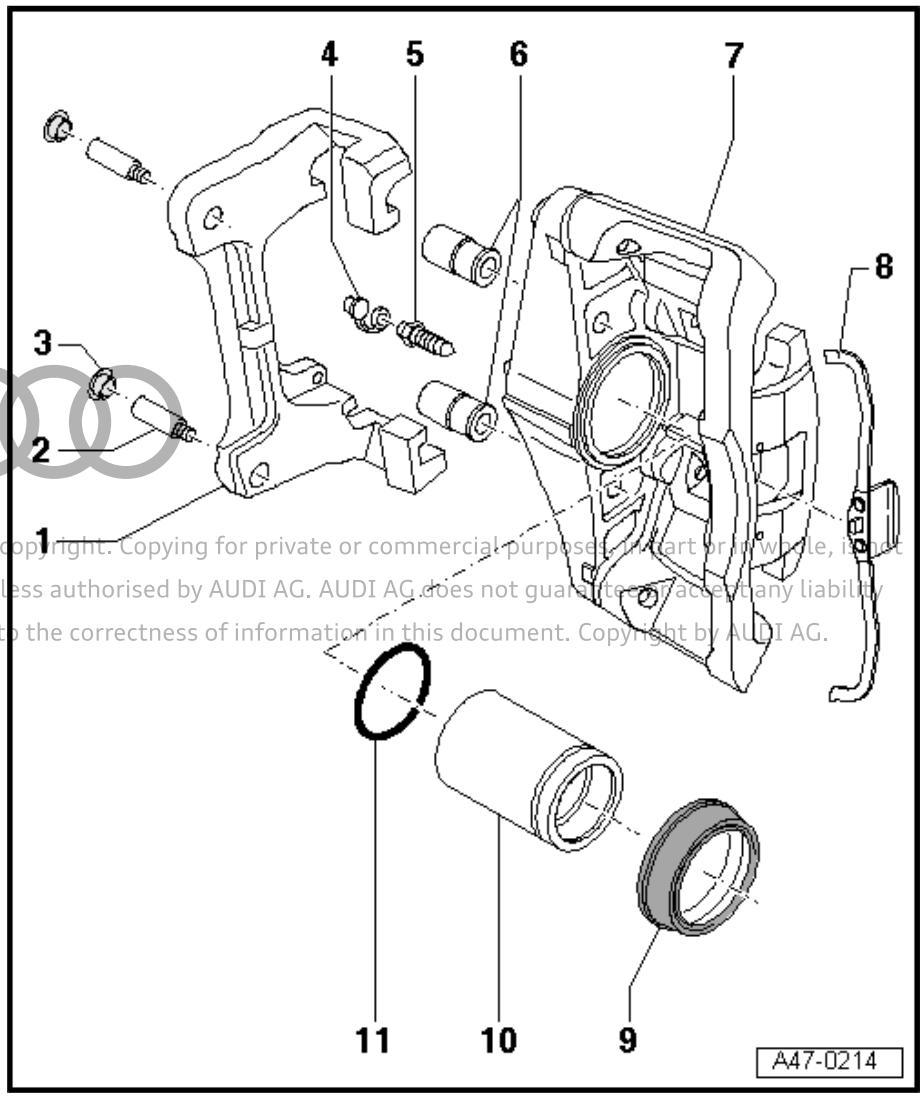
3 Brake caliper FNR G60

3.1 Servicing brake calipers

Note

- *Install complete repair kit when servicing.*
- *Apply a thin coat of assembly paste - G 052 150 A2- to brake cylinder, piston and seal.*
- *After servicing and installing brake caliper, bleed brake system* *⇒ page 154* .



1 - Brake carrier
- ❑ Bolt to brake caliper housing

2 - Guide pins, 30 Nm

3 - Caps
- ❑ Insert into bearing bush

4 - Protective cap
- ❑ Push onto bleeder valve

5 - Bleeder valve, 15 Nm
- ❑ Before screwing in, grease thread with thin coat of assembly paste - G 052 150 A2- .

6 - Bearing bush
- ❑ Insert into brake caliper housing

7 - Brake caliper housing

8 - Retaining spring
- ❑ Note correct installation position.
- ❑ Engage onto both brake caliper housing studs and onto outer pad retaining spring.

9 - Protective cap
- ❑ Do not damage when inserting piston
- ❑ Grease with assembly paste - G 052 150 A2- .

10 - Piston
- ❑ Apply a thin coat of assembly paste - G 052 150 A2- to piston before inserting

11 - Seal
- ❑ Grease with assembly paste - G 052 150 A2- .

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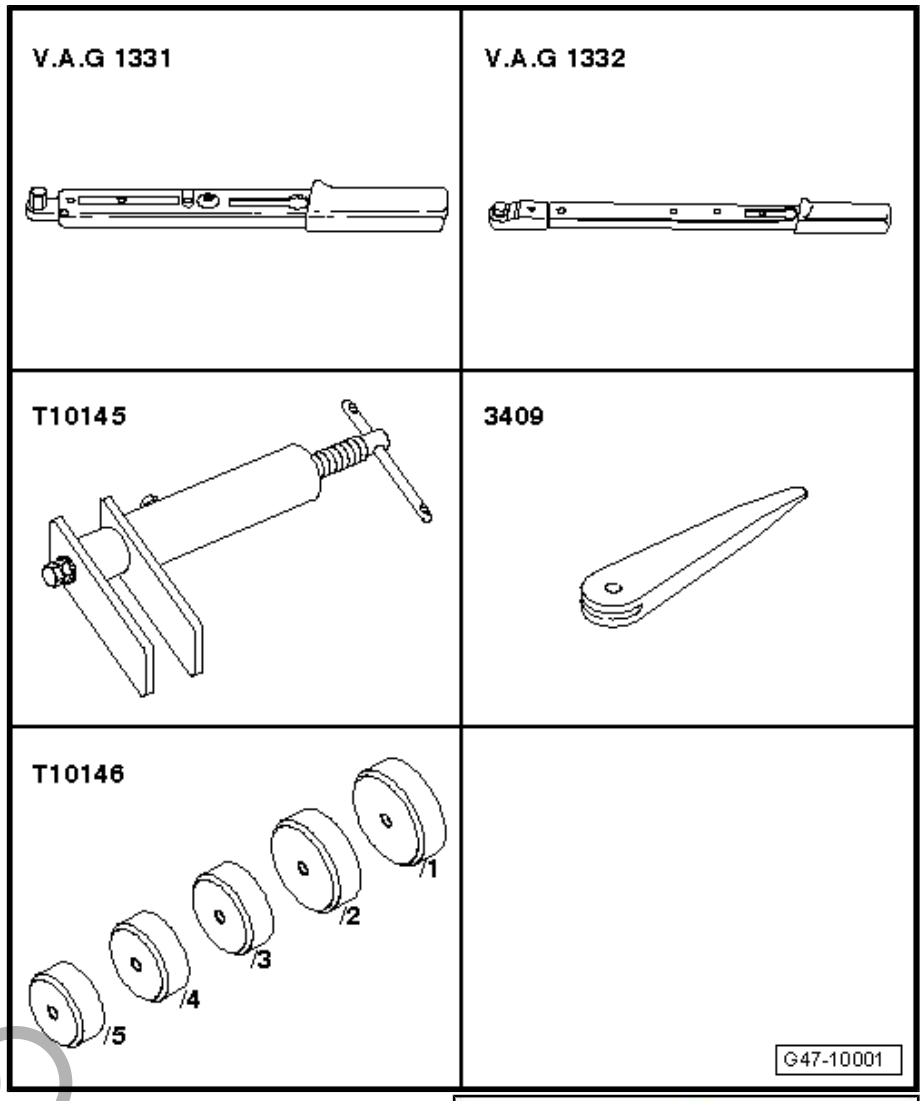
3.2 Removing and installing piston for front brake caliper

Special tools and workshop equipment required



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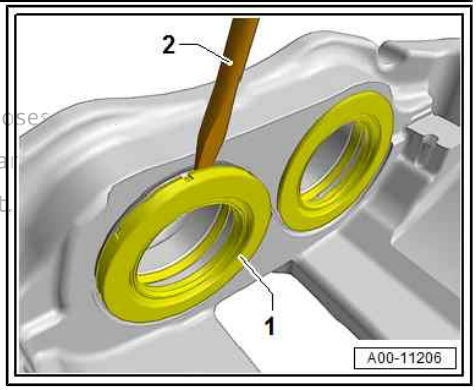
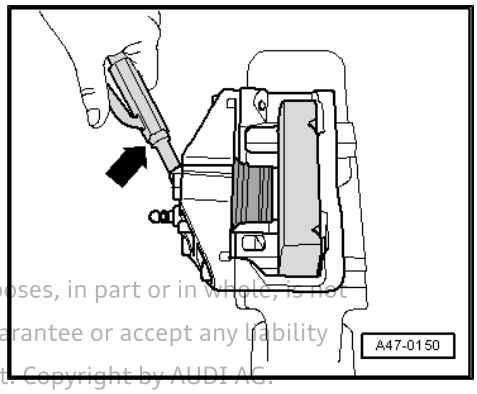


- Torque wrench - V.A.G 1331-
- Torque wrench - V.A.G 1332-
- Piston resetting appliance - T10145-
- Removal tool - T 40338-

- Carefully lever protective cap -1- and seal out of brake caliper with gentle movements using removal tool - T 40338- -2-; take care not to damage groove for protective cap in brake caliper.
- Assembly tool for protective caps - T10146/5-
- Assembly paste - G 052 150 A2-

Removing

– Force piston out of brake caliper housing using compressed air.



Note

Place a piece of wood in the recess to prevent damaging the piston.

Removal tool - T 40338-

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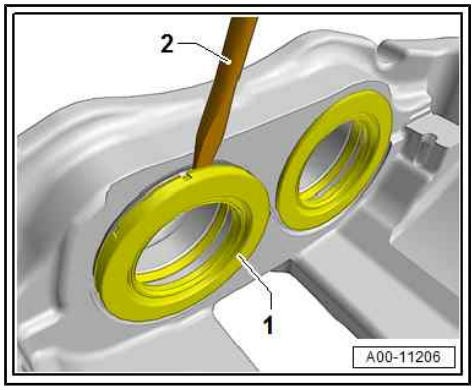
– Carefully lever protective cap -1- and seal out of brake caliper with gentle movements using removal tool - T 40338- -2-; take care not to damage groove for protective cap in brake caliper.
– Take out seal.

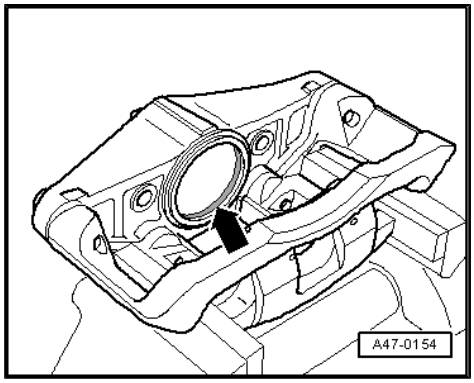


Note

When removing ensure that the bore of the cylinder is not damaged.

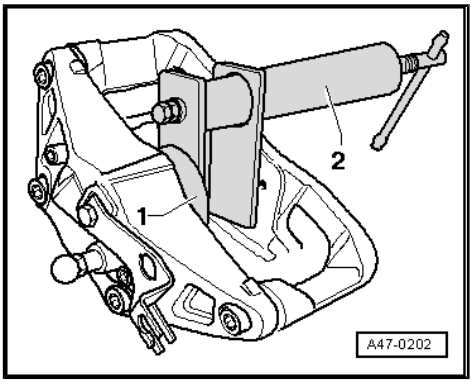
Installing

– The surface of the piston and seal should be cleaned using only methylated spirits and then dried.
– Apply a thin coat of assembly paste - G 052 150 A2- to piston and seal before inserting.
– Using removal wedge - 3409- , insert inner seal into groove of brake caliper.

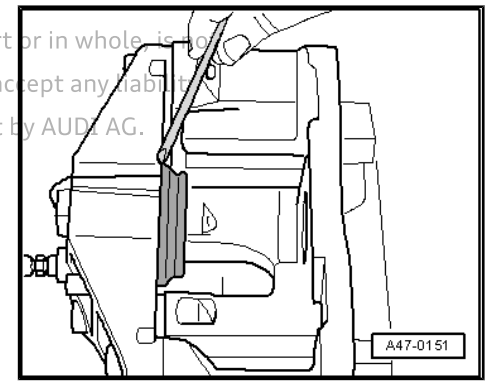


– Press in protective cap with special tool -1- and -2-.
– -Item 1-: Assembly tool for protective caps - T10146/1-
– -Item 2-: Piston resetting appliance - T10145-

Use jaw protectors



– Push protective cap onto brake caliper housing and press it in so that it is seated flush -arrow-.
– At this stage it should not be possible to remove the protective cap from the brake caliper housing by hand.
– Apply a thin coat of assembly paste - G 052 150 A2- to piston and seal before inserting.



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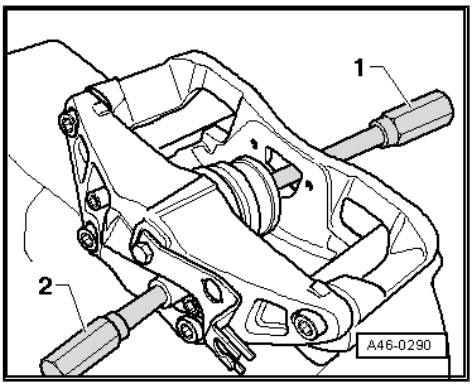
– Hold piston with standard extension and ratchet attachment as shown in illustration and press lightly onto protective cap.

Keep the piston straight to avoid damaging the seal.

– Inflate protective cap with compressed air (maximum 3 bar). The protective cap will then locate around the brake piston.

Use jaw protectors

– Press piston into brake caliper housing by hand.



Note

The inner sealing lip on the protective cap will then locate in the piston groove.

Note

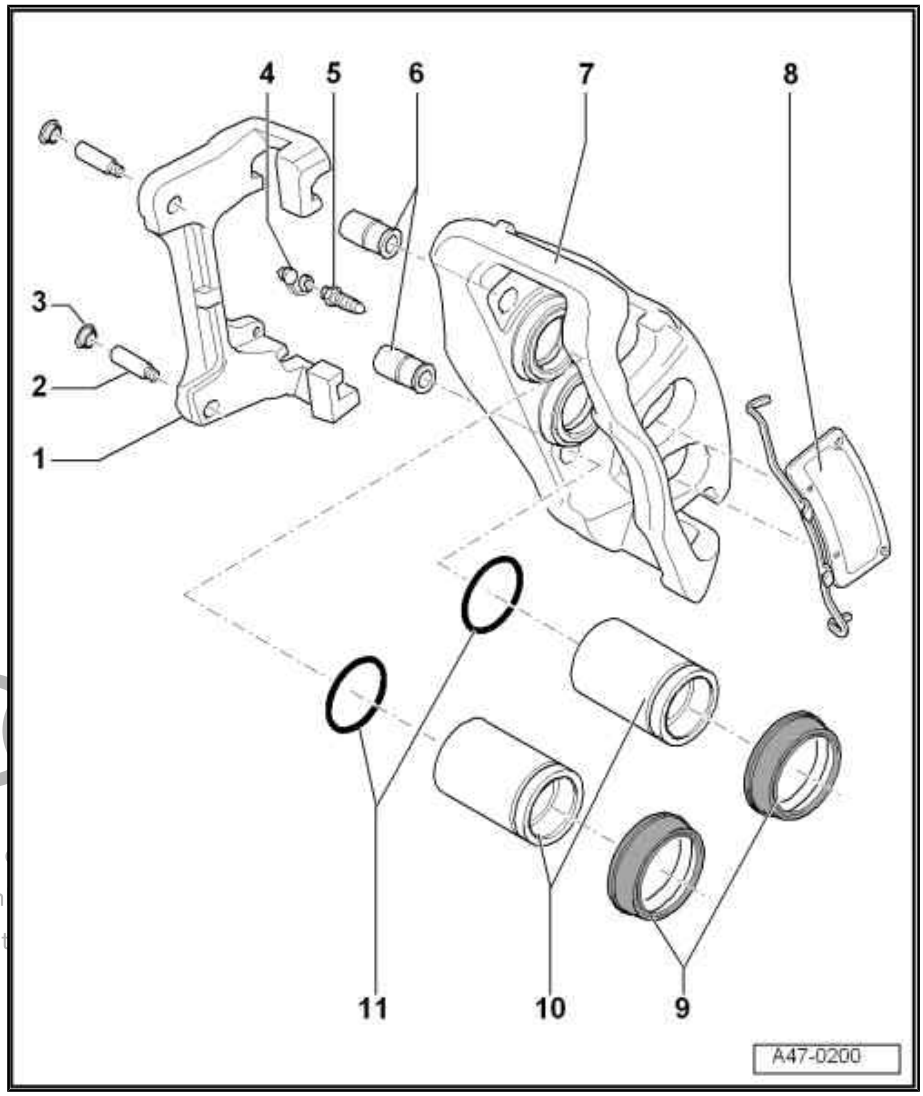
After servicing and installing brake caliper, bleed brake system *⇒ page 154* *.*

4 Brake calipers 2FNR 42 AL

4.1 Servicing brake calipers

Note

- *Install complete repair kit when servicing.*
- *Apply a thin coat of assembly paste to brake cylinders, pistons and seals. ⇒ Parts catalogue*
- *After servicing and installing brake caliper, bleed brake system* *⇒ page 154* .



1 - Brake carrier
- ❑ Bolt to brake caliper housing

2 - Guide pin
- ❑ Tightening torque: 30 Nm

3 - Caps
- ❑ Insert into bearing bush

4 - Protective cap
- ❑ Push onto bleeder valve

5 - Bleeder valve
- ❑ Tightening torque: 10 Nm
- ❑ Before screwing in, grease thread lightly with lithium grease ⇒ Parts catalogue

6 - Bearing bush
- ❑ Insert into brake caliper housing

7 - Brake caliper housing

8 - Retaining spring
- ❑ Note correct installation position.
- ❑ Engage onto both brake caliper housing studs and onto outer pad retaining spring.

9 - Protective cap
- ❑ Do not damage when inserting piston
- ❑ Apply a thin coat of lithium grease

10 - Piston
- ❑ Apply a thin coat of lithium grease to piston

11 - Seal
- ❑ Grease with assembly paste

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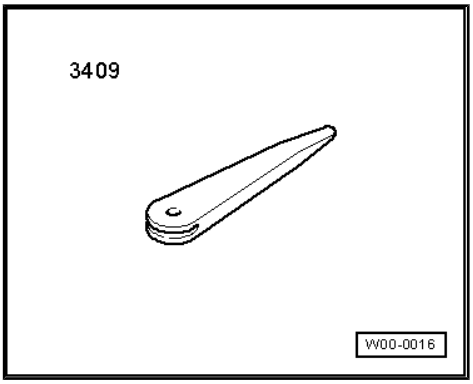
4.2 Removing and installing piston for front brake caliper

Special tools and workshop equipment required

- Removal wedge - 3409-



- Removal tool - T 40338-
- Carefully lever protective cap -1- and seal out of brake caliper with gentle movements using removal tool - T 40338- -2-; take care not to damage groove for protective cap in brake caliper.

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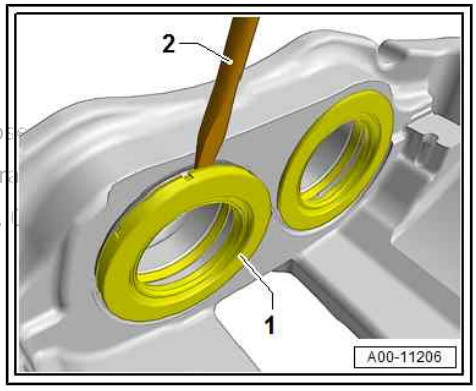
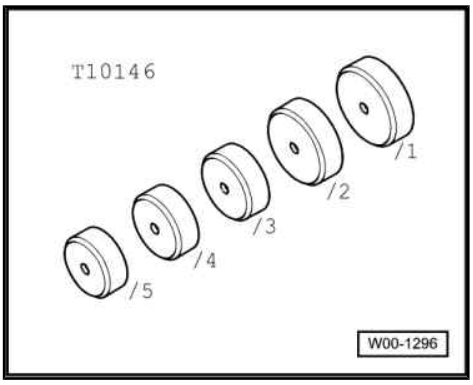


- Assembly paste ⇒ Parts catalogue
- Assembly tool for protective caps -T10146/5-

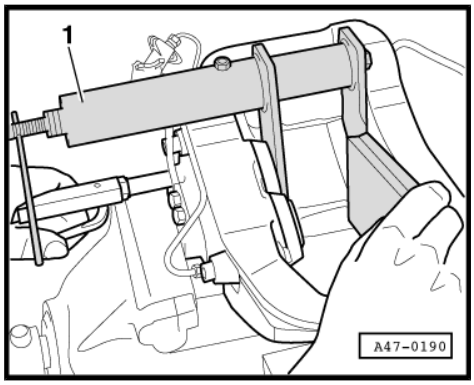


- Piston resetting appliance -T10145-

Removing

– Force piston out of brake caliper housing using compressed air.

– Item -1-: Piston resetting appliance -T10145-

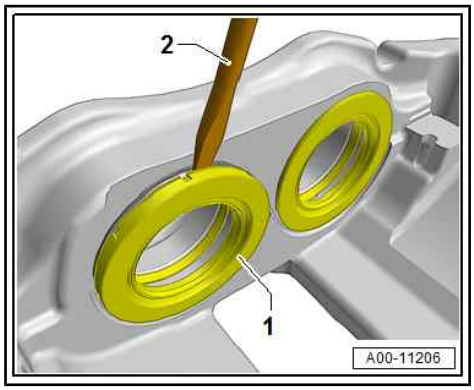


Note

Place a piece of wood in the recess to prevent damaging the piston.

Removal tool - T 40338-

– Carefully lever protective cap -1- and seal out of brake caliper with gentle movements using removal tool - T 40338- -2-; take care not to damage groove for protective cap in brake caliper.



Note

When removing ensure that the bore of the cylinder is not damaged.

Installing

– The surface of the piston and seal should be cleaned using only methylated spirits and then dried.

– Apply a small amount of assembly paste to piston and seal before inserting.

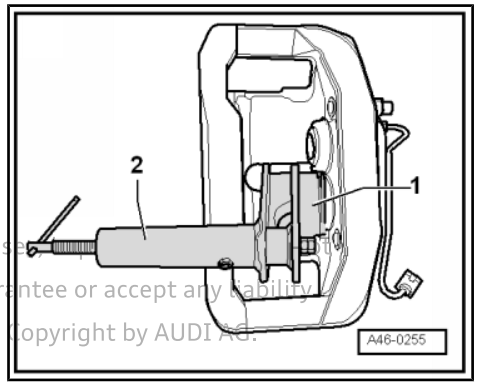
– Insert inner seal in groove in brake caliper housing with removal wedge 3409.

– Press in protective cap with special tool -1- and -2-.

– Item -1-: Assembly tool for protective caps -T10146/5-

– Item -2-: Piston resetting appliance -T10145-

Use jaw protectors



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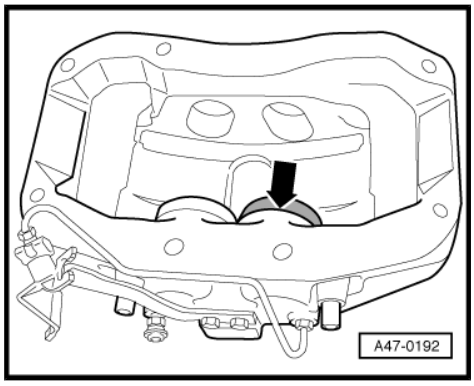
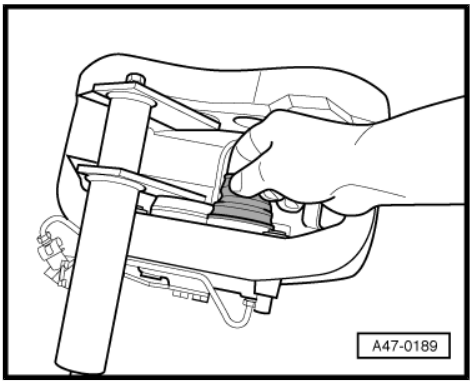
– Push protective cap onto brake caliper housing and press it in so that it is seated flush -arrow-.

Use jaw protectors



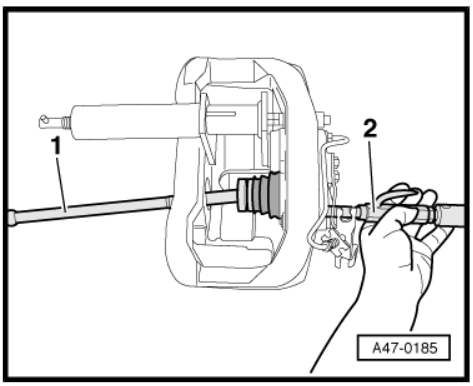
– At this stage it should not be possible to remove the protective cap from the brake caliper housing by hand.
– Apply a small amount of assembly paste to piston and seal before inserting.



– Hold piston with standard extension and ratchet attachment as shown in illustration and press lightly onto protective cap.

Keep the piston straight to avoid damaging the seal.

– Inflate protective cap with compressed air (maximum 3 bar). The protective cap will then locate around the brake piston.



Use jaw protectors

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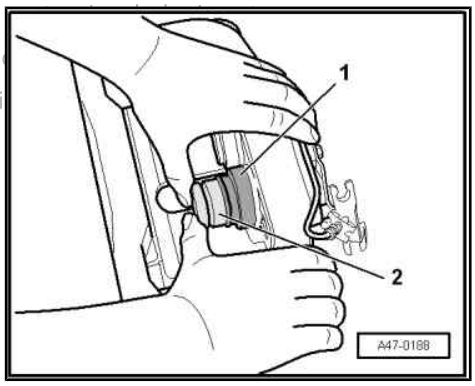
– Press piston into brake caliper housing by hand.



Note

The inner sealing lip on the protective cap will then locate in the piston groove.

Note

After servicing and installing brake caliper, bleed brake system *⇒ page 154* *.*

5 Servicing brake calipers (steel version) - RS 6

Note

- *Install complete repair kit when servicing.*
- *Apply a thin coat of assembly paste to brake cylinders, pistons and seals. ⇒ Parts catalogue*
- *After servicing and installing brake caliper, bleed brake system* *⇒ page 154* *.*

WARNING

Do not perform any repairs on the brake caliper other than "Removing and installing pistons for front brake caliper".

5.1 Removing and installing piston for front brake caliper

Install complete repair kit when servicing.

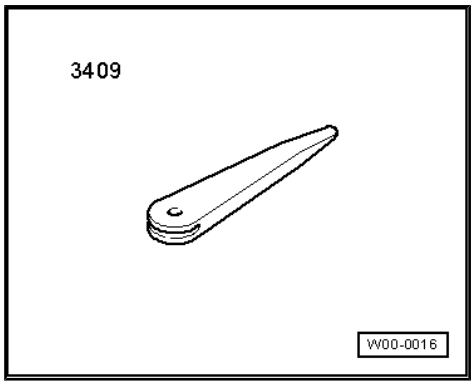
Apply a thin coat of assembly paste to brake cylinders, pistons and seals. ⇒ Parts catalogue

WARNING

The brake pistons have different diameters. When re-installing, please make sure that each of the brake pistons is inserted in the correct aperture in the brake caliper.

Special tools and workshop equipment required

- Removal wedge - 3409-



- Removal tool - T 40338-

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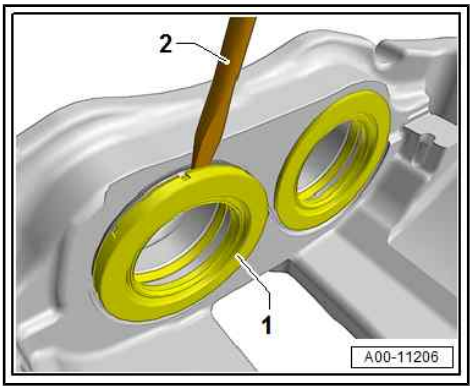
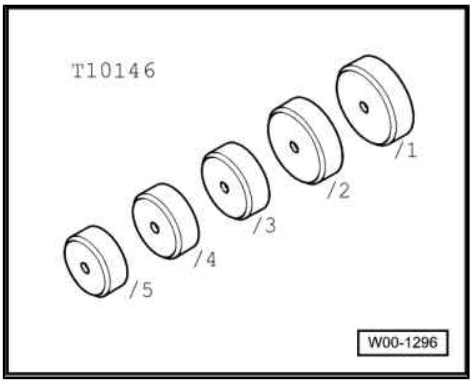
♦ Carefully lever protective cap -1- and seal out of brake caliper with gentle movements using removal tool - T 40338- -2-; take care not to damage groove for protective cap in brake caliper.



♦ Assembly paste ⇒ Parts catalogue

♦ Assembly tool for protective caps -T10146/5-



♦ Piston resetting appliance -T10145-

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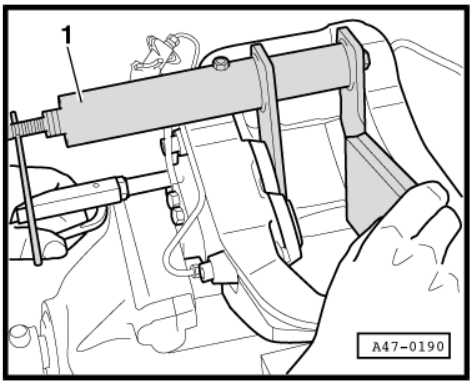
Removing

– Force piston out of brake caliper housing using compressed air.

– Item -1-: Piston resetting appliance -T10145-

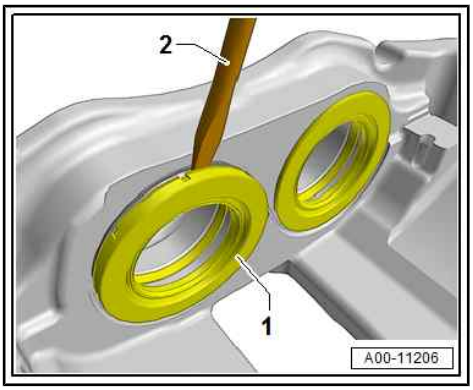


Note

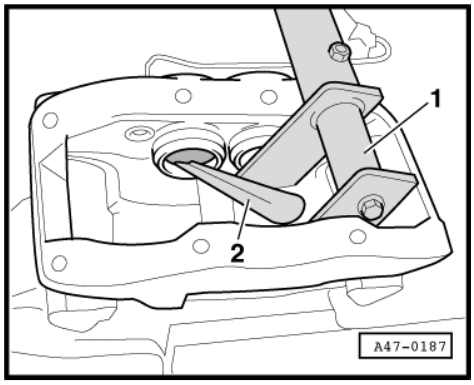
Place a piece of wood in the recess to prevent damaging the piston.

Removal tool - T 40338-

– Carefully lever protective cap -1- and seal out of brake caliper with gentle movements using removal tool - T 40338- -2-; take care not to damage groove for protective cap in brake caliper.



– Take out seal.
– Item -1-: Piston resetting appliance -T10145-



Note

When removing ensure that the bore of the cylinder is not damaged.

Installing

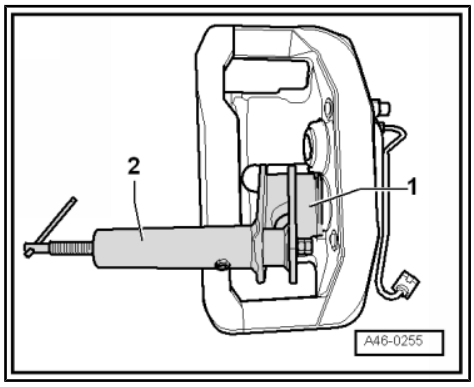
WARNING

The brake pistons have different diameters. When re-installing, please make sure that each of the brake pistons is inserted in the correct aperture in the brake caliper.

– The surface of the piston and seal should be cleaned using only methylated spirits and then dried.
– Apply a small amount of assembly paste to piston and seal before inserting.
– Insert inner seal in groove in brake caliper housing with removal wedge 3409.

– Press in protective cap with special tool -1- and -2-.
– Item -1-: Assembly tool for protective caps -T10146/5-
– Item -2-: Piston resetting appliance -T10145-
– Push protective cap onto brake caliper housing and press it on so that it makes contact all round.

Use jaw protectors

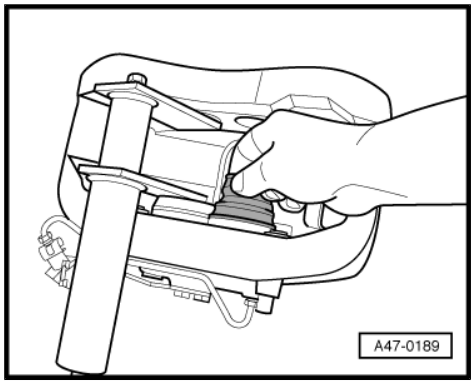


– At this stage it should not be possible to remove the protective cap from the brake caliper housing by hand.
– Apply a small amount of assembly paste to piston and seal before inserting.
– Press brake piston lightly against protective cap.

Keep the piston straight to avoid damaging the seal.

– Inflate protective cap with compressed air (maximum 3 bar). The protective cap will then locate around the brake piston.

Use jaw protectors



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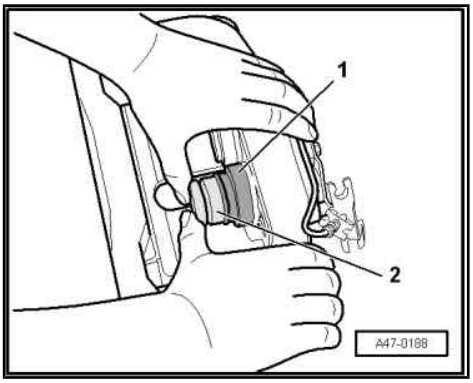
– Press piston into brake caliper housing by hand.



Note

The inner sealing lip on the protective cap will then locate in the piston groove.

Note

After servicing and installing brake caliper, bleed brake system *⇒ page 154* *.*

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6 Servicing front brake calipers (ceramic brakes) - RS 6

Note

- *Install complete repair kit when servicing.*
- *Apply a thin coat of assembly paste to brake cylinders, pistons and seals. ⇒ Parts catalogue*
- *After servicing and installing brake caliper, bleed brake system* *⇒ page 154* .

WARNING

Do not perform any repairs on the brake caliper other than "Removing and installing pistons for front brake caliper".

1 - Brake caliper

2 - Bleeder screws

- ❑ Each front brake caliper has two bleeder screws. Bleed brake caliper at each bleeder screw.

3 - Bolts

- ❑ 196 Nm

Always use new bolts

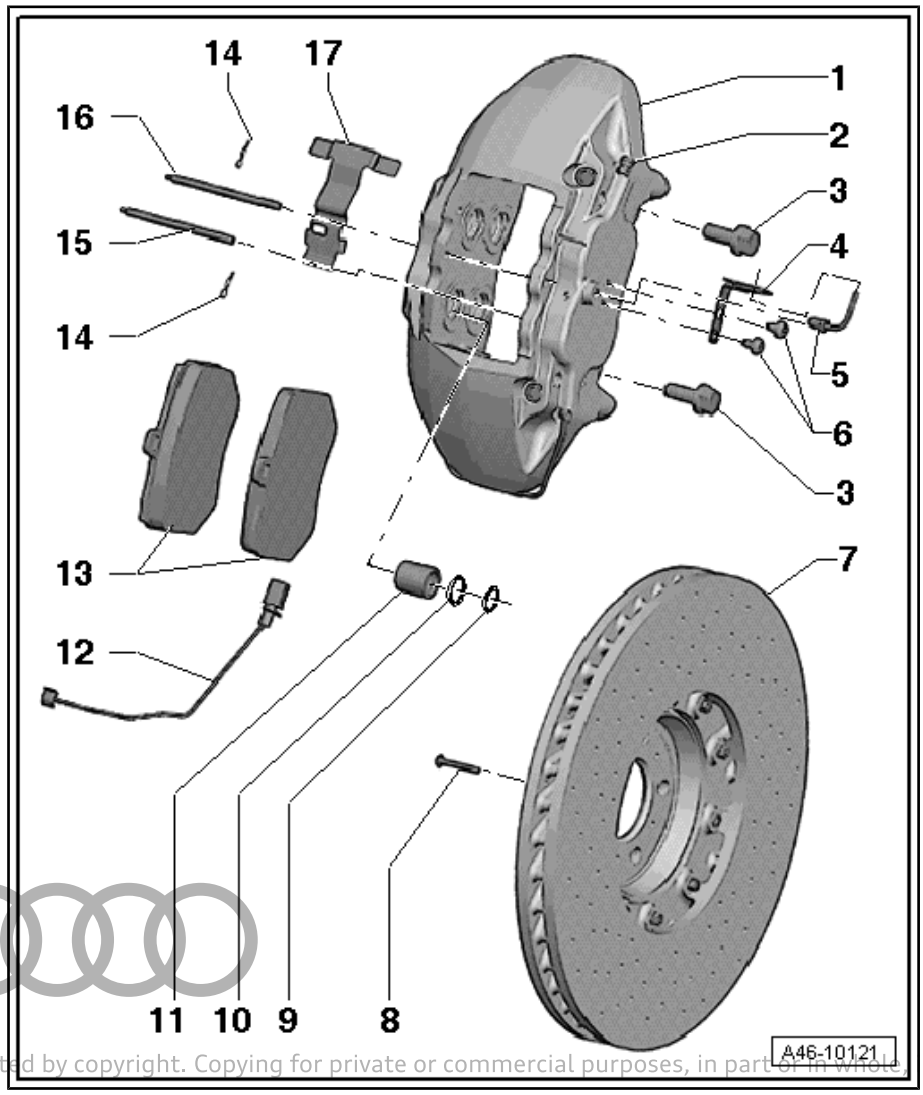
4 - Brake line retainer

5 - Brake line

9 - Seal

10 - Seal

11 - Brake piston



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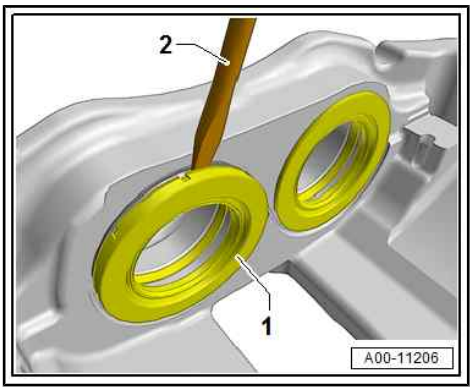
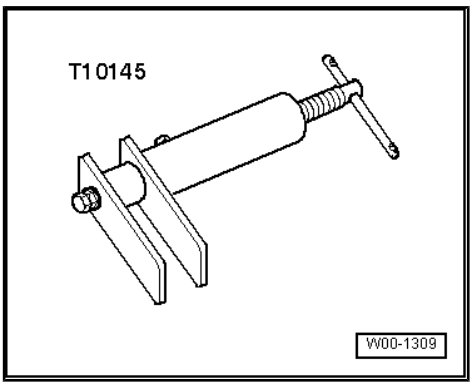
6.1 Removing and installing pistons for front brake caliper (ceramic brakes)

Special tools and workshop equipment required

- Assembly paste - G 052 150 A2-
- Removal tool - T 40338-
- Carefully lever protective cap -1- and seal out of brake caliper with gentle movements using removal tool - T 40338- -2-; take care not to damage groove for protective cap in brake caliper.



- Piston resetting appliance - T10145-



Install complete repair kit when servicing.

Apply a thin coat of assembly paste to brake cylinders, pistons and seals. ⇒ Parts catalogue

WARNING

The ceramic inserts on the brake piston act as heat insulators and must not be separated from the brake piston. If the ceramic insert is damaged, the brake pistons must be renewed for safety reasons.

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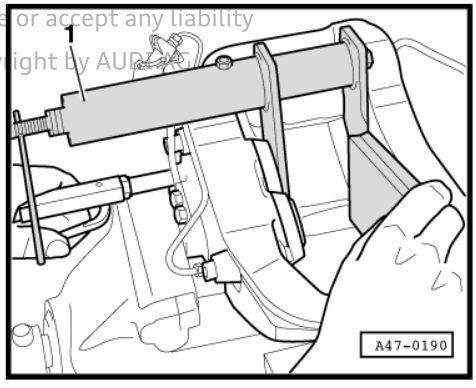
Removing

– Force piston out of brake caliper housing using compressed air.
– Item -1-: Piston resetting appliance -T10145-

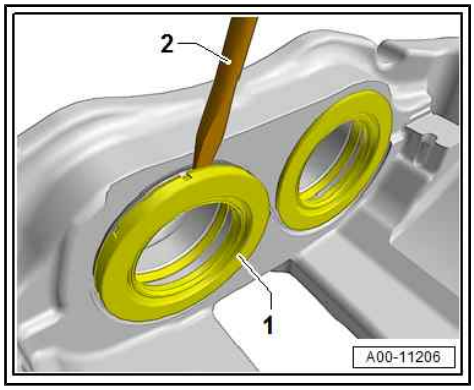


Note

Place a piece of wood in the recess to prevent damaging the piston.

Removal tool - T 40338-

– Carefully lever protective cap -1- and seal out of brake caliper with gentle movements using removal tool - T 40338- -2-; take care not to damage groove for protective cap in brake caliper.



Note

When removing ensure that the bore of the cylinder is not damaged.

– Take out seal.

Installing

– The surface of the piston and seals should be cleaned using only methylated spirits and then dried.

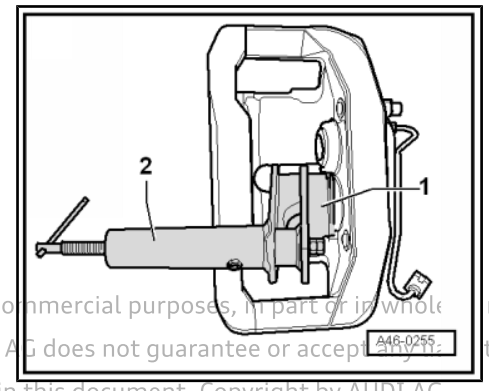
– Apply a small amount of assembly paste to piston and seals before inserting.

– Insert inner seal in groove in brake caliper housing with removal wedge 3409.

– Press in protective cap with special tool -1- and -2-.

– Item -1-: Assembly tool for protective caps -T10146/5-

– Item -2-: Piston resetting appliance -T10145-



Use jaw protectors

– Push protective cap onto brake caliper housing and press it on so that it makes contact all round.

Use jaw protectors

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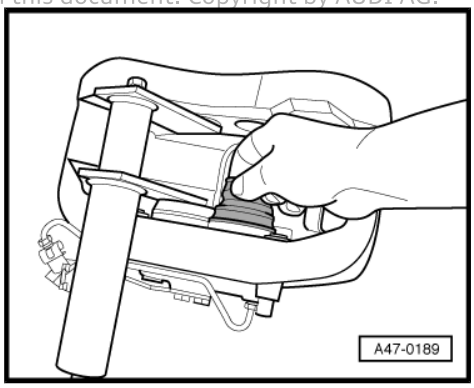
– At this stage it should not be possible to remove the protective cap from the brake caliper housing by hand.

– Apply a small amount of assembly paste to piston and seals before inserting.

– Hold piston with standard extension and ratchet attachment as shown in illustration and press lightly onto protective cap.

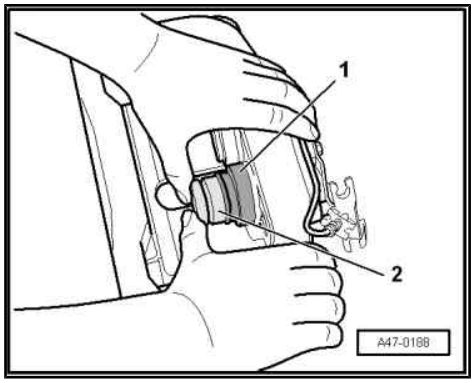


Keep the piston straight to avoid damaging the seal.

– Inflate protective cap with compressed air (maximum 3 bar). The protective cap will then locate around the brake piston.

Use jaw protectors

– Press piston into brake caliper housing by hand.



Note

The inner sealing lip on the protective cap will then locate in the piston groove.

Note

After servicing and installing brake caliper, bleed brake system *⇒ page 154* *.*

7 Rear brake calipers for electronic parking brake and handbrake (EPB)

7.1 Servicing brake calipers

Note

- *When carrying out repairs install all parts supplied in repair kit.*
- *Apply a thin coat of assembly paste - G 052 150 A2- to brake cylinder, piston and seal.*
- *After servicing and installing brake caliper, bleed brake system* ⇒ page 154 .

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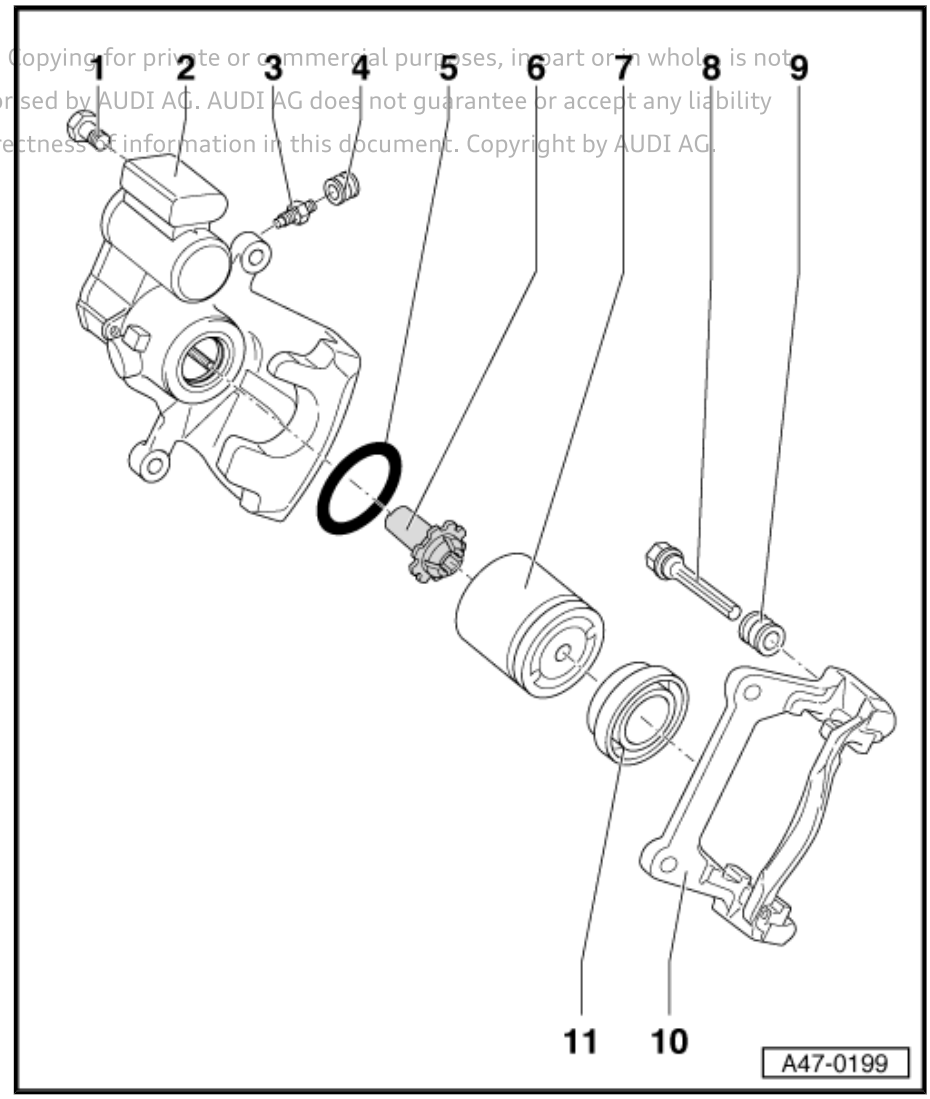

1 - Self-locking bolt, 35 Nm

- ❑ Always renew
- ❑ Counter-hold guide pin when loosening and tightening

2 - Brake caliper housing with actuator

- ❑ After repairing, pre-bleed brake caliper housing ⇒ page 154

3 - Bleeder valve, 10 Nm

4 - Grease cap

- ❑ Fit onto bleeder valve

5 - Seal

- ❑ Removing and installing ⇒ page 150

6 - Compressor nut

- ❑ To operate the parking brake

7 - Piston

- ❑ Removing and installing ⇒ page 150

8 - Guide pin

- ❑ Lubricate before installing protective cap

9 - Protective cap

- ❑ Insert onto brake carrier and guide pin

10 - Brake carrier with guide pins and protective caps

- ❑ Replacement carriers are supplied assembled and with sufficient grease on guide pins
- ❑ If protective caps or guide pins are damaged, renew using repair kit. Use grease sachet supplied to lubricate the guide pins.

11 - Protective cap

- ❑ Removing and installing ⇒ page 150

❑ Push outer sealing lip onto piston

7.2 Removing and installing piston for rear brake caliper

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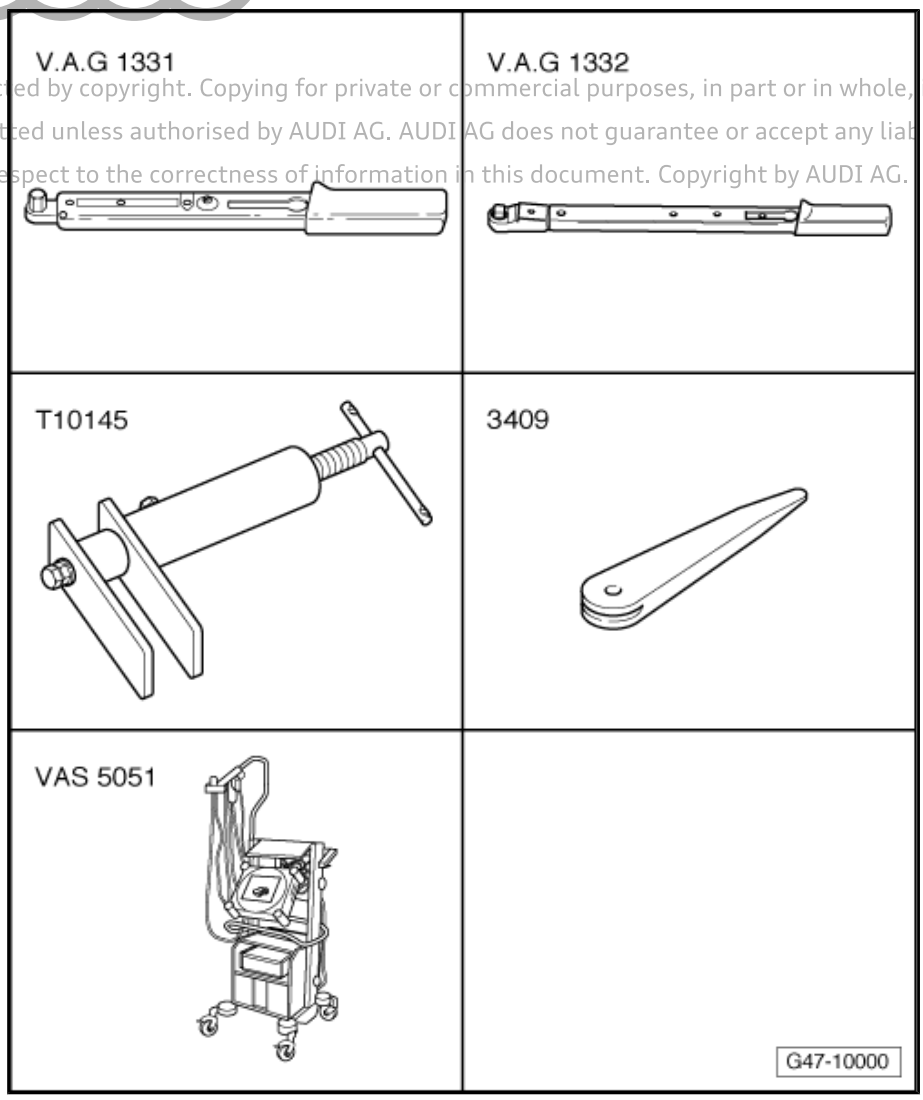
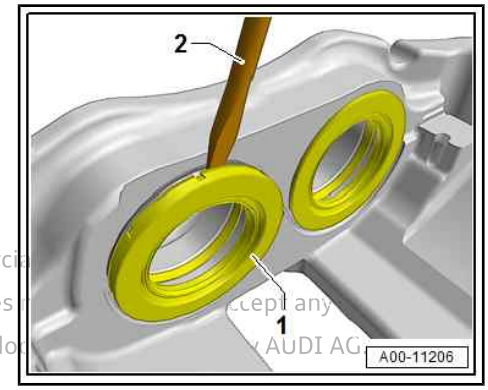


Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-
- Torque wrench - V.A.G 1332-
- Piston resetting appliance - T10145-
- Removal wedge - 3409-
- Assembly paste - G 052 150 A2-
- Removal tool - T 40338-

- Carefully lever protective cap -1- and seal out of brake caliper with gentle movements using removal tool - T 40338- -2-; take care not to damage groove for protective cap in brake caliper.



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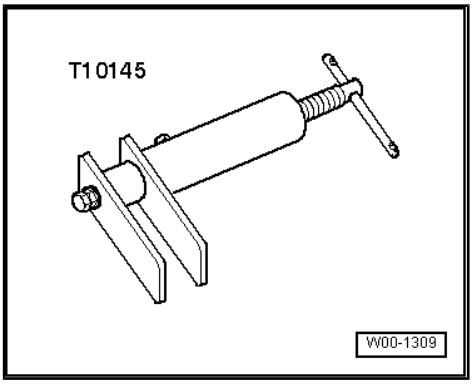
- Piston resetting appliance - T10145-

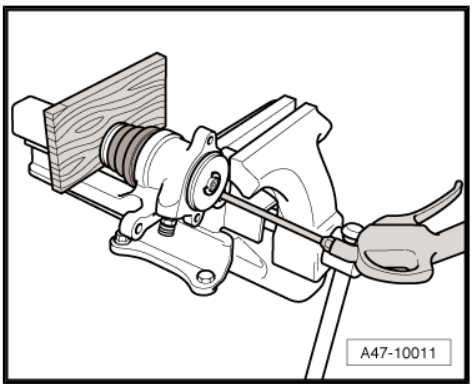


- Removal tool - T 40338-
- Vehicle diagnostic, testing and information system - VAS 5051B- or -VAS 5052-

Removing

– Screw piston out of brake caliper as far as possible.

– Force piston out of brake caliper housing using compressed air.

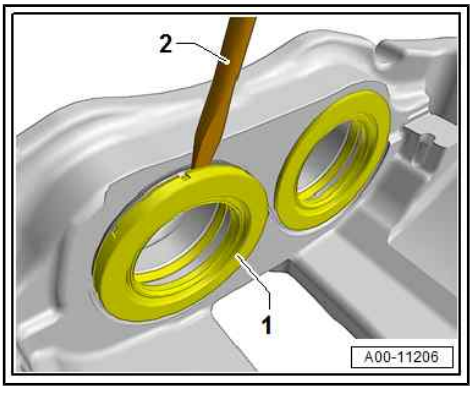


Note

- *When removing ensure that the bore of the cylinder is not damaged.*
- *Place a piece of wood in the recess to prevent damaging the piston.*

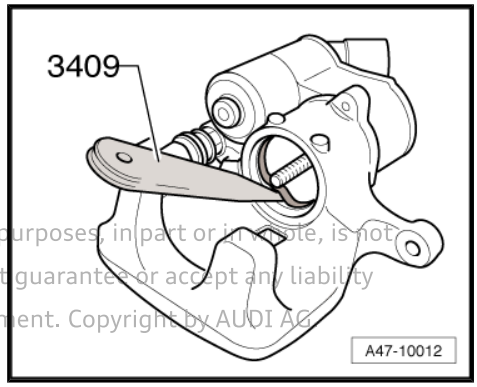
Removal tool - T 40338-

– Carefully lever protective cap -1- and seal out of brake caliper with gentle movements using removal tool - T 40338- -2-; take care not to damage groove for protective cap in brake caliper.



Installing

– Fit the new seal in the brake caliper.



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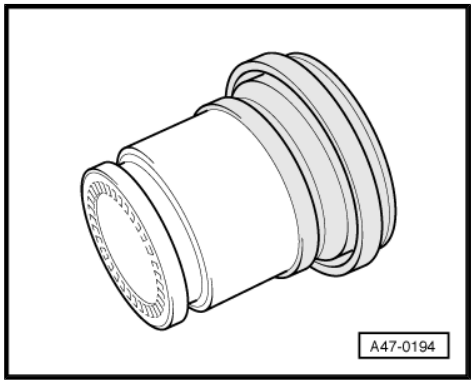
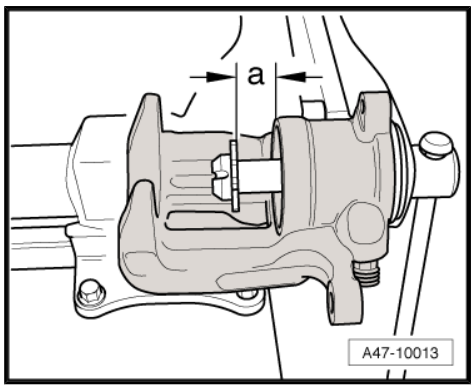
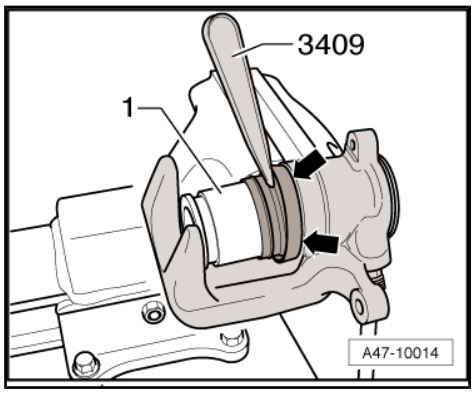
– Fit the new protective cap onto the brake piston as shown in the illustration.



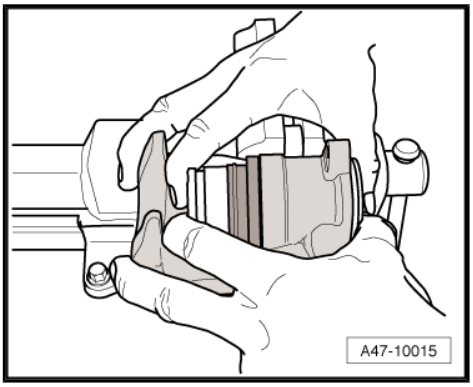
– Screw in compressor nut to dimension -a- 15 mm.



– Insert protective cap into groove in brake caliper. To do this use removal wedge - 3409- .
– Carefully slide brake piston into brake caliper. Turn brake piston as required. There are only four positions in which it is possible to guide the brake piston over the compressor nut.



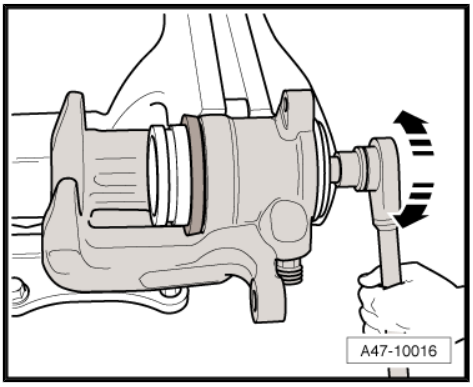
– Press brake piston onto stop in brake caliper after guiding it onto the compressor nut.



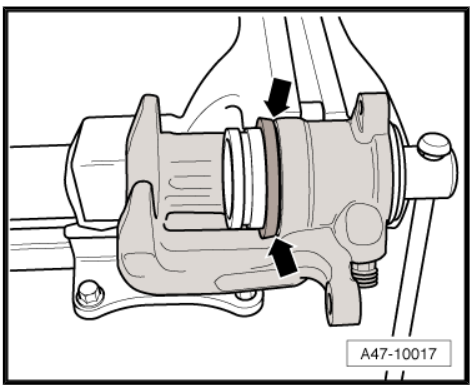
Note

Make sure not to damage the compressor nut.

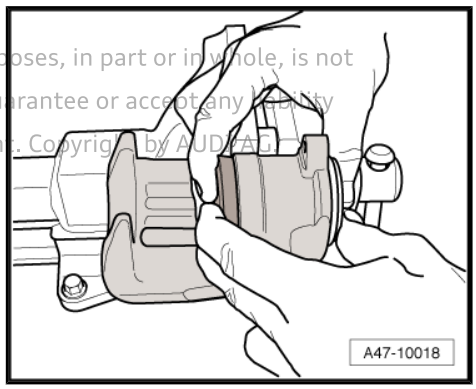
– Screw in compressor nut onto stop by turning clockwise.



– Make sure that the protective cap fits tight all round the brake caliper housing -arrows-.



– Press piston into brake caliper by hand.



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Note

The inner sealing lip on the protective cap will then locate in the piston groove.

Note

After servicing and installing brake caliper, bleed brake system *⇒ page 154* *.*

8 Bleeding brake system

⇒ “8.1 Bleeding hydraulic system with brake filling and bleeding equipment”, page 155

⇒ “8.2 Bleeding hydraulic system without brake filling and bleeding equipment”, page 157

Note

- *The brake system cannot be completely bled if the older version of the pressure sensor (ACC sensor) (1J0...) is installed. Replace the pressure sensor for ACC with the new version. ⇒ ETKA*
- *Removing and installing brake pressure sender ⇒ page 54*

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WARNING

- ***Brake fluid must NOT come into contact with fluids containing mineral oils (oil, petrol, cleaning agents). Mineral oils damage the plugs and sleeves in the brake system.***
- ***Brake fluid is poisonous and must NOT be drawn off by sucking through a hose. Because of its caustic properties it must also not come into contact with paintwork.***
- ***Brake fluid is hygroscopic, i.e. it absorbs moisture from the surrounding air. It must therefore always be stored in airtight containers.***
- ***Brake fluid flushed out during the bleeding process must not be re-used and must be disposed of in the proper manner.***

Note

- *Only use new brake fluid conforming to US standard FMVSS 116 DOT 4.*
- *Genuine VW/Audi brake fluid conforms to this specification.*
- *Do not use liquids containing silicone.*
- *Avoid contamination of brake fluid with any dirt particles or bits of fluff (e.g. from cleaning cloths etc.).*
- *Rinse off spillages using plenty of water.*
- *When the system is open, do not work with compressed air and do not move the vehicle.*
- *During the final road test, ensure that at least one ABS-controlled brake application is performed (pulsations must be felt at the brake pedal).*
- *The brake system warning lamp flashes if the level of the brake fluid is too low, in case of a malfunction of the ABS or a malfunction of the electronic parking brake.*

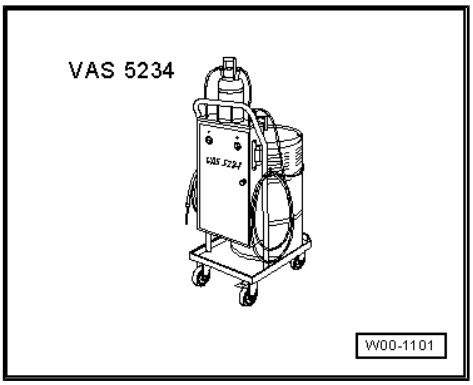
8.1 Bleeding hydraulic system with brake filling and bleeding equipment

Note

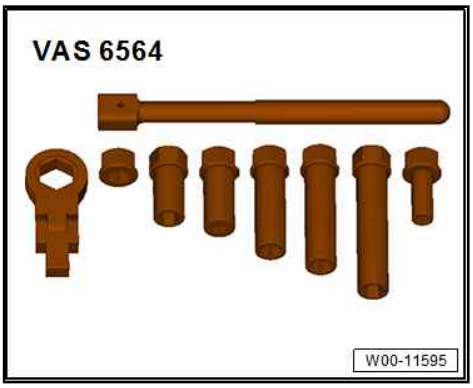
- *A pressure of 2 bar is required for bleeding the hydraulic unit. For this reason it is important to always check the pressure setting on the bleeder unit.*
- *Observe instructions given in operating manual for - VAS 5234- or brake filling and bleeding equipment - VAS 6860- .*

Special tools and workshop equipment required

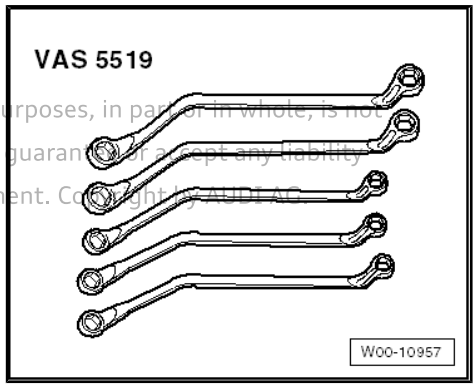
- Brake filling and bleeding equipment - VAS 5234- or



- Brake filling and bleeding equipment - V.A.G 1869-
- Or
- Brake filling and bleeding equipment - VAS 6860- with adapter - VAS 5234/1A-
- Tool set for brake bleeding - VAS 6564-



- Brake pipe bleeding wrench - VAS 5519-



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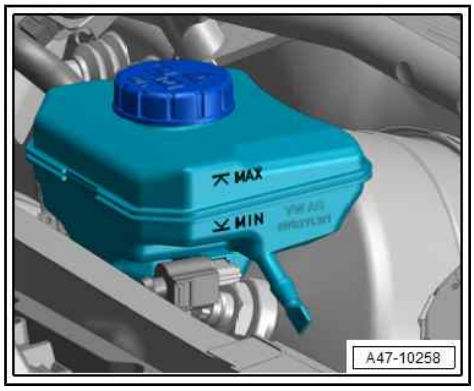
Observe instructions given in operating manual for -VAS 5234- or brake filling and bleeding equipment - VAS 6860- .

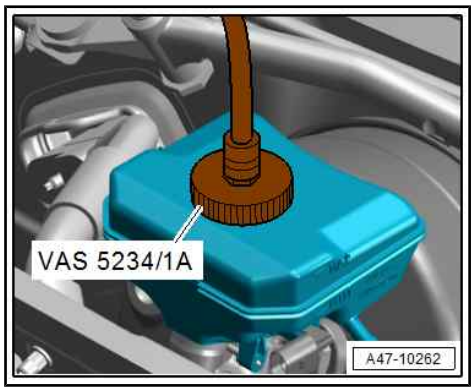
Procedure

– Fill brake fluid into brake fluid reservoir up to “max” marking.



– Connect -VAS 5234- or brake filling and bleeding equipment - VAS 6860- with adapter -VAS 5234/1- .

– Open bleeder screws in the specified order and bleed brake calipers (assist as required with pedal pressure).



WARNING

Depending on the model, the front brake caliper has two bleeder screws. Bleed brake caliper at each bleeder screw.

Bleed sequence for LHD and RHD vehicles

1 - Front left brake caliper

2 - Front right brake caliper

3 - Rear left brake caliper

4 - Rear right brake caliper

Note

Bleed brake caliper at each bleeder screw. If brake caliper has two bleeder screws, first bleed at outer screw.

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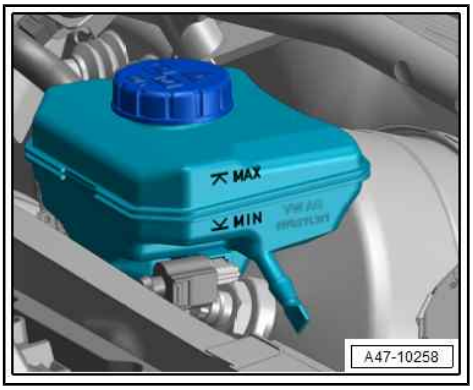
– Keep bleeding the calipers until clear, foam-free brake fluid emerges.

– Close bleeder screw.

– Fill brake fluid into brake fluid reservoir up to “max” marking.
– Close reservoir.
– Start engine and check brake pedal travel and brake pedal pressure.
– In the event of excessive pedal travel, check brake system for leaks and/or repeat bleeding procedure.

Perform road test after completion of bleeding. At least one ABS control operation must be applied at all four wheels.

Changing brake fluid ⇒ Maintenance ; Booklet 817



WARNING

Risk of accident!

- *Make sure that the brakes work properly before the vehicle is driven on the road.*

8.2 Bleeding hydraulic system without brake filling and bleeding equipment

Special tools and workshop equipment required

- Reservoir -1-

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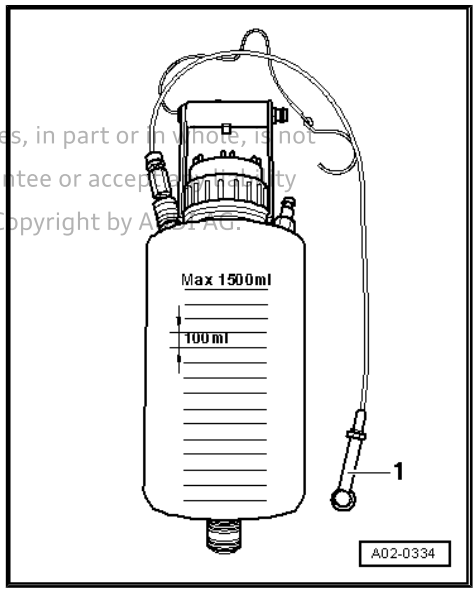
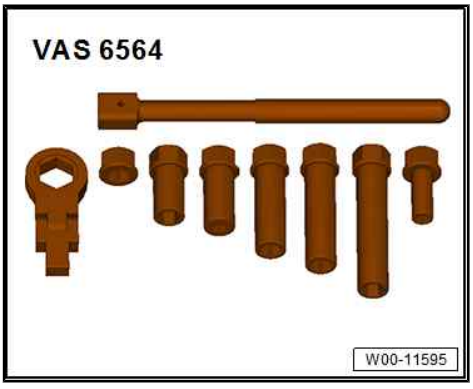
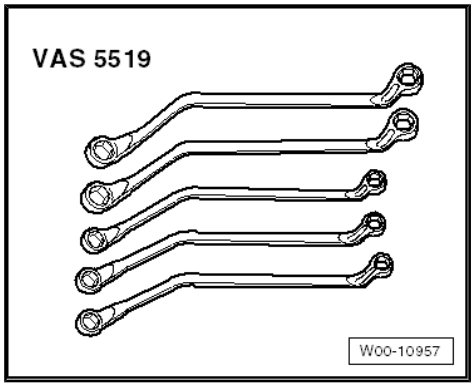


- Tool set for brake bleeding - VAS 6564-



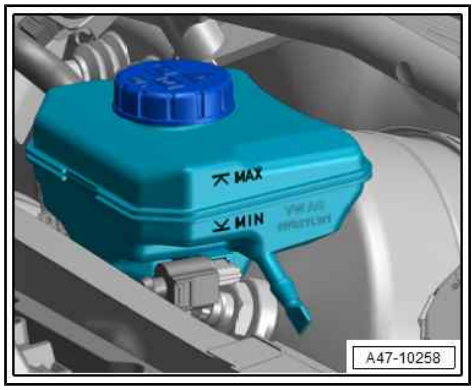
- Brake pipe bleeding wrench - VAS 5519-



Procedure

– Fill brake fluid into brake fluid reservoir up to “max” marking.

– Close reservoir.



WARNING

- *Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.*
- *If brake fluid comes into contact with skin, rinse with plenty of water.*
- *If you get brake fluid in your eyes, rinse your eyes out and consult a doctor.*

Note

Make sure brake fluid reservoir is always full.

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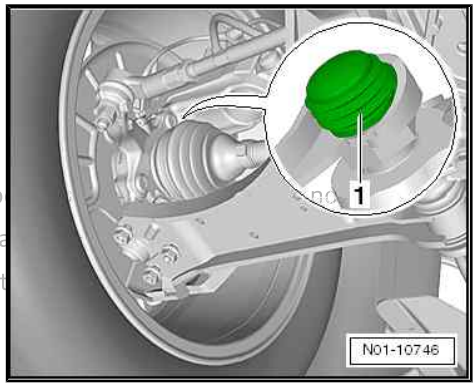
– Remove protective cap -1- from bleeder screw on relevant brake caliper and fit hose from reservoir onto bleeder screw.



Bleeding sequence

1 - Front left brake caliper

2 - Front right brake caliper

3 - Rear left brake caliper

4 - Rear right brake caliper

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Note

Bleed brake caliper at each bleeder screw. If brake caliper has two bleeder screws, first bleed at outer screw.

– Build up pressure in brake system by pumping brake pedal.

Note

Press brake pedal slowly to avoid formation of bubbles.

– Once pressure has built up, keep brake pedal depressed.

– Open bleeder screw with hose of reservoir attached until pressure has dissipated (pedal sags).

– Keep pedal depressed and close bleeder screw.

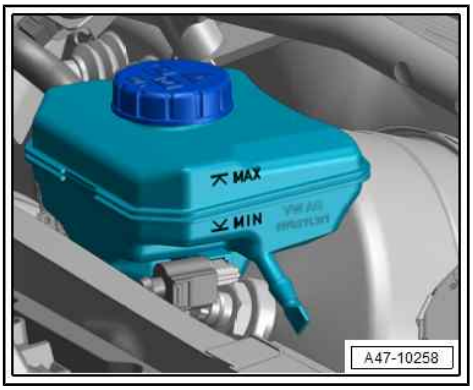
– Release brake pedal and wait approx. 2 seconds to allow brake fluid to flow in from brake fluid reservoir.

– Repeat procedure until emerging brake fluid is clear and free from bubbles.

– Tighten bleeder screw, detach bleeder hose and fit protective cap on bleeder screw.

– Repeat bleeding procedure in stated sequence at other brake calipers.

– Fill brake fluid into brake fluid reservoir up to “max” marking.



– Close reservoir.

– Start engine and check brake pedal travel and brake pedal pressure.

– In the event of excessive pedal travel, check brake system for leaks and/or repeat bleeding procedure.

WARNING

Risk of accident!

- ***Make sure that the brakes work properly before the vehicle is driven on the road.***

8.3 Changing brake fluid

Brake fluid change

⇒ Maintenance ; Booklet 405 ; Work descriptions; Changing brake fluid (every 2 years)

9 Exploded view - brake servo / brake master cylinder

Note

- *Brake master cylinders can no longer be dismantled, i.e. there is no provision for servicing.*
- *Use only new brake fluid. Observe information on brake fluid reservoir!*

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1 - Brake fluid reservoir

- ❑ Do not remove strainer from brake fluid reservoir

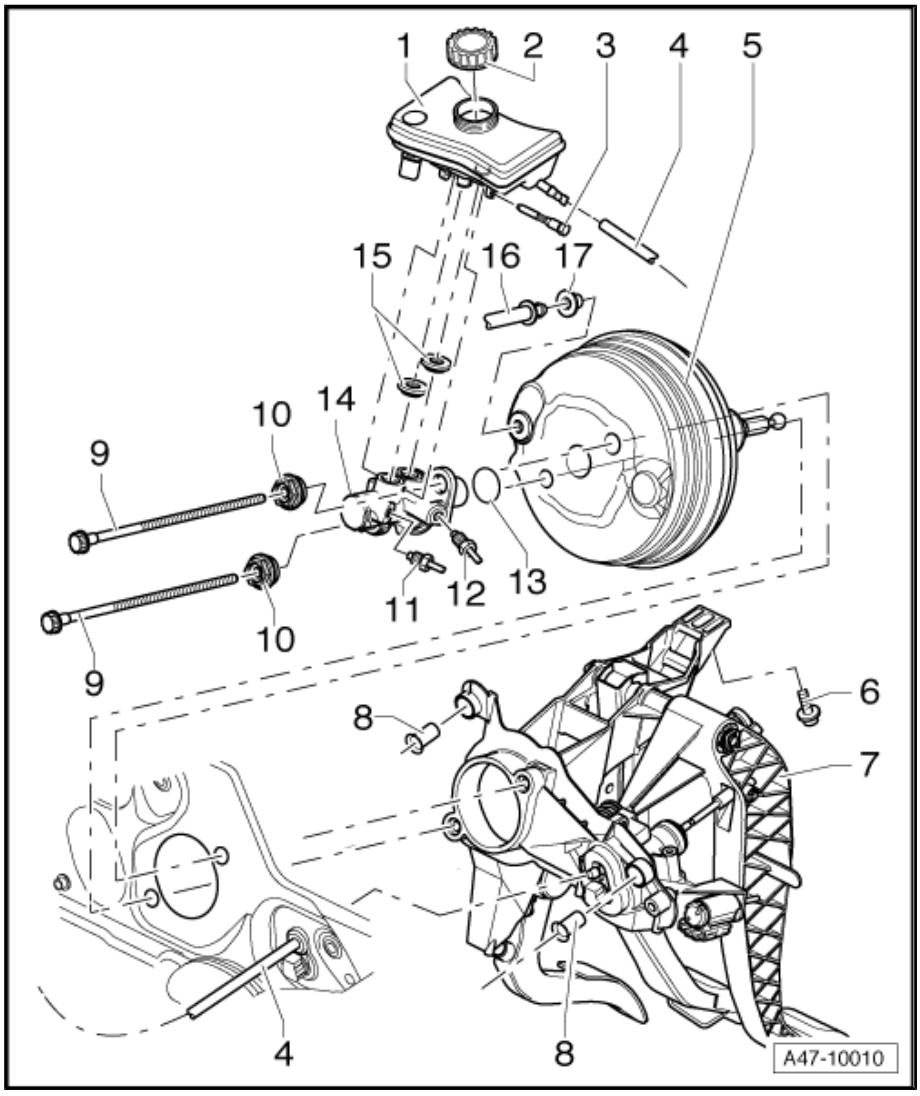
2 - Filler cap with seal

3 - Trunnion bolt, 10 Nm

4 - Pipe to master cylinder

5 - Tandem brake servo

- ❑ Adjusting ball head ⇒ page 161
- ❑ Function test: With the engine turned off, firmly depress the brake pedal several times (this reduces the vacuum present in the servo unit).
- ❑ Then hold brake pedal in applied position employing moderate force and start engine. If the servo unit is working properly, the pedal will give slightly under foot (servo assistance becomes activated).
- ❑ With bonded gasket
- ❑ Renew complete unit if defective.
- ❑ Removing and installing



⇒ page 165

6 - Hexagon socket head flange bolt, 25 Nm

7 - Mounting bracket for pedal cluster

- ❑ Removing and installing ⇒ page 120

8 - Sleeves

9 - Bolt (Torx 45), tightening torque 23 Nm

10 - Self-locking hexagon nut, 49 Nm

11 - Brake line, 16 Nm

- ❑ Brake master cylinder/secondary piston circuit to hydraulic unit

12 - Brake line, 16 Nm

- ❑ Brake master cylinder/primary piston circuit to hydraulic unit

13 - Seal

- ❑ Renew

14 - Tandem brake master cylinder

- ❑ Cannot be repaired. Renew complete unit if defective
- ❑ Removing and installing ⇒ page 162

15 - Sealing plug

- ❑ Moisten with brake fluid and press into brake fluid reservoir

16 - Vacuum hose with hose clip (with lug fastener)

- ❑ Insert into brake servo unit

17 - Sealing plug

- ❑ Connection for vacuum hose

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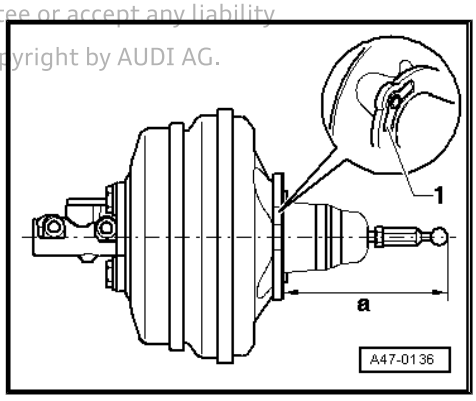
Note

Use only new brake fluid. Observe information on brake fluid reservoir!



Adjusting ball head

Left-hand drive vehicles:

-a = 178.2 mm ± 0.5 mm-

Right-hand drive vehicles:

-a = 203.3 mm ± 0.5 mm-

Note

- *Surface -1- for measuring.*
- *The ball head must be set at right angles to the surface of the brake servo when taking the measurement.*
- *Measure to end of ball head without gasket fitted.*
- *Whenever the length of the pushrod is re-adjusted in the vehicle the brake light switch must be renewed.*

Tightening torque:	
Ball head to brake servo	30 Nm

10 Removing and installing brake master cylinder

10.1 Removing and installing brake master cylinder

Special tools and workshop equipment required

- Brake filling and bleeding equipment - VAS 5234- or

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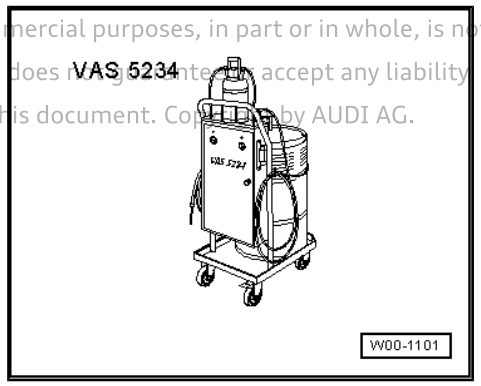
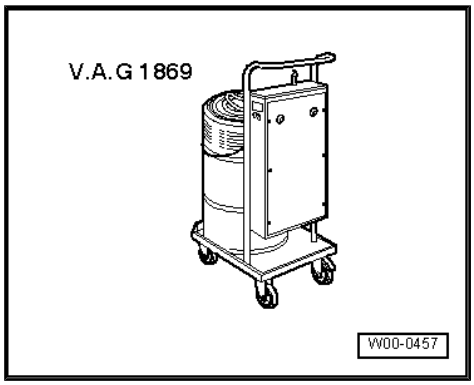
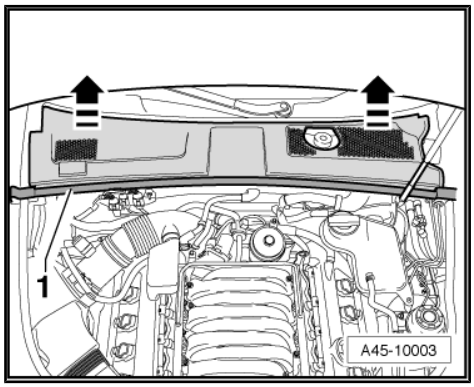


- Brake filling and bleeding equipment - V.A.G 1869-
- Sealing plugs (repair kit) - 1H0 698 311 A-

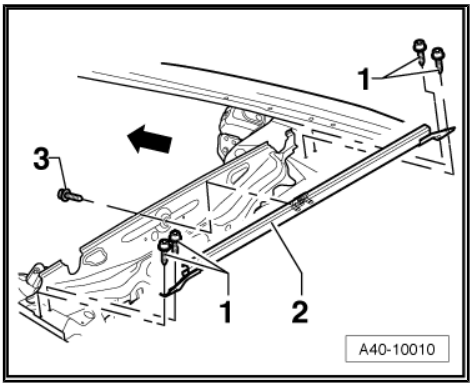


- Upgrade kit and extraction unit - V.A.G 1869/4-

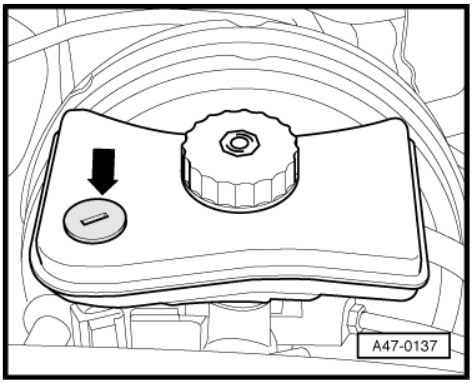
– Detach plenum chamber cover.



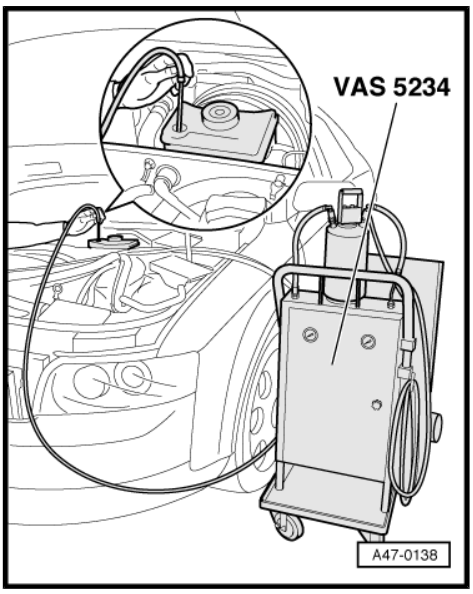
– Remove multi-point socket head bolts -1- and -3-, tightening torque 25 Nm.
– Take out body brace -2-.



– Open brake fluid reservoir.
– As protection against escaping brake fluid, place a sufficient number of lint-free cloths in area beneath brake master cylinder.



– Use upgrade kit and extraction unit - V.A.G 1869/4- or brake filling and bleeding equipment - VAS 5234- to extract as much brake fluid as possible from brake fluid reservoir.
– Unscrew securing bolt -1- for brake fluid reservoir.



– Unplug connector -2-.

Note

Protect the plenum chamber against any brake fluid which escapes.

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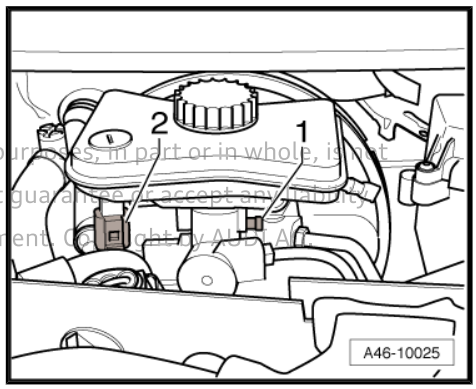
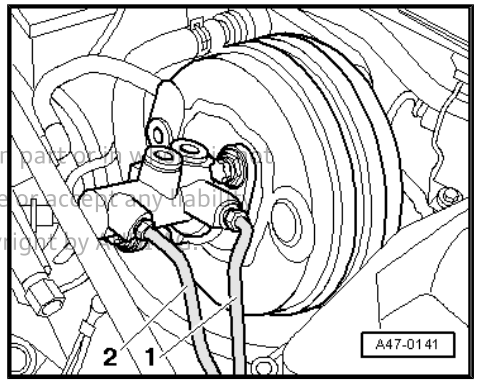
– Disconnect brake line and seal with sealing plug.
– To remove reservoir, press down locking lug and at the same time pull brake fluid reservoir out of sealing plugs.



– Disconnect brake lines -1- and -2- from brake master cylinder and hydraulic unit and remove.



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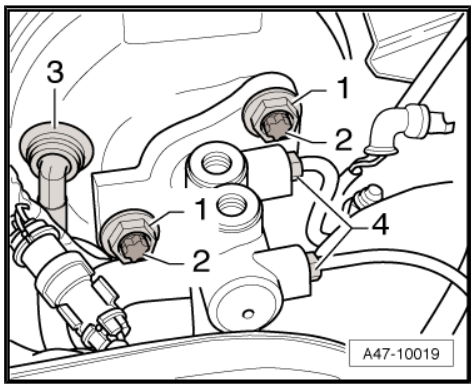
– Unscrew securing bolts for brake master cylinder -1-.
– Carefully remove brake master cylinder from brake servo.



Installing

When installing, note the following points in particular:

- Before installing brake master cylinder, clean any residual brake fluid off plenum chamber.
- When assembling brake master cylinder with brake servo unit, make sure push rod is properly positioned in brake master cylinder.

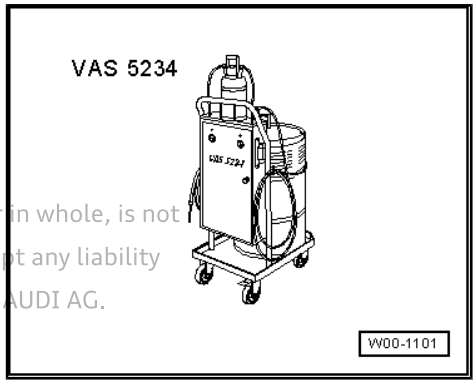
– Bleed brake system ⇒ page 154 .

11 Brake servo

11.1 Removing and installing brake servo

Special tools and workshop equipment required

- Brake filling and bleeding equipment - VAS 5234- or



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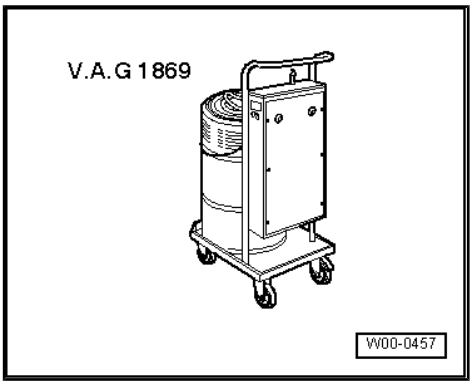
- Brake filling and bleeding equipment - V.A.G 1869-



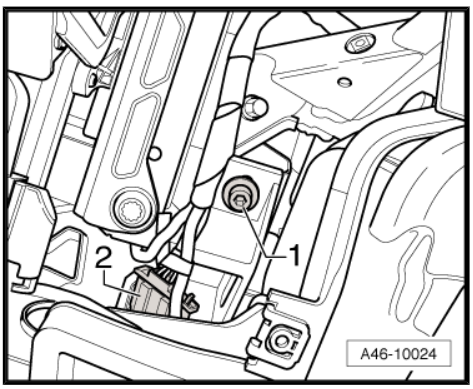
- Upgrade kit and extraction unit - V.A.G 1869/4-
- Sealing plugs (repair kit) - 1H0 698 311 A-

– Remove driver's storage compartment. ⇒ Rep. gr. 68

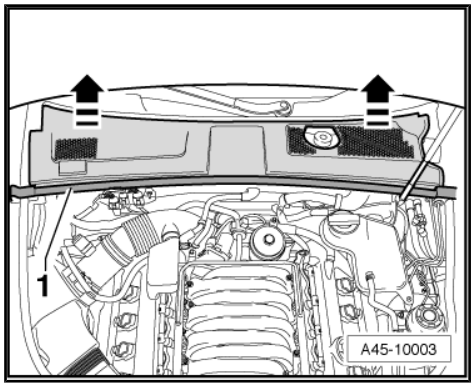
– Move adjustable steering column all the way out (opposite to direction of travel)

– Unplug brake light switch -2- and remove, see ⇒ page 50 .

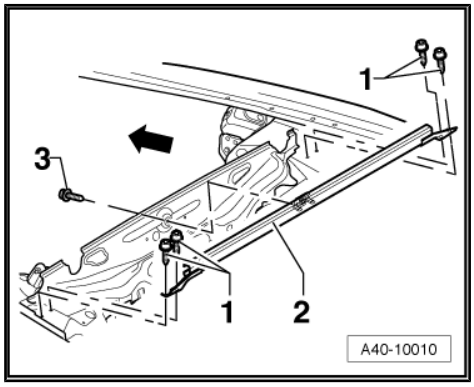
– Separate brake pedal from brake servo ⇒ page 118 .



– Detach plenum chamber cover.



– Remove multi-point socket head bolts -1- and -3-, tightening torque 25 Nm.
– Take out body brace -2-.
– Remove wiper arms ⇒ Rep. gr. 92 .
– Remove rear plenum chamber cover.



– Open brake fluid reservoir.
– As protection against escaping brake fluid, place a sufficient number of lint-free cloths in area beneath brake master cylinder.

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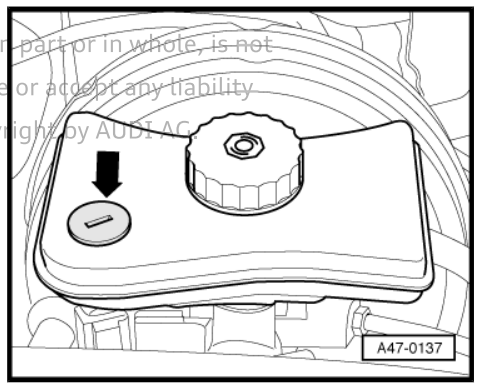
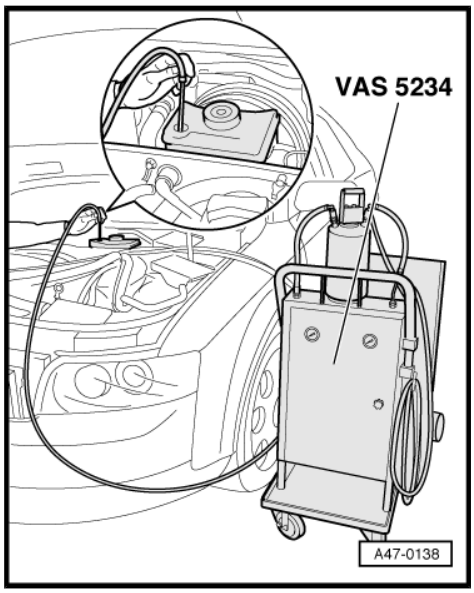
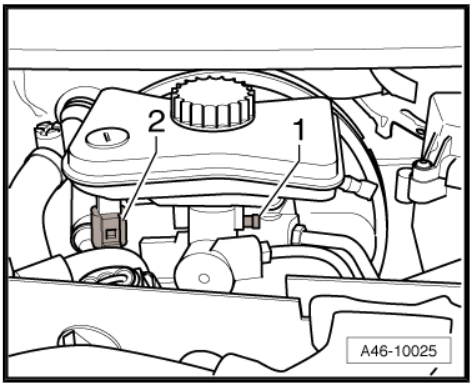


– Use upgrade kit and extraction unit - V.A.G 1869/4- or brake filling and bleeding equipment - VAS 5234- to extract as much brake fluid as possible from brake fluid reservoir.
– Unscrew securing bolt -1- for brake fluid reservoir.



– Unplug connector -2-.

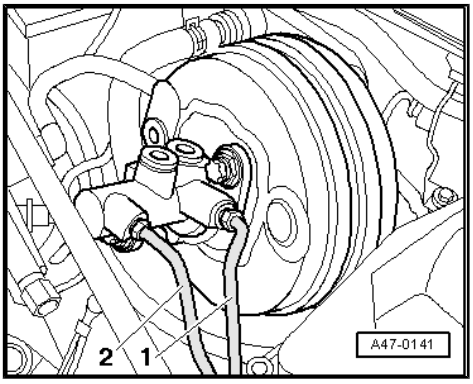


Note

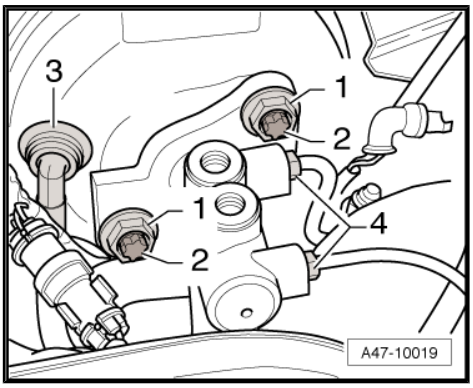
Protect the plenum chamber against any brake fluid which escapes.

– Disconnect brake line
– To remove reservoir, press down locking lug and at the same time pull brake fluid reservoir out of sealing plugs.

– Disconnect brake lines -1- and -2- from brake master cylinder and from hydraulic unit and remove after sealing with sealing plugs.
– Unscrew securing bolts for brake servo -2-.



– Disconnect vacuum line -3-.

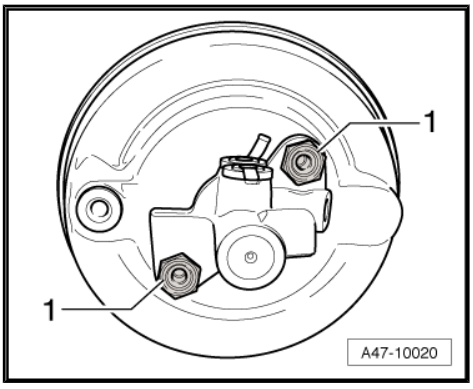


Note

Make sure that no dirt can enter the vacuum line opening.

– Remove brake servo with brake master cylinder.

– Unbolt securing nuts for brake master cylinder -1-.
– Carefully remove brake master cylinder from brake servo.



Installing

When installing, note the following points in particular:

- Before installing brake master cylinder, clean any residual brake fluid off plenum chamber.
- When assembling brake master cylinder with brake servo unit, make sure push rod is properly positioned in brake master cylinder.

Attaching brake pedal to brake servo

– Hold ball head of push rod in front of mounting and push brake pedal towards brake servo so that ball head audibly locks into place.
– Adjust brake light switch ⇒ page 50 .
– Bleed brake system ⇒ page 154 .

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12 Vacuum pumps for brake servo

Removing and installing vacuum pump (2.0 ltr. petrol engine) ⇒ page 170

Removing and installing vacuum pump (2.4 ltr. petrol engine) ⇒ page 173

Removing and installing vacuum pump (2.8 ltr. petrol engine) ⇒ page 174

Removing and installing vacuum pump (3.0 ltr. petrol engine) ⇒ page 175

Removing and installing vacuum pump (3.2 ltr. petrol engine) ⇒ page 176

Removing and installing vacuum pump (RS 6) ⇒ page 177

Removing and installing vacuum pump (diesel engine) ⇒ page 179

Removing and installing vacuum pump (2.7 ltr. and 3.0 ltr. diesel engine) ⇒ page 181

Electric vacuum pump ⇒ page 183

Removing and installing electric vacuum pump ⇒ page 185

Removing and installing electric vacuum pump (S6) ⇒ page 185

12.1 Exploded view - vacuum pump for brake servo

1 - Bolt

- ❑ 9 Nm

2 - Vacuum pump

- ❑ Removing and installing ⇒ page 169

3 - Vacuum hose

- ❑ Secure with hose clips (same as original equipment) ⇒ ETKA

4 -

5 Nm

5 - O-ring

- ❑ Renew

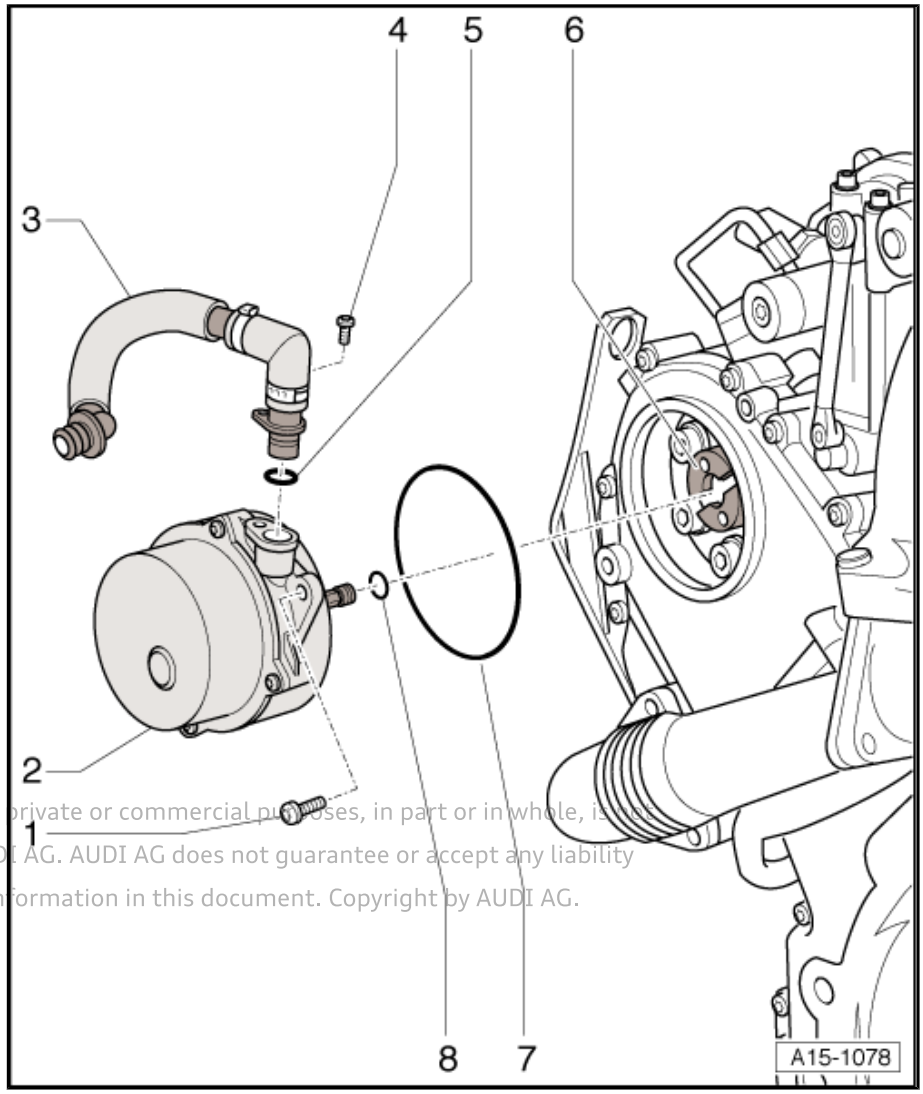
6 - Camshaft

7 - O-ring

- ❑ Renew

8 - O-ring

- ❑ Renew



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12.2 Removing and installing vacuum pump

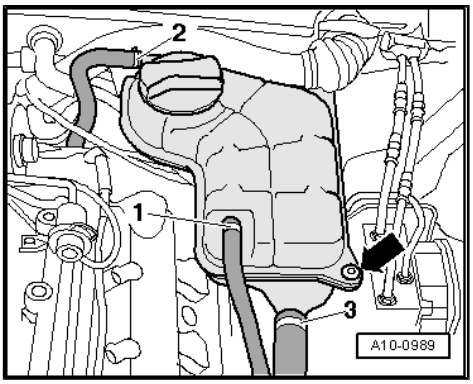
Removing

– Carefully pull engine cover panel off mounting studs, one after the other.

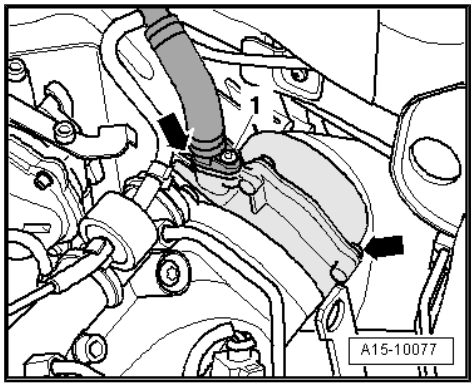
– Unbolt coolant expansion tank -arrow-.

– Detach electrical connector at coolant shortage indicator switch - F66- on underside of expansion tank.

– Lay aside coolant expansion tank with coolant hoses connected.



– Unscrew bolt -1- and detach vacuum hose with connection at vacuum pump.
– Remove bolts -arrows- and take off vacuum pump.

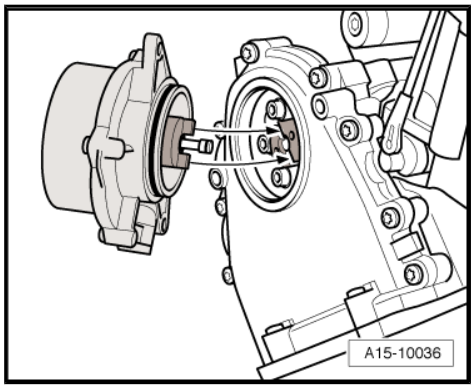


Installing

Install in reverse sequence, paying attention to the following:

Note

Renew O-rings.



– Set drive lugs of vacuum pump so they engage in slots in camshaft when vacuum pump is installed.
– Attach vacuum pump to flange and tighten bolts to 9 Nm.
– Secure vacuum hose to vacuum pump with bolt (5 Nm).

Tightening torques

Component	Nm
Vacuum pump to timing chain cover	9
Connection for vacuum hose to vacuum pump	5

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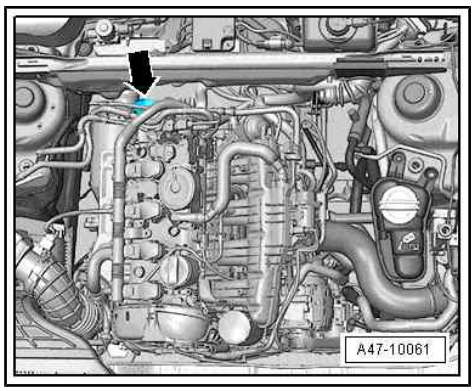
12.3 Removing and installing vacuum pump - vehicles with 2.0 ltr. petrol engine

Before removing the vacuum pump, the high-pressure fuel pump must be removed ⇒ Rep. gr. 24 .

The plenum chamber partition panel does not have to be removed.

Removing

The vacuum pump is located in the rear of the engine compartment -arrow-, as seen in the direction of travel.



WARNING

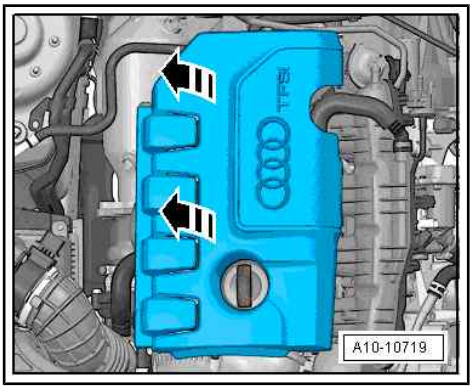
Fuel line is under pressure, do not disconnect.

– Carefully pull engine cover panels away from retaining pins, one after the other.

The vacuum pump is located in the rear of the engine compartment (right-side), as seen in the direction of travel.

– Unscrew bracket for fuel lines at high-pressure fuel pump.

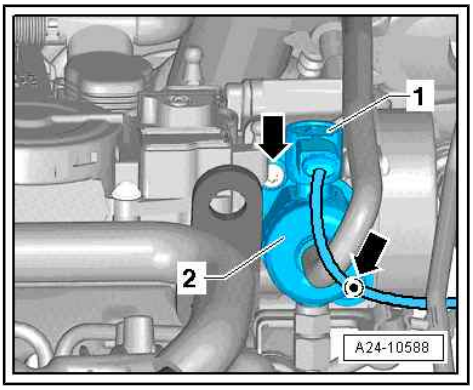
– Unplug electrical connector -1- for high-pressure fuel pump.



– Unclip electrical wire from bracket -arrow-.

– Remove high-pressure fuel pump -2- ⇒ Rep. gr. 24 .

– Slacken ignition coil rail at bracket.

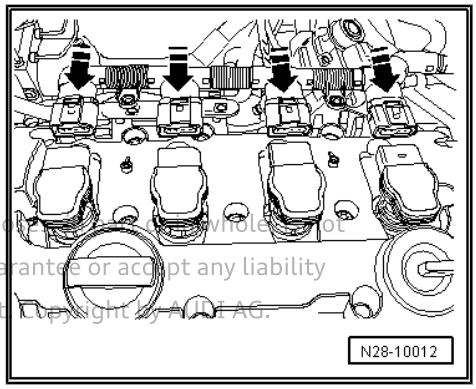


– Unplug connectors -arrows- for ignition coils.

– Carefully press ignition coil rail to one side.

– Unscrew lines at high-pressure pump and vacuum pump and press to one side.

– Disconnect vacuum hose from vacuum pump at hose clip.



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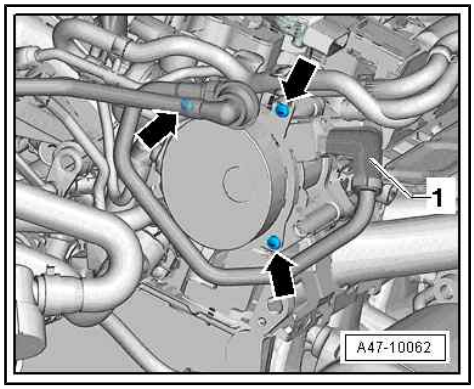
Note

On some models the vacuum hose is secured at the vacuum pump with a bolt.

Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

– Remove all bolts -arrows- from sealing flange of vacuum pump.



Note

Do not disconnect vacuum hose from vacuum line at plenum chamber partition panel.

– Pull vacuum pump out of its mounting.

Installing

Note

Renew gasket.

Ensure that gasket is seated correctly.

– Turn drive lugs of vacuum pump so they engage in slots in camshaft when vacuum pump is installed.
– Make sure that gasket is seated correctly.
– Fit all bolts -arrows- on sealing flange of vacuum pump and tighten.

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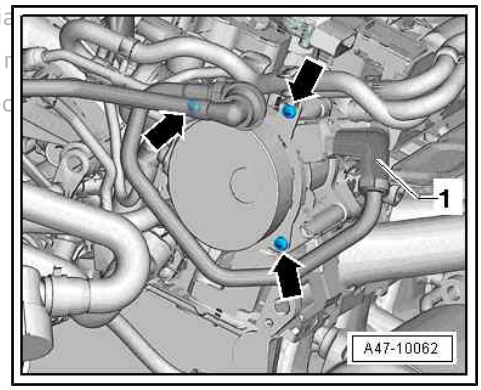


Note

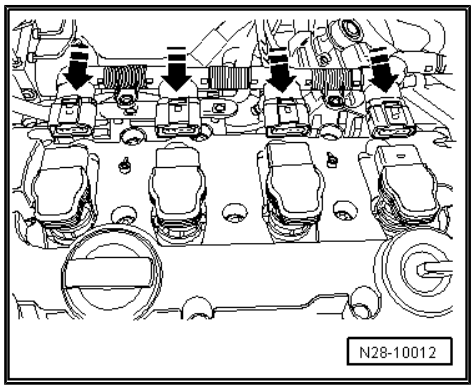
On some models the vacuum hose must be secured at the vacuum pump with a bolt (5 Nm).

– Slide new hose clip onto vacuum hose.
– Slide vacuum hose onto connection on vacuum pump.
– Use suitable pliers to tighten hose clip on connection of vacuum pump.

Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

– Tighten lines to high-pressure pump and vacuum pump.
– Plug in connectors -arrows- for ignition coils.
– Secure ignition coil rail.
– Install high-pressure fuel pump ⇒ Rep. gr. 24 .
– Secure brackets for fuel lines at high-pressure fuel pump.
– Install engine cover panel.



12.4 Removing and installing vacuum pump - vehicles with 2.4 ltr. petrol engine

The vacuum pump is fitted at the front left of the engine.

Removing

– Release hose clip on vacuum hose using suitable pliers.

Note

On some models the vacuum hose is secured at the vacuum pump with a bolt.

– Pull off vacuum hose.

Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

– Remove all bolts from sealing flange of vacuum pump.

– Take vacuum pump out of vehicle.

Installing

Install in reverse sequence, paying attention to the following:

Note

Renew O-rings.

– Set drive lugs of vacuum pump so they engage in slots in camshaft when vacuum pump is installed.

– Fit all bolts in sealing flange of vacuum pump and secure pump by tightening bolts to 9 Nm.

Note

On some models the vacuum hose must be secured at the vacuum pump with a bolt (5 Nm).

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– Slide vacuum hose onto connection of vacuum pump with new hose clip.

Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

– Close hose clip using suitable pliers.

12.5 Removing and installing vacuum pump - vehicles with 2.8 ltr. petrol engine

The vacuum pump is fitted at the front left of the engine.

Removing

– Release hose clip on vacuum hose using suitable pliers.

Note

On some models the vacuum hose is secured at the vacuum pump with a bolt.

– Disconnect vacuum hose.

Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

– Remove all bolts from sealing flange of vacuum pump.

– Take vacuum pump out of vehicle.

Installing

Install in reverse sequence, paying attention to the following:

Note

Renew O-rings.

– Set drive lugs of vacuum pump so they engage in slots in camshaft when vacuum pump is installed.

– Fit all bolts in sealing flange of vacuum pump and secure pump by tightening bolts to 9 Nm.

Note

On some models the vacuum hose must be secured at the vacuum pump with a bolt (5 Nm).

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– Slide vacuum hose onto connection of vacuum pump with new hose clip.

Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

– Close hose clip using suitable pliers.

12.6 Removing and installing vacuum pump - vehicles with 3.0 ltr. petrol engine

The vacuum pump is fitted at the front left of the engine.

Removing

Note

The radiator fan control unit must first be removed before removing the pump.

– Unbolt radiator fan control unit and press aside.

– Release hose clip on vacuum hose using suitable pliers.

Note

On some models the vacuum hose is secured at the vacuum pump with a bolt.

– Disconnect vacuum hose.

Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

– Remove all bolts from sealing flange of vacuum pump.

– Take vacuum pump out of vehicle.

Installing

Install in reverse sequence, paying attention to the following:

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Note

Renew O-rings.

– Set drive lugs of vacuum pump so they engage in slots in camshaft when vacuum pump is installed.

– Fit all bolts in sealing flange of vacuum pump and secure pump by tightening bolts to 9 Nm.

Note

On some models the vacuum hose must be secured at the vacuum pump with a bolt (5 Nm).

– Slide vacuum hose onto connection of vacuum pump with new hose clip.

Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

– Close hose clip using suitable pliers.

– Install and secure radiator fan control unit.

12.7 Removing and installing vacuum pump - vehicles with 3.2 ltr. petrol engine

The vacuum pump is fitted at the front left of the engine.

Removing

– Release hose clip on vacuum hose using suitable pliers.

Note

On some models the vacuum hose is secured at the vacuum pump with a bolt.

– Disconnect vacuum hose.

Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

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– Remove all bolts from sealing flange of vacuum pump.

– Take vacuum pump out of vehicle.

Installing

Install in reverse sequence, paying attention to the following:

Note

Renew O-rings.

– Set drive lugs of vacuum pump so they engage in slots in camshaft when vacuum pump is installed.

– Fit all bolts in sealing flange of vacuum pump and secure pump by tightening bolts to 9 Nm.

Note

On some models the vacuum hose must be secured at the vacuum pump with a bolt (5 Nm).

– Slide vacuum hose onto connection of vacuum pump with new hose clip.

Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

– Close hose clip using suitable pliers.

12.8 Exploded view - vacuum pump, RS 6

The RS 6 model has a mechanically driven vacuum pump. It is also provided with a vacuum connection to the intake manifold for the critical idling speed.

The vacuum pump is fitted at the right cylinder bank facing the bulkhead.

Note

Engine must be removed before removing or installing vacuum pump.

1 - Banjo bolt
- ❑ 17 Nm

2 - Seals
- ❑ Renew

3 - Oil supply pipe
- ❑ To vacuum pump

4 - Bolt
- ❑ 9 Nm

5 - Banjo bolt
- ❑ 17 Nm

6 - Seals
- ❑ Renew

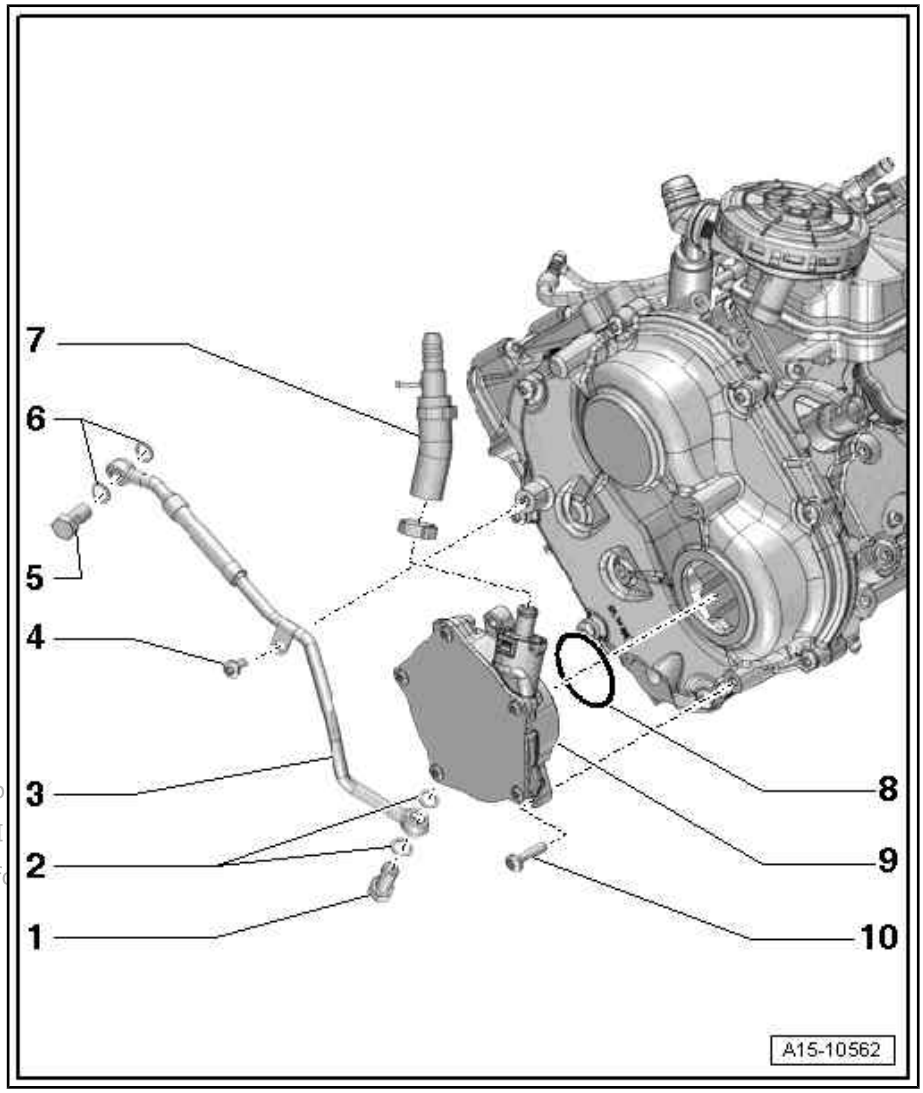
7 - Vacuum hose
- ❑ To brake servo

8 - O-ring
- ❑ Renew

9 - Vacuum pump
- ❑ For brake servo
- ❑ Removing and installing

⇒ page 178

10 - Bolt
- ❑ 9 Nm



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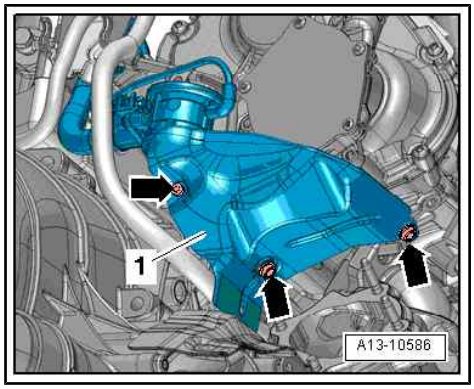
12.9 Removing and installing vacuum pump - RS 6

Removing

- Engine/gearbox assembly removed ⇒ Rep. gr. 10 .

– Remove front exhaust pipe (right-side) with catalytic converters ⇒ Rep. gr. 26 .

– Remove bolts -arrows- and detach heat shield -1-.

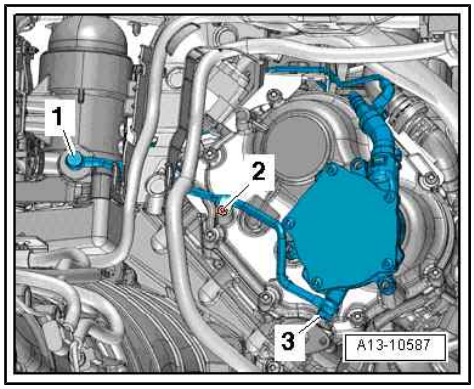


Note

Place a cloth beneath the union to catch escaping engine oil.

– Unscrew bolt -2- and banjo bolt -3-.

– Press oil supply pipe to side.



Note

Disregard item -1-.

– Detach vacuum hose -2-.

– Remove bolts -arrows- and detach vacuum pump -1-.

Installing

- Tightening torque ⇒ page 177

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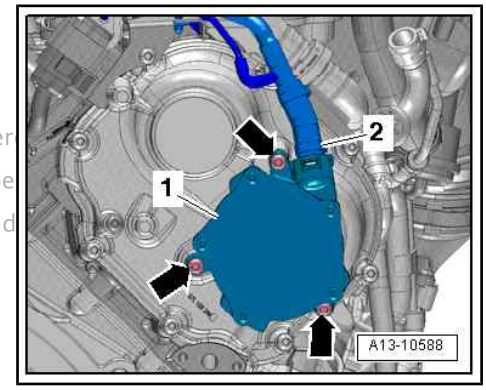


Note

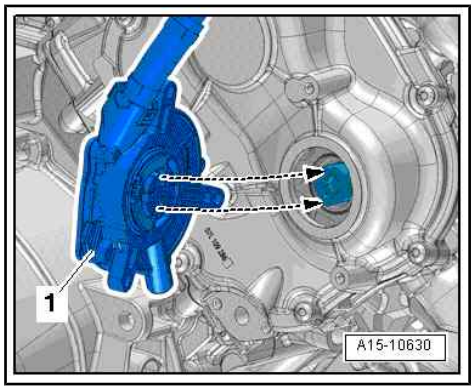
- ♦ *Renew seals and O-rings.*
- ♦ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Position vacuum pump -1- at camshaft.

- The drive lugs on the camshaft must engage in the slots in the vacuum pump -arrows-.

Remaining installation steps are carried out in reverse sequence; note the following:

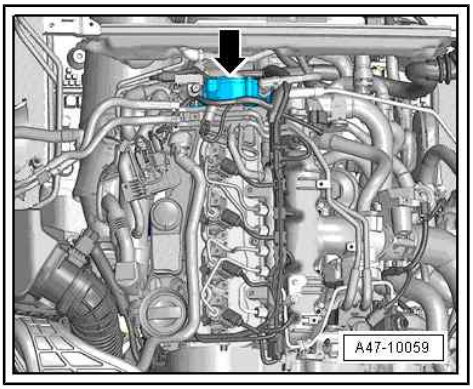
– Install front exhaust pipe (right-side) with catalytic converters ⇒ Rep. gr. 26 .



12.10 Removing and installing vacuum pump - vehicles with diesel engine

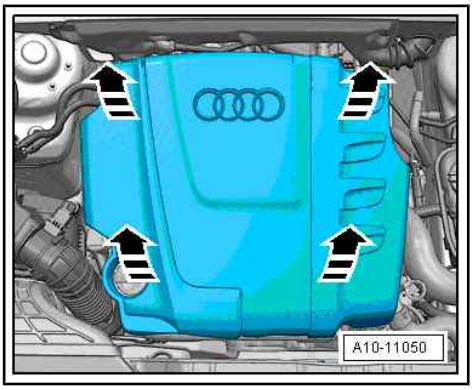
Removing

The vacuum pump is located in the rear of the engine compartment -arrow-, as seen in the direction of travel.



– Detach engine cover panel.

The plenum chamber partition panel does not have to be removed.



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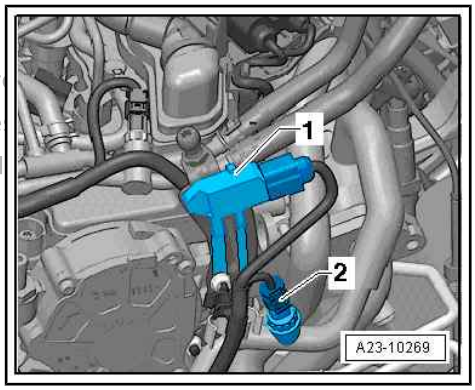
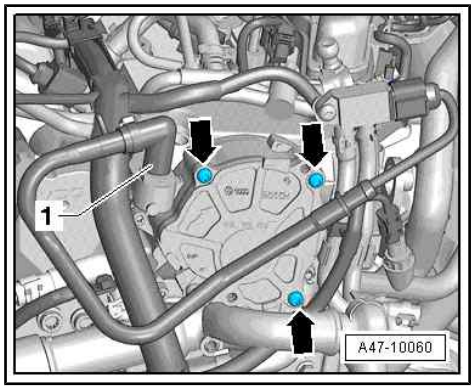
– Remove pressure sensor -1- for diesel particulate filter from bracket.
– Unclip pressure sensor pipe -2- and carefully press to the side.
– Remove bracket for pressure sensor at vacuum pump.
– Unscrew coolant pipe at bracket and at left engine transportation shackle and press to the side.



– Detach vacuum hose -1- from vacuum pump.
– Remove all bolts -arrows- from sealing flange of vacuum pump.
– Pull vacuum pump out of its mounting.



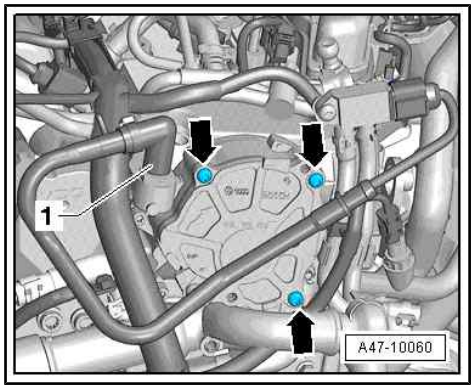
Installing

Note

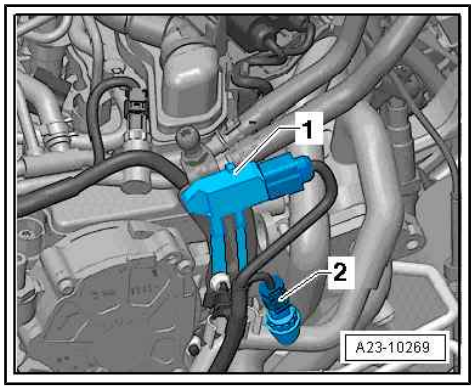
Renew gasket.

Ensure that gasket is seated correctly.

– Turn drive lugs of vacuum pump so they engage in slots in camshaft when vacuum pump is installed.
– Fit vacuum pump in position.
– Make sure that gasket is seated correctly.
– Fit all bolts -arrows- on sealing flange of vacuum pump and tighten.
– Connect vacuum hose to vacuum pump.
– Screw coolant pipe into bracket and left engine transportation shackle.



– Fit bracket for pressure sensor -1- of diesel particulate filter at vacuum pump.
– Secure bracket.
– Clip pressure sensor pipes into bracket.
– Tighten pressure sensor.
– Install engine cover panel.



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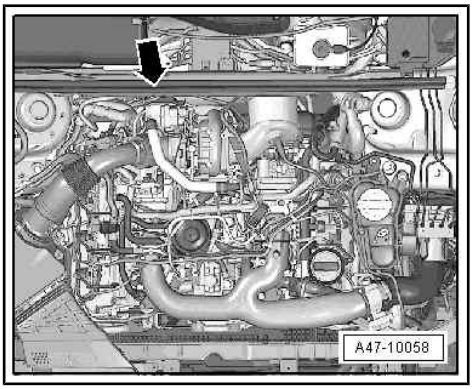
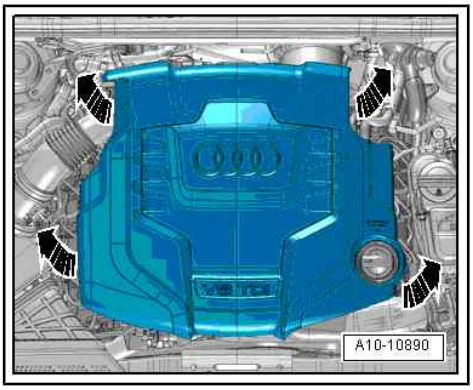
12.11 Removing and installing vacuum pump - vehicles with 2.7 ltr. TDI and 3.0 ltr. TDI diesel engine

Removing

The vacuum pump is fitted at the rear of the right cylinder bank -arrow-.



– Carefully pull engine cover panel off retaining pins one after another.



Note

Due to restricted space in the engine compartment, it is recommended to remove the vacuum pump before disconnecting the vacuum line, and to re-connect the vacuum line before installing the pump.

– Removing plenum chamber cover ⇒ Rep. gr. 50

Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

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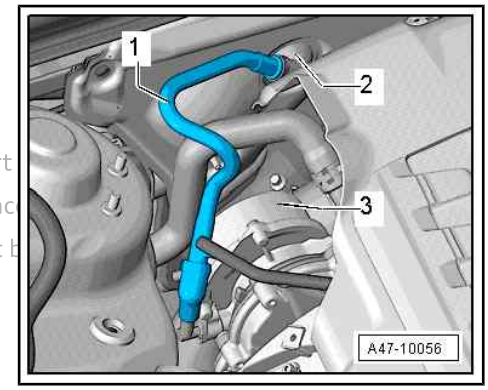
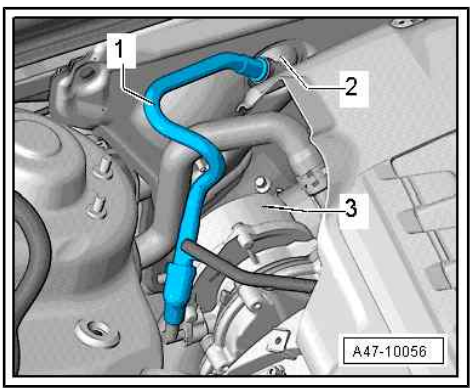
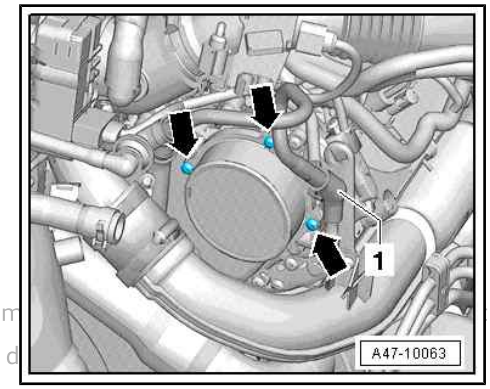


– Disconnect vacuum line and vacuum hose at back of plenum chamber partition panel -2-.
– Pull vacuum line -1- out of plenum chamber partition panel -2-.



– Remove all bolts -arrows- from sealing flange of vacuum pump.
– Pull vacuum pump out of its mounting.
– Disconnect vacuum line from vacuum pump after removing pump.



Installing

Note

Renew gasket.

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Ensure that gasket is seated correctly.

– Connect vacuum line to vacuum pump before installing pump.

Pay attention to correct installation position.

– Turn drive lugs of vacuum pump so they engage in slots in camshaft when vacuum pump is installed.
– Fit vacuum pump in position.
– Make sure that gasket is seated correctly.
– Fit all bolts to sealing flange of vacuum pump and tighten.
– Fit vacuum line into plenum chamber partition panel.
– Connect vacuum line and vacuum hose at back of plenum chamber partition panel.
– Install plenum chamber cover ⇒ Rep. gr. 50 .
– Install engine cover panel.

13 Checking electric vacuum pump for brakes - V192 -

Description and function

The vacuum pump is capable of self-diagnosis. Recognised faults are stored in the engine control unit.

The engine must not be running when you check the function of the electric vacuum pump via self-diagnosis.

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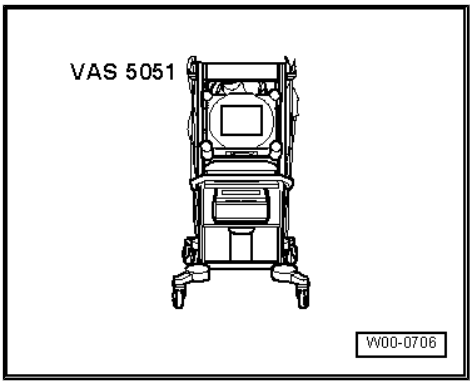
Special tools and workshop equipment required

- Vehicle diagnostic, testing and information system - VAS 5051-

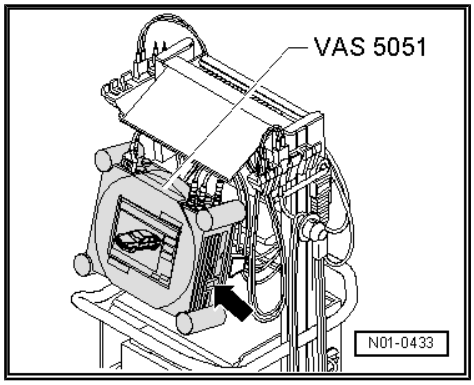


- Diagnosis lead - VAS 5051/1- or diagnosis lead - VAS 5051/3-

Procedure

– With ignition switched off, connect vehicle diagnostic, testing and information system - VAS 5051- to diagnostic connection with diagnosis lead - VAS 5051/1- or diagnosis lead - VAS 5051/3- .

– Switch on the tester -arrow-.



The tester may need up to 3 minutes before it is ready for operation.

– Switch on ignition.
– Select mode: Press the button on the display for “Vehicle self-diagnosis”.
– Select vehicle system in display: “Engine electronics”.

The control unit identification and coding will appear at the top right of the display.

– Select diagnosis function (all diagnosis functions are available at this stage).
– Select “006 - Basic setting” on the display.
– Press buttons 0, 1 and 1 for Measured value block.
– Confirm entry with Q key.

The following information will appear at the bottom of the display:

Basic setting
Not operated
Pump off
xxx mbar
Test off

– Firmly depress the brake pedal several times in succession until the test is activated.

The following information will appear at the bottom of the display:

Basic setting
Not operated
Pump on
xxx mbar
Test on

Do not press the brake pedal again once the test has been activated.

The vacuum pump for brakes - V192- supplies vacuum to the brake servo. The diagnosis of the brake servo system runs in the control unit at the same time.

The system passes the test if the pressure in the brake servo reaches the shut-off threshold within the time limit set by the diagnostic function.

The following information will appear at the bottom of the display:

Basic setting
Not operated
Pump off
xxx mbar
Syst. OK

– You can cancel or exit from this mode by pressing the Go to button.

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The system fails the test if the pressure in the brake servo does not reach the shut-off threshold within the time limit set by the diagnostic function.

The following information will appear at the bottom of the display:

Basic setting
Not operated
Pump off
xxx mbar
Syst.n.OK

– Follow “Guided Fault Finding” procedure using vehicle diagnostic, testing and information system - VAS 5051- .

13.1 Exploded view - electric vacuum pump for brakes - V192-

1 - Buffer

2 - Hexagon socket head bolt (2x)

- ❑ Tightening torque: 10 Nm

3 - Bracket

4 - Cap nut

- ❑ Tightening torque: 10 Nm

5 - Stud (on body)

6 - Buffer

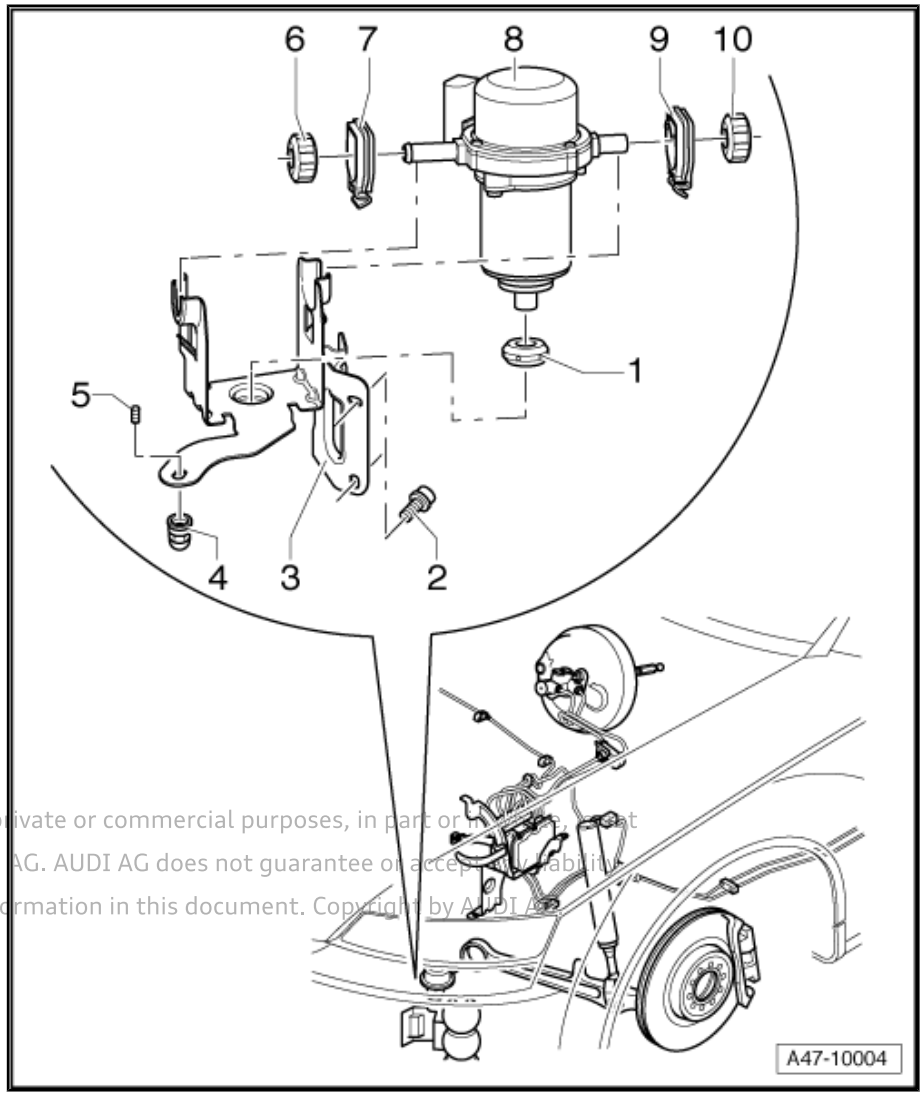
7 - Retaining clip

8 - Electric vacuum pump for brakes - V192-

- ❑ Removing and installing ⇒ page 185
- ❑ Removing and installing (S6) ⇒ page 188
- ❑ Checking non-return valve ⇒ page 190
- ❑ Checking non-return valve (S6) ⇒ page 190
- ❑ Checking ⇒ page 183

9 - Retaining clip

10 - Buffer



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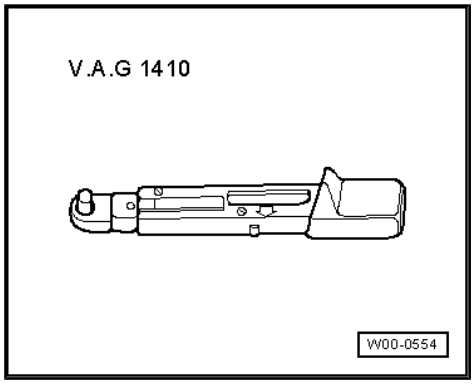
13.2 Removing and installing electric vacuum pump

Removing and installing (S6) ⇒ page 188

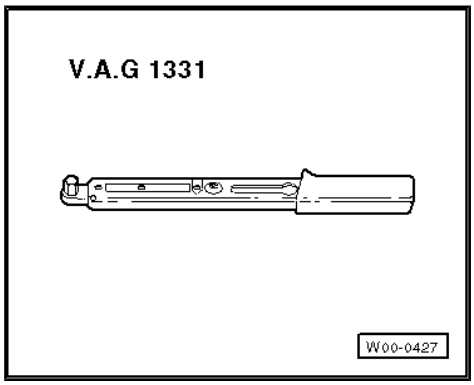
Removing

Special tools and workshop equipment required

- Torque wrench - V.A.G 1410-



- Torque wrench - V.A.G 1331-



The vacuum pump is not intended to be serviced. If problems occur, trace the fault by means of a function test and/or pressurised leak test. If a fault is found, the electric vacuum pump must be renewed.

Removing:

Note

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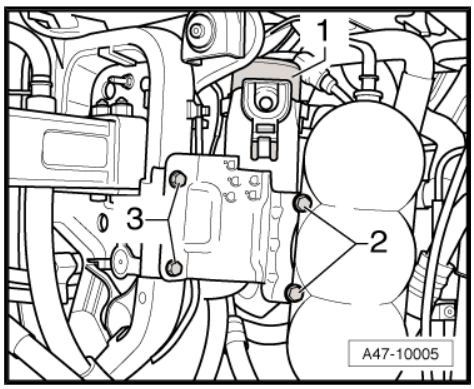
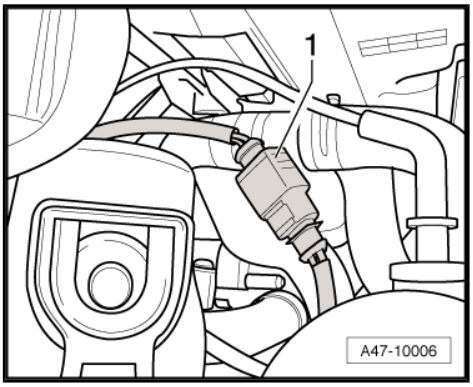
The electric vacuum pump is located behind the front bumper, below the left headlight.

– Remove front bumper ⇒ Rep. gr. 63 .

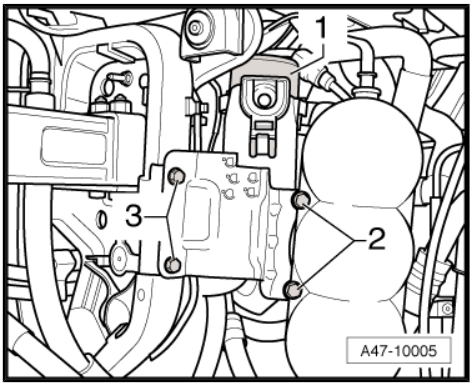
– Press clip -1- out of retainer by hand (2x).



– Unplug electrical connector -1-.



– Detach vacuum hose from vacuum pump.



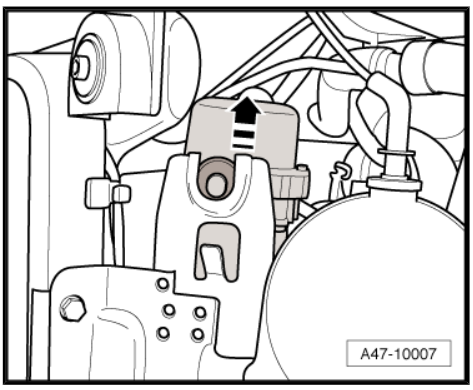
– Lift out electric vacuum pump.

Removing bracket for electric vacuum pump

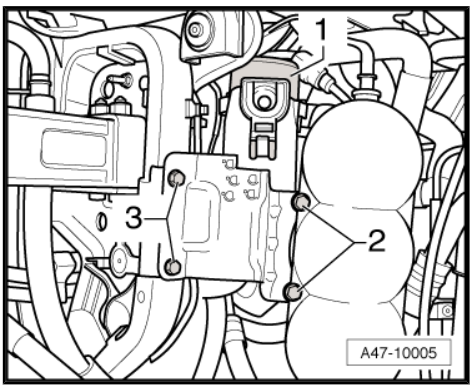
Note

The vacuum pump must be unclipped from the retainer before removing the bracket.

– Unscrew bolts -2- and -3-.



– Move vacuum reservoir for engine clear to one side.



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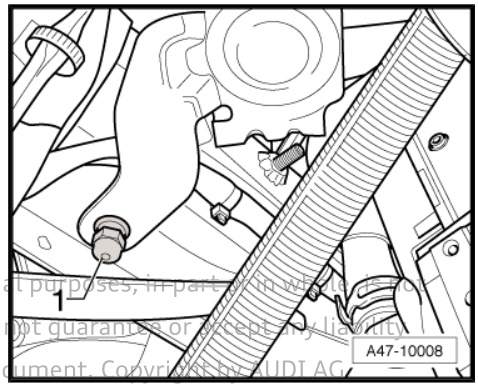
– Remove bolt -1-.



Installing

Installation is carried out in reverse sequence.

Note

Use new clip when fitting vacuum line.

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13.3 Removing and installing electric vacuum pump - S6

The S6 model has an electrically driven vacuum pump.

The vacuum pump is not intended to be serviced. If problems occur, trace the fault by means of a function test and/or pressurised leak test. Renew the electric vacuum pump if a fault is found.

Removing:

The vacuum pump is fitted on the right of the engine compartment.

Removing

– Release fuel lines at bracket and press upwards carefully.

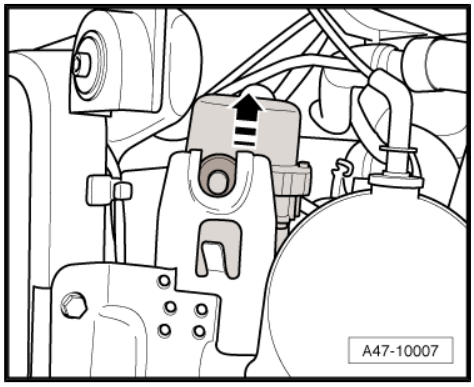
– Release hose clip on vacuum hose using suitable pliers.

– Pull off vacuum hose.

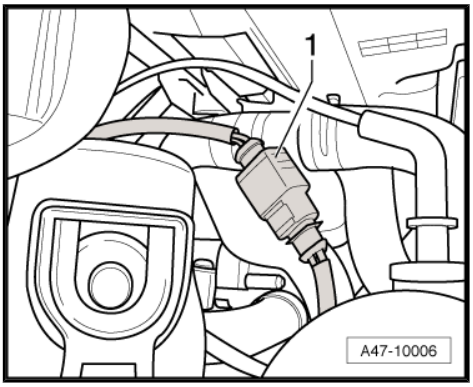
Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

– Press clip -arrow- out of retainer by hand (2x).



– Unplug electrical connector -1-.
– Lift out electric vacuum pump.



Installing

Installation is carried out in reverse sequence.

– Slide vacuum hose onto connection of vacuum pump with new hose clip.

Caution

Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.

– Fasten hose clip using suitable pliers.
– Fit fuel lines in bracket and fasten bracket.

13.4 Brake servo pressure sensor - G294-

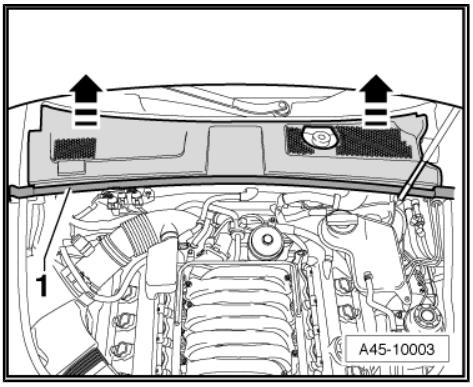
Removing

Note

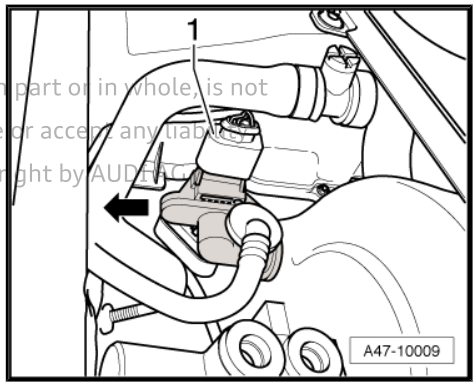
Installation position: The brake servo pressure sensor - G294- is located in the plenum chamber at the brake servo.

13.5 Removing and installing pressure sensor

– Detach plenum chamber cover.
– Unplug electrical connector -1-.



– Pull out pressure sensor in direction of -arrow-.



Note

The sensor may also be attached by means of clips.

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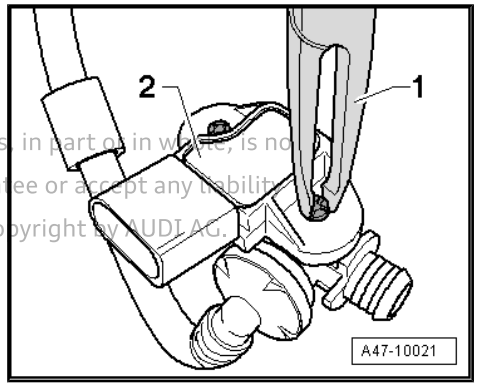
– Release clip using pliers -1-.
– Carefully lever off brake servo pressure sensor - G294- .



Installing

Installation is carried out in reverse sequence.

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13.6 Checking non-return valve

Valve should allow passage of air in direction of arrow.

Valve should remain closed in opposite direction.

Observe correct installation position.

13.7 Checking non-return valve - S6

The non-return valve is fitted directly at the vacuum pump.

Valve should allow passage of air in direction of arrow.

Valve should remain closed in opposite direction.

Observe correct installation position.

14 Brake hoses and brake lines

14.1 Routing of brake hoses/lines

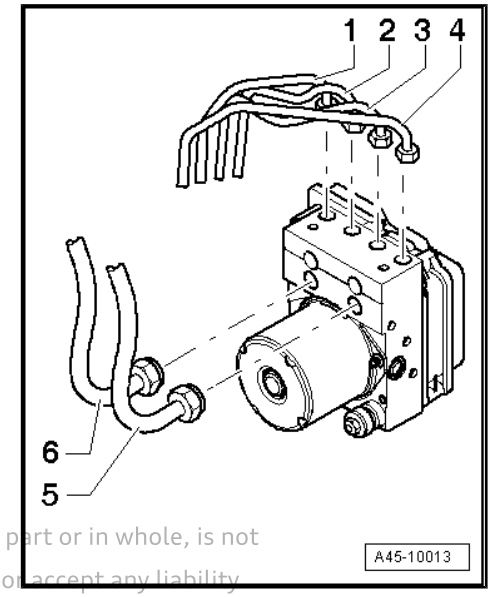
Replacement brake hoses and brake lines are supplied as spare parts ready to be installed.

Secure brake hoses and brake lines to the original mounting points when installing.

Brake lines to hydraulic unit

– Items -1- to -4- Hexagon nuts (-M10- and M12 for ∅ 5 mm brake lines), tightening torque: 12 Nm

– Items -5- and -6- Hexagon nuts (-M14- for ∅ 8 mm brake lines), tightening torque: 16 Nm



Brake hose to brake caliper at front axle

– Item -1- Brake hose; make sure that locating lugs engage properly in bracket.

– Item -2-: Retaining spring

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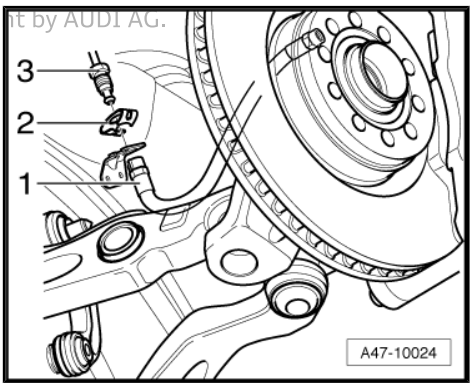
– Item -3-: Brake line, tightening torque: 17 Nm

– Item -1-: Brake line, tightening torque: 17 Nm

– Item -2-: Retaining spring

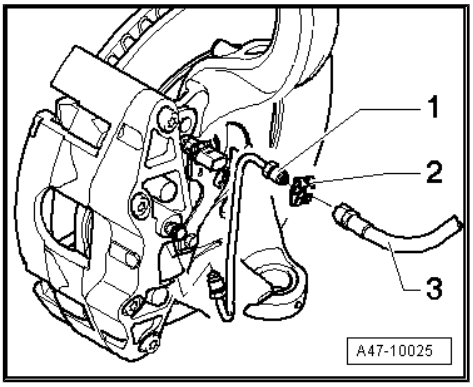


– Item -3- Brake hose; make sure that locating lugs engage properly in bracket.

Brake line routing in wheel housing at front axle

– Item -1-: Brake line, tightening torque: 12 Nm

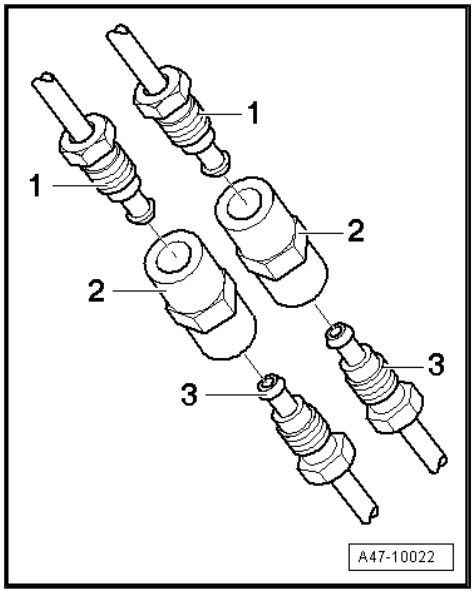
– Item -2-: Connection piece



– Item -3-: Brake line, tightening torque: 12 Nm

Brake line connection in wheel housing at front wheels

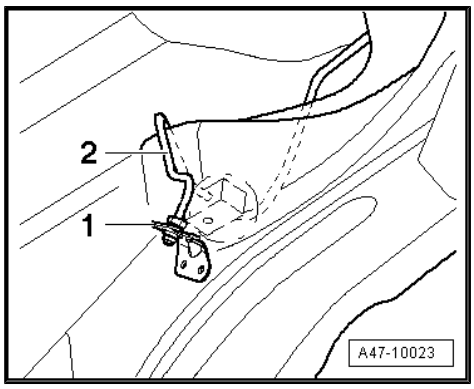
– Item -1-: Brake hose bracket



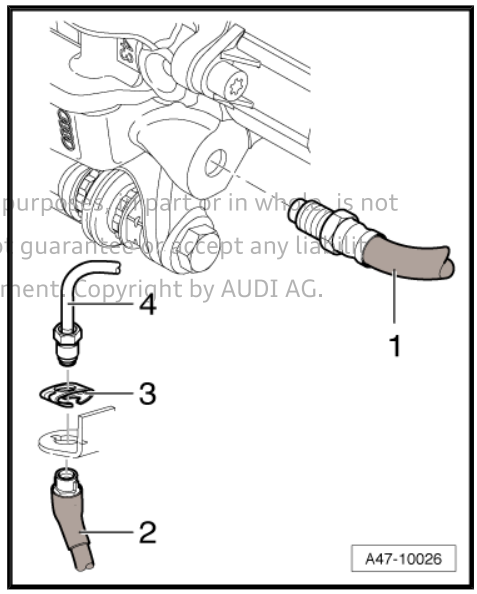
– Item -2- Brake line, tightening torque: 12 Nm

Routing of brake lines at rear wheels

– Item -1-: Brake hose, tightening torque: 12 Nm
– Item -2-: Brake hose retainer; make sure that locating lugs engage in retainer.
– Item -3-: Retaining spring



– Item -4- Brake line, tightening torque: 12 Nm



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