

**Note:**

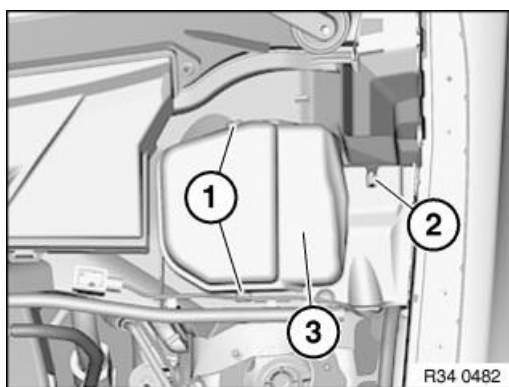
[Read and comply with General Information.](#)

When replacing or repairing, observe the filling and bleeding instructions for the following parts:

- Tandem brake master cylinder
- Hydraulic unit
- Components and connecting lines which are fitted between these assemblies.

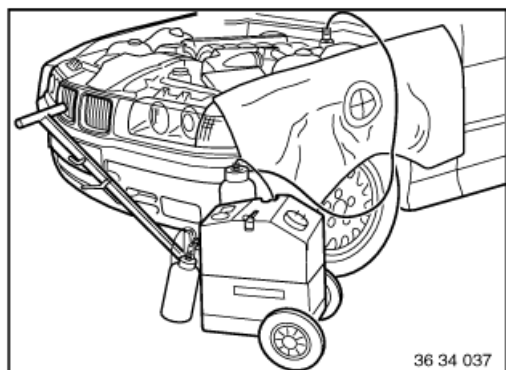
Connect bleeder unit with max. 2 bar filling pressure.

A second person is needed to help carry out this work.



Unclip retaining tabs (1).

Pull cover (3) out of guide (2) and remove.



Connect DIS.

Select path: Service functions - Chassis/Suspension - Traction control systems - Bleeding procedure.

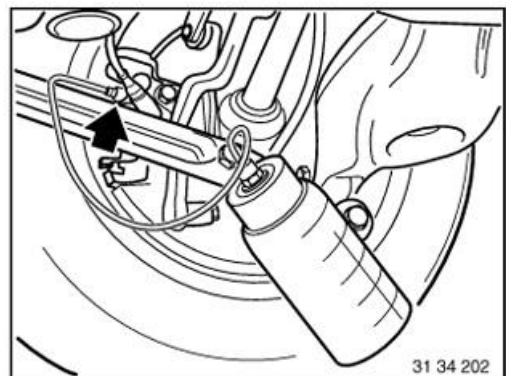
Connect brake fluid changer to expansion tank and switch on.

Important!

Check relevant equipment manufacturer's operating instructions for each device.

Charging pressure should not exceed 2 bar.

Use only BMW-approved brake fluids, see [BMW operating fluids](#).

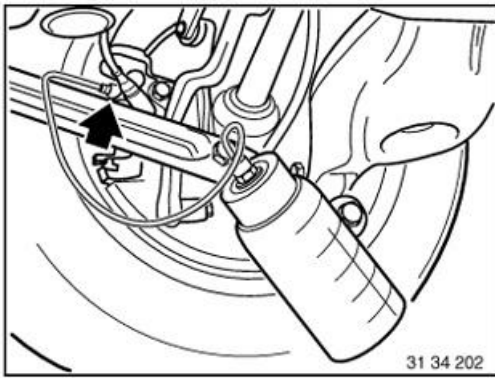
**Fully rinse the brake system**

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Open bleeder valve and purge until clear, bubble-free brake fluid emerges.

Close vent valve.

Follow same procedure on rear left, front right and front left wheel brake.



Bleeding rear axle brake circuit

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

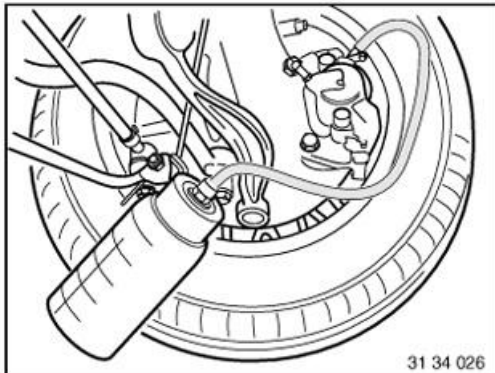
Open vent valve.

Run bleeding routine with DIS with bleeder valve open.

After completing routine, press brake pedal 5 times to floor; clear and bubble-free brake fluid must flow out.

Close vent valve.

Repeat procedure at rear left.



Bleeding front axle brake circuit

Connect bleeder hose with collecting tray to bleeder valve on front right brake caliper.

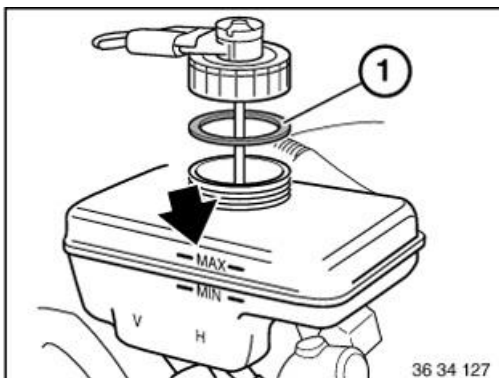
Open vent valve.

Run bleeding routine with DIS with bleeder valve open.

After completing routine, press brake pedal 5 times to floor, clear and bubble-free brake fluid must flow out.

Close vent valve.

Repeat procedure at front left.



Switch off brake fluid changer and remove from expansion tank.

Check brake fluid level.

Close expansion tank.

Note:

Pay attention to rubber seal (1) in sealing cap.

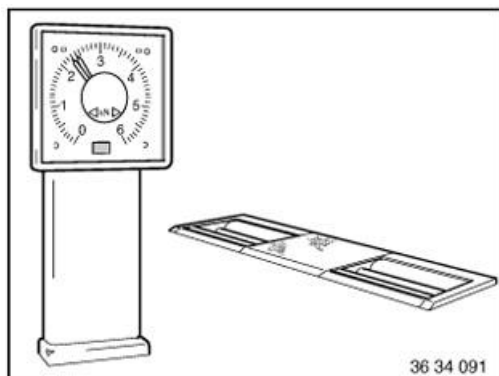


Note:

1. Check tyres for damage
2. Check tyre treads
3. Checking tyre inflation pressure

Read and comply with notes on [Brake testing instructions](#) for E90 / E91.

You must follow without fail the guidelines contained in the operating instructions of the relevant test stand manufacturer.



Important!

Only brake test stands with test speeds of 2.5-6 km/h may be used.

Before driving onto the brake test stand (dynamic brake analyser), switch off the Hill Descent Control (HDC) and keep it switched off while testing the brakes.

The HDC indicator lamp must not light up!

Note:

It is possible for the HDC indicator lamp to go out or not to light up even when HDC mode is activated if HDC is temporarily unavailable on account of high operating temperature.



Important!

- **Vehicles with manual transmission and XDrive:**

Do not select a gear and do not accelerate.

- **Vehicles with automatic transmission and XDrive:**

Carry out brake testing with selector lever in N position (Neutral) only.

Do not accelerate when the rollers start up.

Failure to comply with this instruction may result in damage to the test stand or to the vehicle.

**Special tools required:**

- [34 3 100](#)

**Necessary preliminary work:**

- If necessary, expose the brake booster



- Pull off the vacuum hose on the brake booster. Install vacuum tester [34 3 100](#) between the brake booster and the vacuum hose of the non-return valve.
- Start the engine.
- Check the vacuum build-up.
- Switch off engine.
- Adjust the vacuum to no more than 0.8 bar by pressing the brake pedal and wait until the value stabilises.
- If the brake pedal is not pressed, the vacuum must reduce by maximum 0.06 bar during a test period of 1 minute.

**If the required values are not reached:**

- Change the non-return valve
- Check that the sealing between the brake servo and the tandem brake master cylinder (sealing ring) is in proper condition and fits correctly.
- If necessary, check the tightness of the brake booster with a smoke tester
- If the setpoint values are not reached during the repeat check, the brake booster must be changed.

34 00 ... Checking brake discs



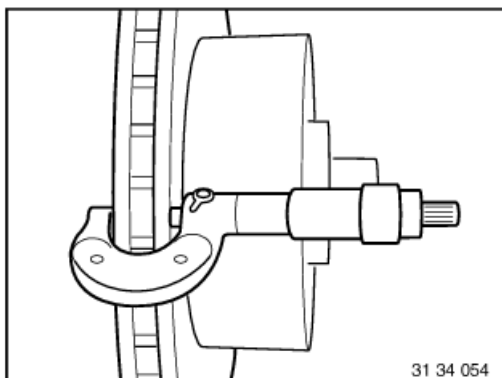
Special tools required:

- [34 1 280](#)



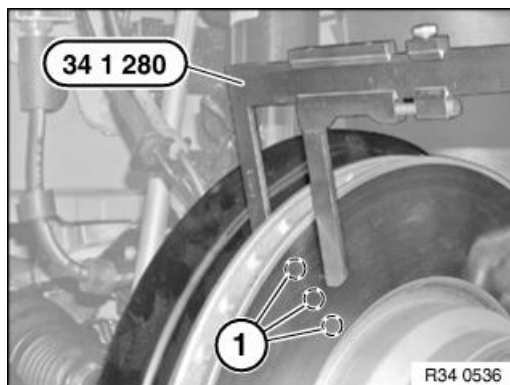
Necessary preliminary work:

- Remove [wheels](#).



Checking thickness difference:

- Measure thickness difference within brake surfaces at 8 point (spread over the circumference) with a micrometer gauge
- Compare measurement result with [setpoint value](#)

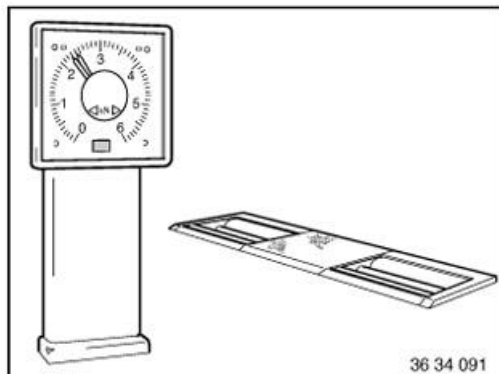


Check minimum brake disc thickness:

- Position special tool [34 1 280](#) at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with [setpoint value](#)

**Necessary preliminary tasks:**

- Check tires for damage
- Check tyre treads
- Checking tyre inflation pressure

**Important!**

The corresponding system must be deactivated on vehicles equipped with ASC+T or DSC.

The ASC+T or DSC telltale and warning light must light up in the instrument cluster!

The brakes must be at normal operating temperature. To do so, gently warm up the brake disks and brake drums while dry by braking the vehicle several times.

**Important!**

Only brake test stands with test speeds of 2.5-6 km/h may be used.

Max. bedding-in time 2 minutes.

You must follow without fail the guidelines contained in the operating instructions of the relevant test stand manufacturer.

Failure to do so may result in damage to the vehicle and the system and also personal injury.

**Important!**

Follow instructions for [Brake testing on test stand](#).

**Note:**

If deviations are identified during the following check, the parking brake must be adjusted:

**0th tooth
(handbrake
released):**

Vehicles with manual transmission: Shift lever in neutral position.

Vehicles with automatic transmission: Selector lever in "N" position.

- Without locking differential ≤ 150 N.
- With locking differential ≤ 200 N (possibly odd display).

1st tooth:

No increase in braking force with regard to 0th tooth. Indicator lamp can be lit.

2nd tooth:

Indicator lamp must be lit.

3rd tooth:

Increase in braking force.

5th tooth:

The brake force display must have reached ≥ 400 N.

Checking brake force differential at wheel:

Apply handbrake until a wheel circumferential force (measured on brake test stand) of min. 1000 N is reached.

Max. permitted brake force differential right/left ≤ 35 % (referred to greater brake value).

It must be possible to brake with locked wheels with the handbrake.

34 00 010 Checking thickness of brake pad



Special tools required:

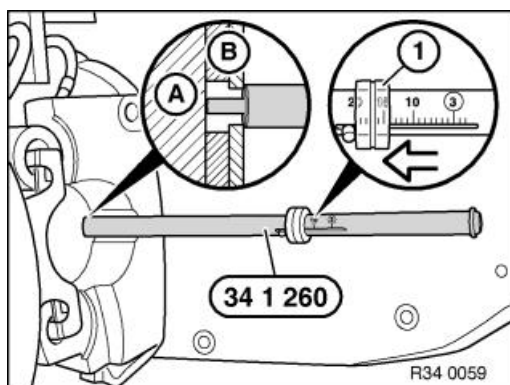
- [34 1 260](#)



Note:

The thickness of the outer brake pads can be determined without removing the wheels.

If necessary, move vehicle until opening for brake pad wear indicator (brake pad) can be seen through rim styling.



Insert special tool [34 1 260](#) wheel rim into opening for brake pad wear indicator.

Press special tool onto brake pad. Slide ring (1) in direction of arrow up to stop and read off measured value.

Note:

(A) Brake disc

(B) Brake pad with backplate

[Safe limit for lining wear, front brake.](#)

[Safe limit for lining wear, rear brake.](#)

34 00 ... General Information

The brake system is one of the most important safety systems on any motor vehicle. It is therefore essential to act with utmost care when working on the brake system and to follow the instructions below.

- Ensure cleanliness and only use rags which do not lose lint.
- Wash away or vacuum up brake dust, do not clear it away using compressed air. This dust is a health hazard.
- Do not under any circumstances allow any oil or grease to get into the brake system. This would result in a complete malfunction of the brake system.
- When cleaning brake components with brake cleaner (refer to BMW Parts Service), do not allow brake cleaner to get into the brake system.
- Even the most minute traces of brake cleaner must be avoided.
- Replace brake fluid at least every two years.
- Never reuse drained brake fluid.
- Always use BMW-approved brake fluid, refer to BMW Service Operating Fluids.
- Dispose of brake fluid in approved appliances only, refer to BMW Service Workshop Equipment Planning documentation.
- Do not allow brake fluid to drain into drain pipes, into the outside environment or into unsuitable facilities. This would create the risk of groundwater contamination since brake fluid is classed as a fluid that is hazardous to water.
- Do not allow brake fluid to come into contact with paintwork as this will destroy the paint.
- Brake fluid must not be allowed to remain on bare skin too long in order to avoid skin problems. Wash skin coated with brake fluid with water and soap.
- If brake fluid makes contact with eyes, immediately flush with large quantity of clean water and visit eye doctor.
- Brake pads:

Brake pads must be replaced when the [warning threshold of the brake pad wear indicator](#) is reached.

Brake pads must always be replaced on both sides of any axle.

The friction surfaces of the brake pads must not come into contact with oil or grease. The brake pads must be replaced if they are fouled by such substances.

In the case of rotation-dependent brake pads, make sure the arrow marking points in the direction of rotation of the brake disc for when the vehicle is moving forward. Brake pads with left/right markings must be fitted on the relevant side of the vehicle.

One-sided angled areas on the brake pads must be located on the disc contact side of the brake caliper for when the vehicle is moving forward.

- Brake discs:

Brake discs must not be scored or cracked. Furthermore, [minimum brake disc thickness](#), disc runout, parallelism and surface roughness of the friction surfaces must not exceed or drop below the permitted values.

Always strip preservative off new parts before installation. With the rear brake discs, also strip preservative off brake drum on parking brake.

- Always strip preservative off new parts before installation.
- Brake calipers:

Only approved pastes on the basis of glycol must be used for repairs on brake callipers.

All moving parts on the brake caliper must move freely: note grease specifications.

Use only BMW-approved lubricants to grease calliper guides (refer to BMW Service Operating Fluids).

- Brake lines and brake hoses must be correctly routed and must not abut with body or components in a way which would cause chafing.
- To prevent damage, release and tighten brake line couplings with a special brake line wrench only.

- The system must be bled each time any brake lines have been detached.
- All connection points must be checked for leaks.
- Only tighten down brake hoses on the front axle when wheels are in straight-ahead position.
- Close off open connections of brake lines and individual components to prevent dirt from getting into the brake system.
- When tightening down brake line couplings, observe tightening torque [34 32 1AZ](#).

The wheel-slip control system is essentially maintenance-free; however the following must be observed:

- When carrying out welding work with electric welding equipment, be sure to disconnect the plug from the electronic control unit (ignition turned off).
- During painting work, the control unit may be subjected for brief periods to loads of max. 95 °C and for long periods (approx. 2 hours) to loads of max. 85 °C.
- Terminals must be completely tight on end poles of battery.
- Brake lines on hydraulic unit must not be swapped over: if applicable, mark them prior to disassembly.

On completion of repair work, carry out swap-over test with the DIS diagnosis system.

**Important!**

After completing work:

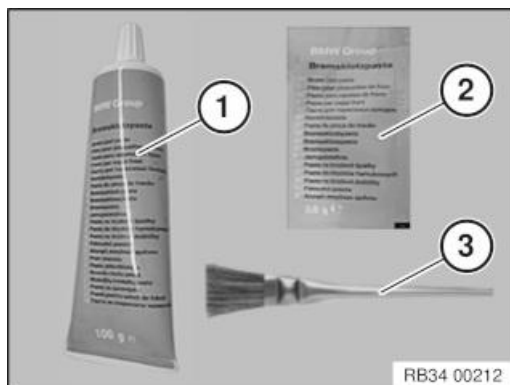
- Carry out function check on brake test stand to ensure that the brakes comply with legal requirements.
- Carry out test braking while driving at low speed; the effectiveness of the brakes may be reduced during the initial braking operations.
- Exaggerated drastic and continuous braking operations for faster braking are not permitted.
- Advise the customer not to perform any wilful drastic braking in the first 200 km after brake replacement.
- Attach mirror tag to interior rearview mirror.



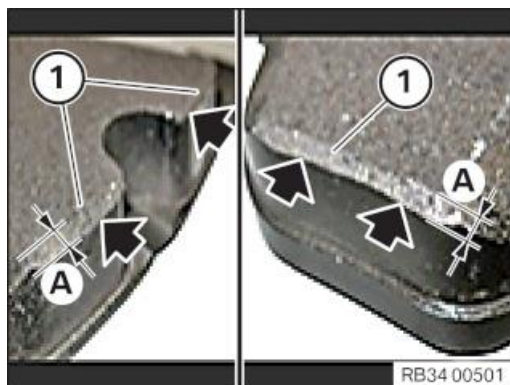
Attention!

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket, but rather clean with brake cleaner BMW TI. Clean number 83 19 2 154 780 and apply a thin coating of BMW TI break pad paste. Coat number 83 19 2 158 851 (3 gr.) or 83 19 2 158 852 (100 gr.).

Spread brake pad paste onto the marked surfaces using a brush!



- (1) Brake pad paste 100 gr. BMW TI. Number 83 19 2 158 852
- (2) Brake pad paste 3 gr. BMW TI. Number 83 19 2 158 851
- (3) Brush for spreading brake pad paste over the marked areas.



Attention!

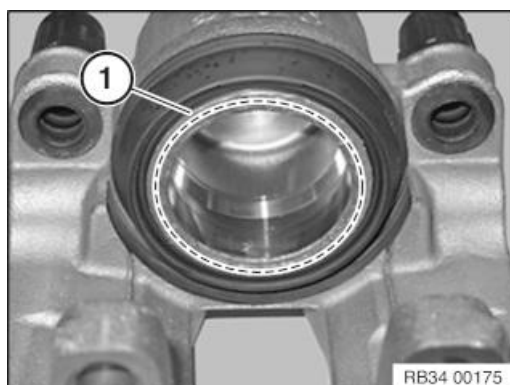
If new brake pads are mounted on a brake disc, the following must be observed:

- Bevel edges in the area (1) slightly (dimension A must not exceed maximum 1 mm).

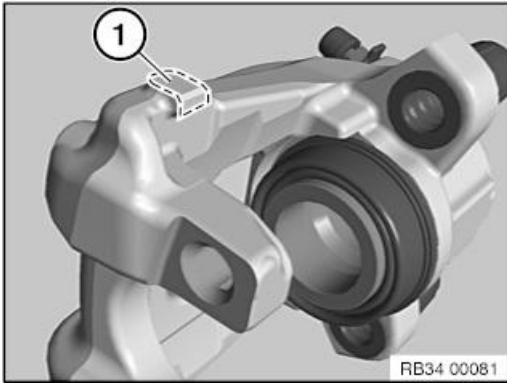
These procedures applies for all the following described brake systems.



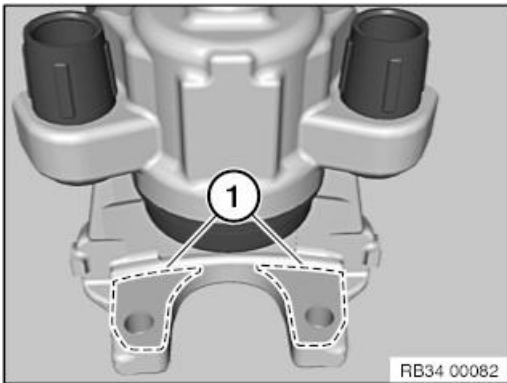
IPS brake (made by CBI), 1-piston floating caliper brake (model ranges: 1-Series, 3-Series, 4-Series, X3)



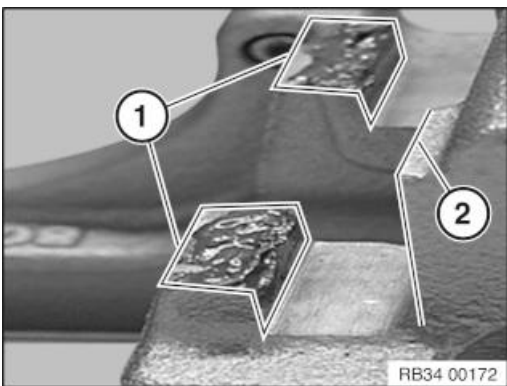
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.



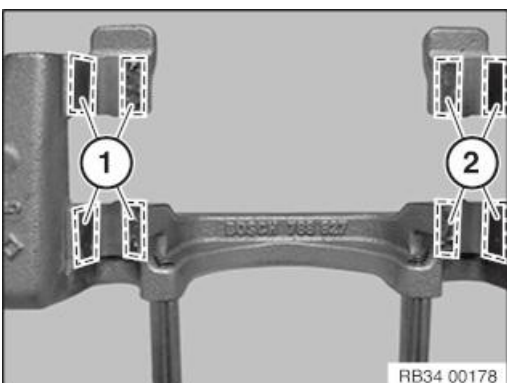
Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.



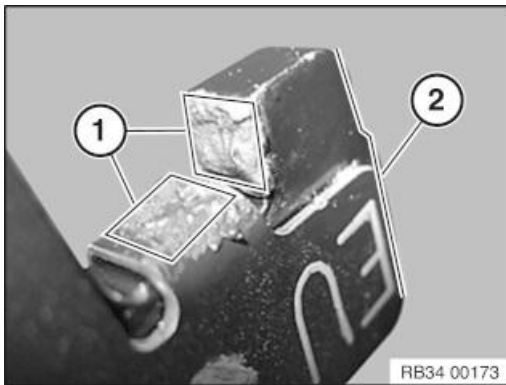
Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.



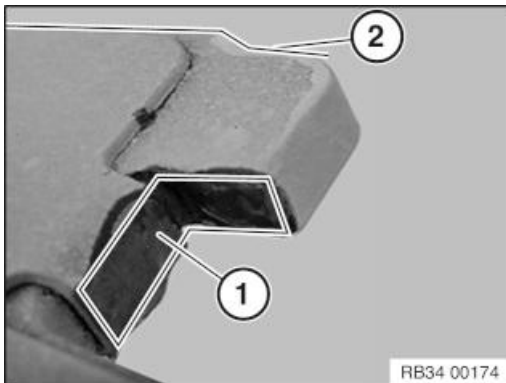
So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



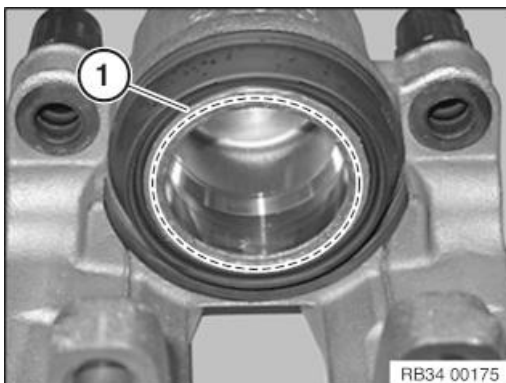
Apply a thin coating of brake pad paste to T-head of inner brake pad in area (1) and (2).



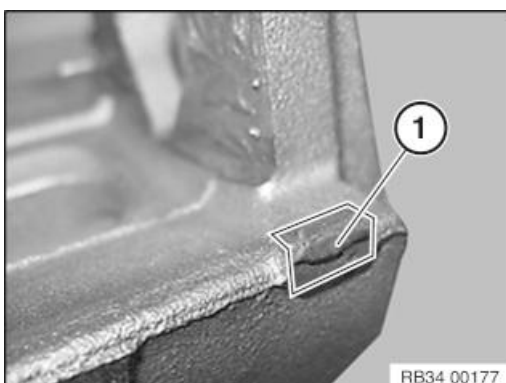
Apply a thin coating of brake pad paste to T-head of outer brake pad in area (1) and (2).



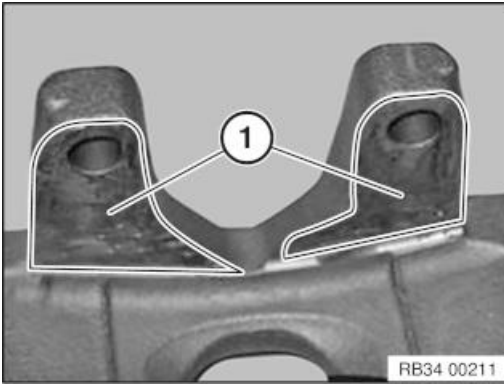
FN brake (made by Continental Teves), 1-piston floating caliper brake (model ranges: 5-Series, 6-Series, 7-Series, 8-Series, X1, X3, X5, Z4, Rolls-Royce)



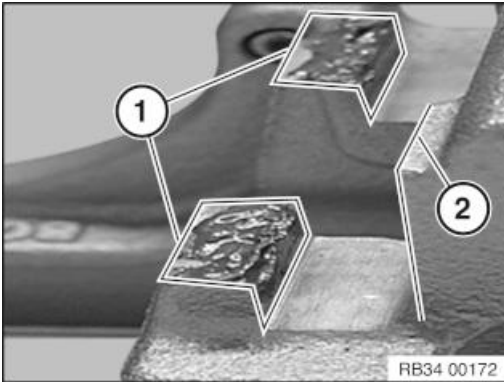
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.



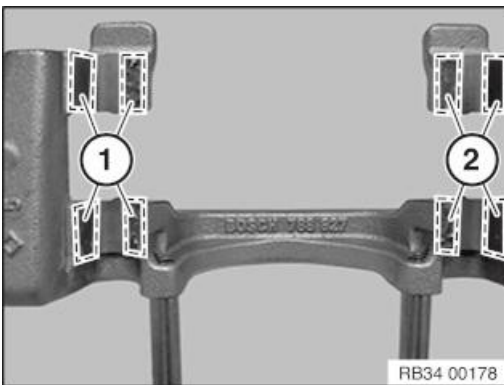
Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.



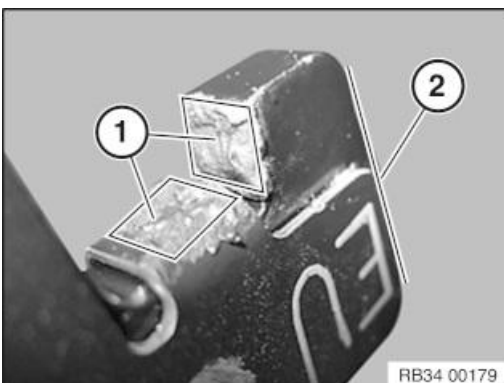
Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.



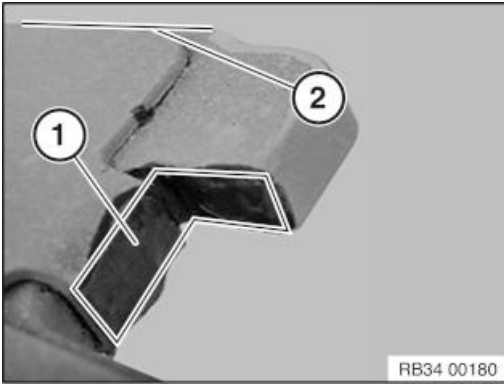
So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1) with brake cleaner and apply a thin coating of brake pad paste.



So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



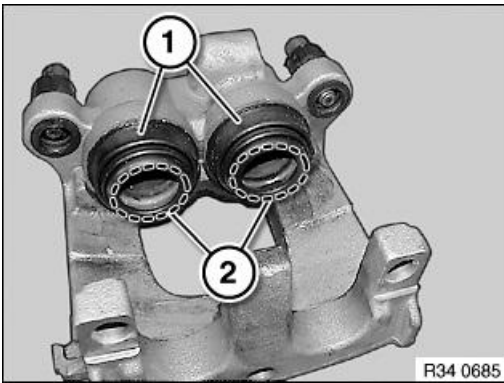
Lightly coat the T-head of the inner brake pad with brake pad paste in area (1 and 2).



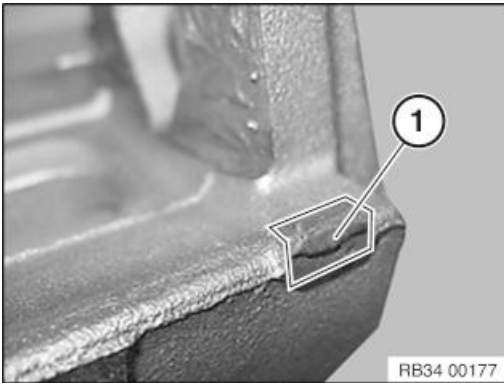
Lightly coat the T-head of the outer brake pad with brake pad paste in area (1 and 2).



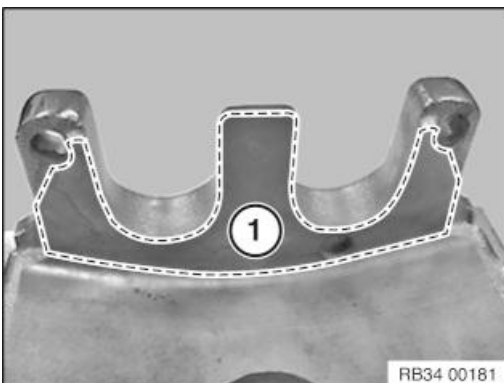
FN brake (made by Continental Teves), 2-piston floating caliper brake (model ranges: 5-Series, 6-Series, 7-Series, 8-Series, X5, Rolls-Royce)



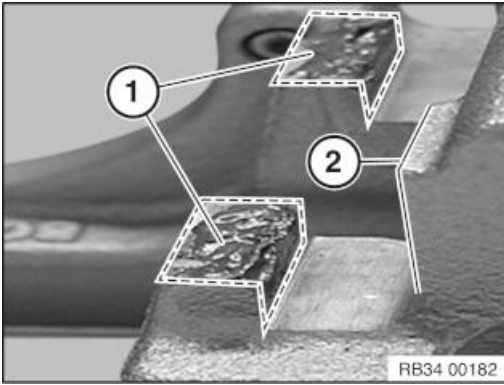
Clean contact surface (2) of brake piston with brake cleaner and apply a thin coating of brake pad paste.



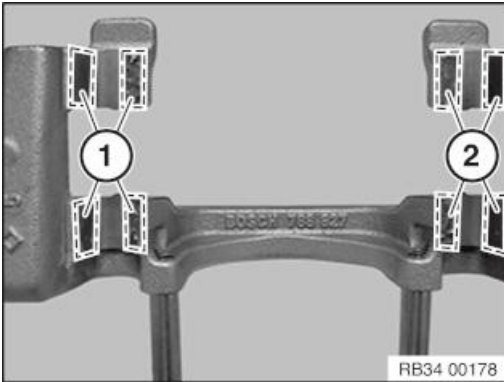
Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.



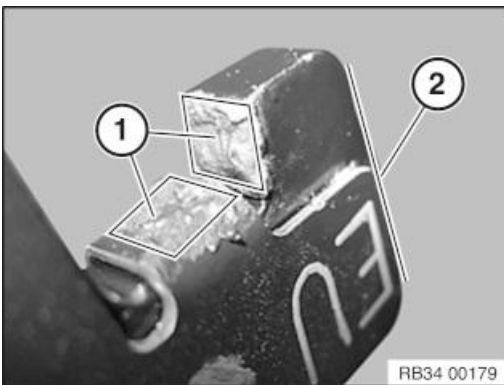
Clean contact surface (1) and brake caliper with brake cleaner and apply a thin coating of brake pad paste.



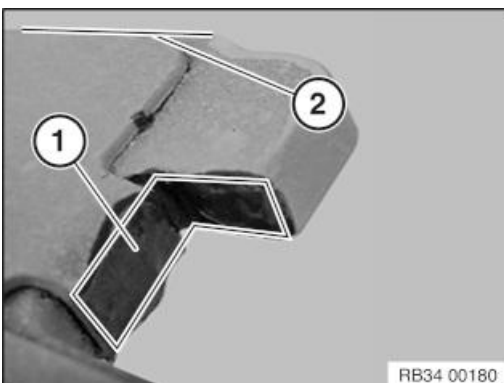
So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



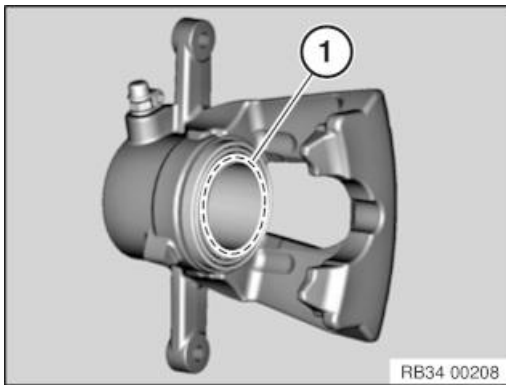
Lightly coat the T-head of the inner brake pad with brake pad paste in area (1 and 2).



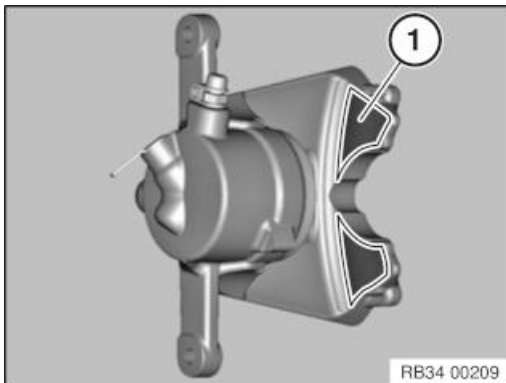
Lightly coat the T-head of the outer brake pad with brake pad paste in area (1 and 2).



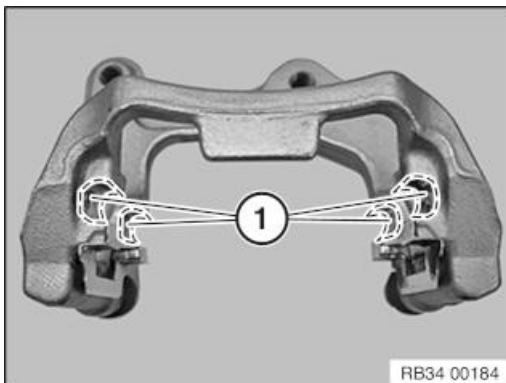
Collette brake (made by TRW), 1-piston brake caliper (model ranges: MINI, 1-Series, 5-Series, 6-Series, Z4)



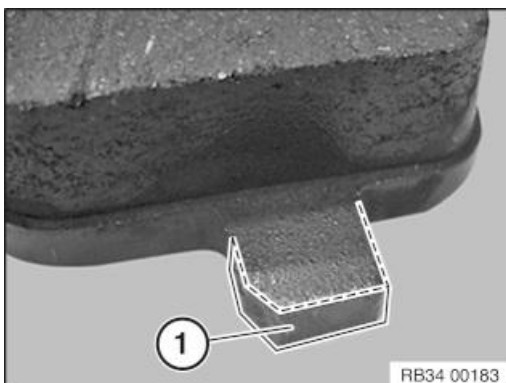
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.



Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.



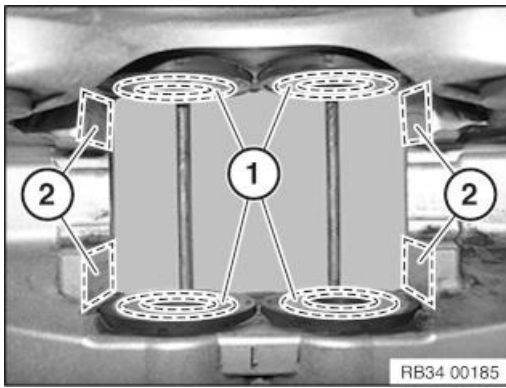
So as not to damage the surface coating, if possible do not mechanically clean the guide surface (1) for the brake pads on the brake caliper mounting bracket. Clean guide surface (1) with brake cleaner and apply a thin coating of brake pad paste.



Apply a thin coating of brake pad paste to both sides of T-head of brake pad in area (1).



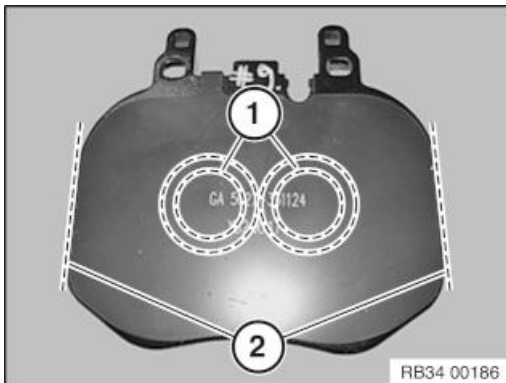
P 4.40 brake (made by Brembo), 4-piston fixed caliper brake (model ranges: MINI, 1-Series, 3-Series, 4-Series, 5-Series, 6-Series, 7-Series, 8-Series, X5, Rolls-Royce)



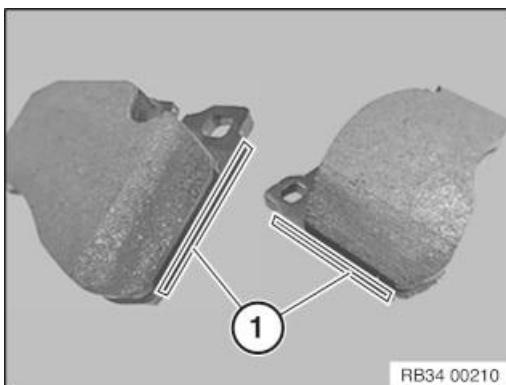
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (2) for the brake pads on the brake calliper mounting bracket. Clean guide surface (2) with brake cleaner and apply a thin coating of brake pad paste.

Clean both inner and outer guide surfaces (2) and apply a thin coating of brake pad paste.



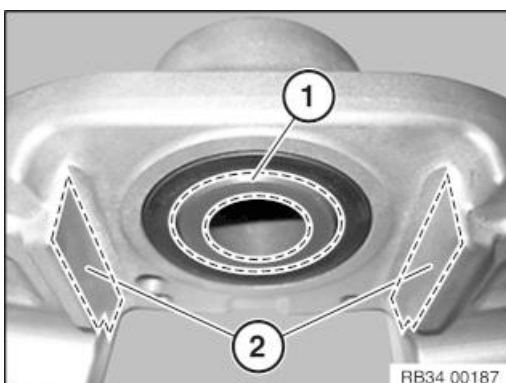
Lightly coat both sides of the contact surface in area (1 and 2) with brake pad paste.



Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.



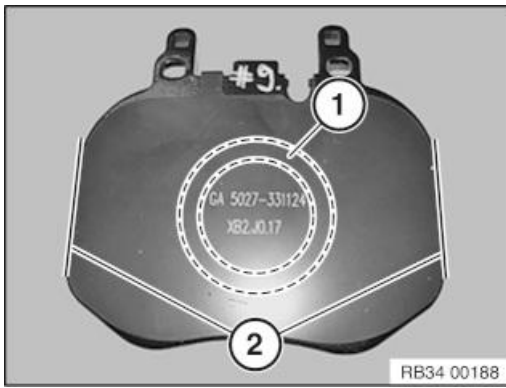
P 4.40 brake (made by Brembo), 2-piston fixed caliper brake (model ranges: 1 Series, 2 Series, 3 Series; does not apply to M2 F87)



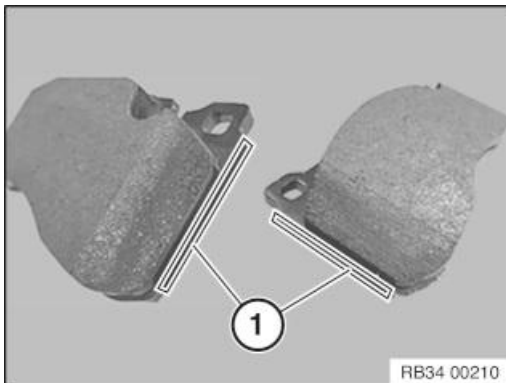
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (2) for the brake pads on the brake calliper mounting bracket. Clean guide surface (2) with brake cleaner and apply a thin coating of brake pad paste.

Clean both inner and outer guide surfaces (2) and apply a thin coating of brake pad paste.



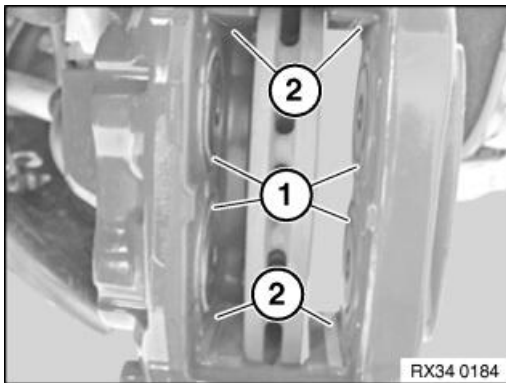
Lightly coat both sides of the contact surface in area (1 and 2) with brake pad paste.



Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.

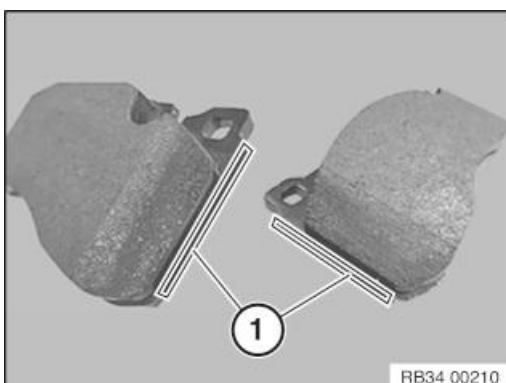


Brake (made by Brembo), 4-piston fixed caliper brake (model ranges: MINI F5x sport brake)



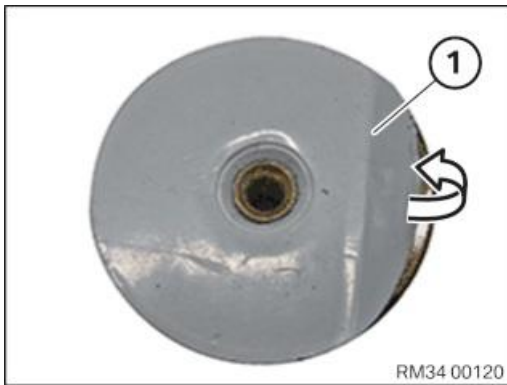
Check dust boot (1) for damage and replace if necessary.

Clean brake caliper compartments (2) and apply a thin coating of brake pad paste.



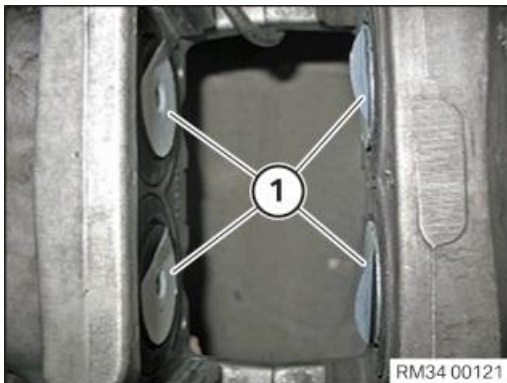
Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.

Do not grease the brake lining backplate and thoroughly clean it with brake cleaner!

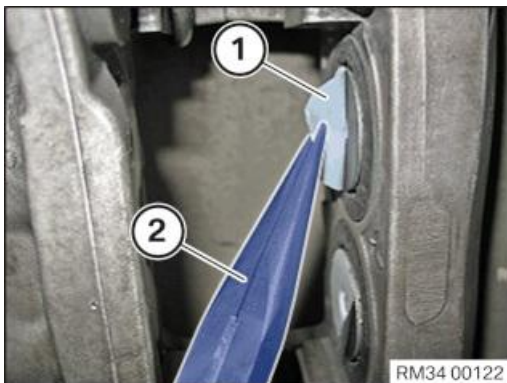


Only use new claw plates!

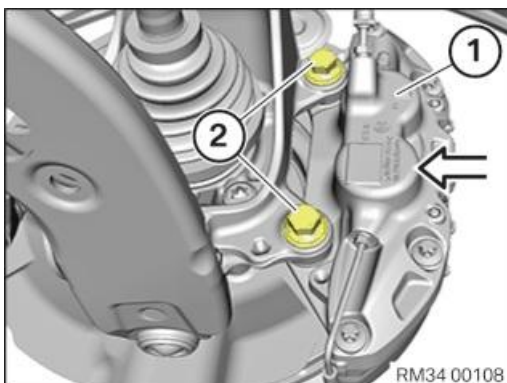
Slightly raise the protective film (1) at a place.



Insert the claw plates (1) into the brake pistons.



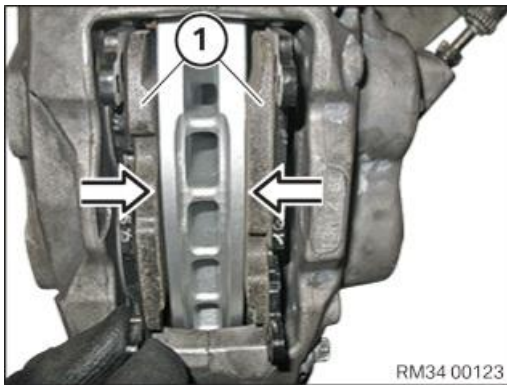
Pull off the protective film (1) with long-nose pliers (2). **Attention!**
The bonding surface of the claw plates must not be touched!



Install the brake caliper (1) in direction of arrow.

Parts: Replace screws (2).

Insert screws (2) and tighten.



Install the brake pad (1). **Attention!**

The brake pads must not touch the bonding surface of the claw plates when inserting!

Apply the brake pads to the brake disc and insert.

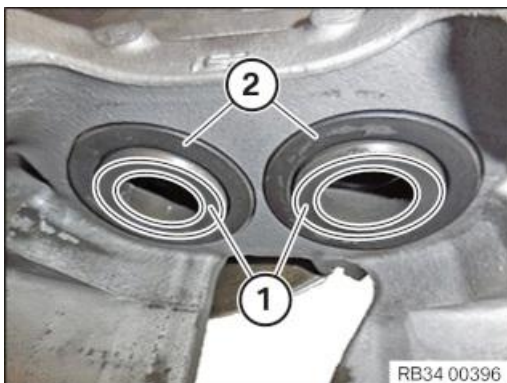


In order to ensure a complete bonding of the claw plates with the brake pads, the following instruction must be strictly adhered to:

Strongly press the brake pedal and hold it for at least 1 min!

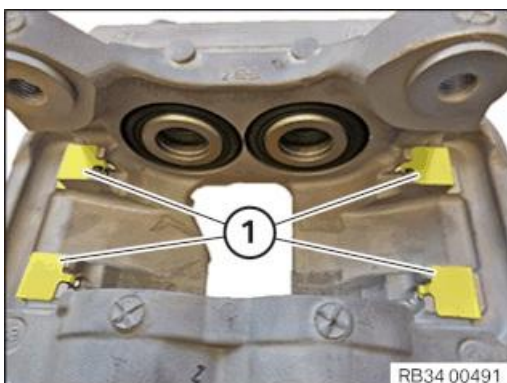


Brake (made by Continental), 4-piston fixed caliper brake (model ranges: 7-Series (G11, G12))



Clean the contact surface (1) of the brake piston (4 pieces) with brake cleaner.

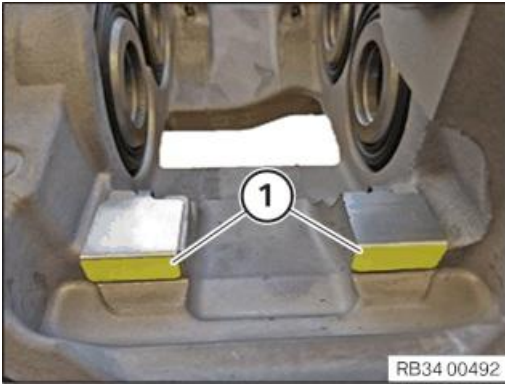
Check the dust boots (2) and renew as necessary.



Always renew retaining plates 1!

Mount retaining plate 1.

It is paramount that the slide panels are correctly positioned in the guides!

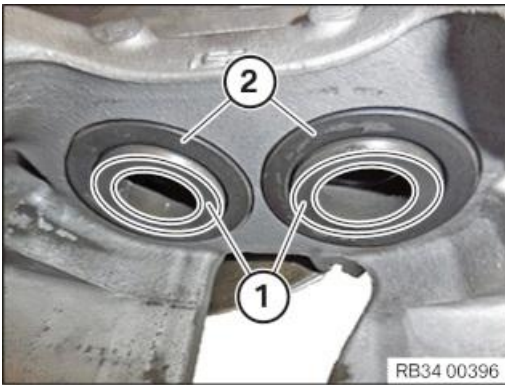


So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket.

Apply a thin layer of brake pad paste to the surfaces of the sliding plates (1).



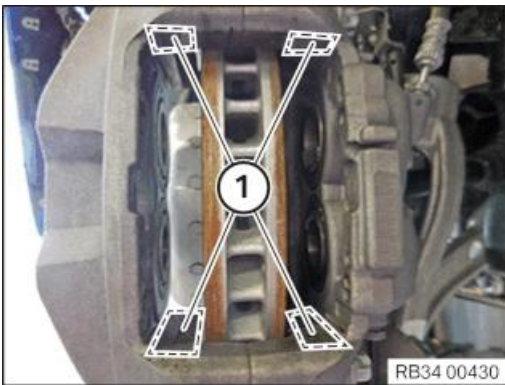
Brake (made by Brembo), 4-piston fixed caliper brake (model ranges: 7-Series (G11, G12))



Clean the contact surface (1) of the brake piston (4 pieces) with brake cleaner.

Adhesive residues must be completely removed.

Check the dust boots (2) and renew as necessary.



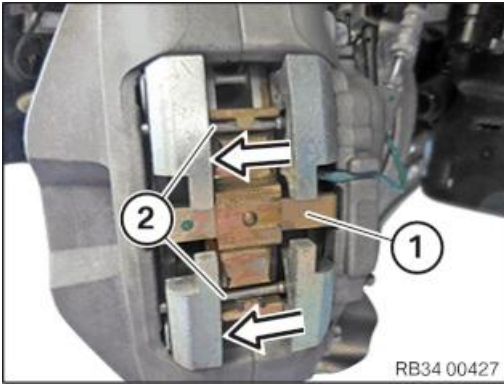
To prevent damage to the surface coating, do not clean the guide surfaces (1) for the brake pads on the brake calliper mechanically, if possible.

Clean guide surfaces (1) with brake cleaner and apply a thin coating of brake pad paste.



Remove the protective film of the adhesive layer (1) from the brake pads.

Do not touch the adhesive layer!



Insert brake pads in the brake caliper, making sure the adhesive layer does not touch the brake pistons.

Fit retaining clip (1).

Drive in the locking pins (2) in the direction of the arrow.

Attention!

After the brake pads have been installed they must immediately be bonded to the brake pistons:

- Step on the brake pedal to the floor and hold the pressure for one minute. This causes the brake pads to adhere to the brake pistons.

34 00 ... Instructions for brake testing for E90 / E91 / E92 / 84 (AWD)

Manufacturing period: as of volume production launch

1. Vehicles with manual gearbox and xDrive:

Important!

Before driving onto the dynamic brake or power analyser), switch off the Hill Descent Control (HDC) and keep it switched off while testing the brakes.

The HDC indicator lamp must not light up!

It is possible for the HDC indicator lamp to go out or not to light up even when HDC operation is activated. This may be because HDC is temporarily unavailable due to high brake temperature.

Do not select a gear and do not accelerate. Otherwise damages occur to the test stand or vehicle!

Pressing the accelerator pedal causes the multi-plate clutch in the transfer case to close, even in Neutral. Consequently the stationary axle is also driven, and the vehicle surges from the analyser. Because the front and rear axles are now coupled, the axle to be tested then increases the brake force until the analyser is shut down.

2. Vehicles with automatic transmission and xDrive:

Important!

Before driving onto the dynamic brake or power analyser), switch off the Hill Descent Control (HDC) and keep it switched off while testing the brakes.

The HDC indicator lamp must not light up!

It is possible for the HDC indicator lamp to go out or not to light up even when HDC operation is activated. This may be because HDC is temporarily unavailable due to high brake temperature.

Carry out brake testing with selector lever in N position (Neutral) only.

Do not accelerate when the rollers start up.

During roller operation pressing the accelerator pedal in selector lever position N (Neutral) has no damaging effect.

Selecting a gear causes the transfer case clutch to close when the analyser rollers start up. Consequently the stationary axle is also driven, and the vehicle surges from the analyser. Because the front and rear axles are now coupled, the axle to be tested then increases the brake force until the analyser is shut down.

34 00 ... Manual determination for the extrapolation of the total braking force and minimum brake force shares for front and rear axle.

To the extent that the test stand computer does not provide an automatic calculation of the braking forces, the necessary evaluation values can also be determined manually.

Premises:

- Statutory minimum total braking force throughout the EU: $z \geq 58 \%$
- additionally in Germany: Minimum share of VA and HA brake force according to manufacturer specifications

Input values:

1. Permitted total weight according to registration certificate part 1 column F1
2. maximum brake pedal force for minimum brake force 58% according to manufacturer specification
3. Input of the brake pedal force range for test application
4. x % minimum front axle brake force share of the total brake force according to type or series specific manufacturer specifications.
5. x % minimum rear axle brake force share of the total brake force according to type or series specific manufacturer specifications.

Manufacturer specific specifications for brake effect test as part of periodic vehicle inspections

Baureihe	Basismodell	Bemerkung	zulässiges Gesamtgewicht [kg]	max. Pedalkraft zur Erreichung einer Verzögerung von 58 % in [N]	minimaler Vorderachs-bremskraftanteil in [%]	minimaler Hinterachs-bremskraftanteil in [%]
E70/71/72	3.0i	X5	2680	240	53,3	19,4
E83	2.0i	X3	2200	200	52,3	19,8
E81	116i	3-türer	1780	170	51,8	21,2
E82	120d	Coupe	1820	170	51,3	21,6
E87	116i	5-türer	1745	170	51,8	21,2
E88	118i	Cabrio	1885	170	50,4	21,2
E90	316i	Limousine	1860	170	51,0	19,6
E91	316i	Touring	1960	170	48,8	19,6
E92	316i	Coupe	1800	170	51,9	19,6
E93	320i	Cabrio	2055	200	52,7	19,6
F01/04	730i	Limousine	2505	240	53,1	20,4
F02	730Li	Limousine lang	2515	240	53,1	20,4
F07	530dA	GT	2590	240	53,0	20,4
F10	523i	Limousine	2235	200	52,2	18,7
F11	523iT	Touring	2365	200	52,2	18,7
F12	635dA EU5	Cabrio	2080	200	55,9	18,6
F13	635dA EU5	Coupe	1920	170	55,9	18,6
R55	Mini One	Clubman	1680	170	60,8	13,8
R56	Mini One	2-türer	1550	170	60,8	14,9
R57	Mini One	Cabrio	1630	170	60,8	14,9
R60	Cooper D	Countryman	1575	170	54,8	19,3
E89	74 2.0i	Roadster	1750	170	51,7	21,3
E84	sDrive 1.8i	X1	2010	200	50,5	22,1
F25	sDrive 2.3i	X3	2275	200	51,3	21,6
RR01	xxx	Phantom	3200	240	51,6	21,4
RR04	xxx	Ghost	2940	240	50,9	21,9

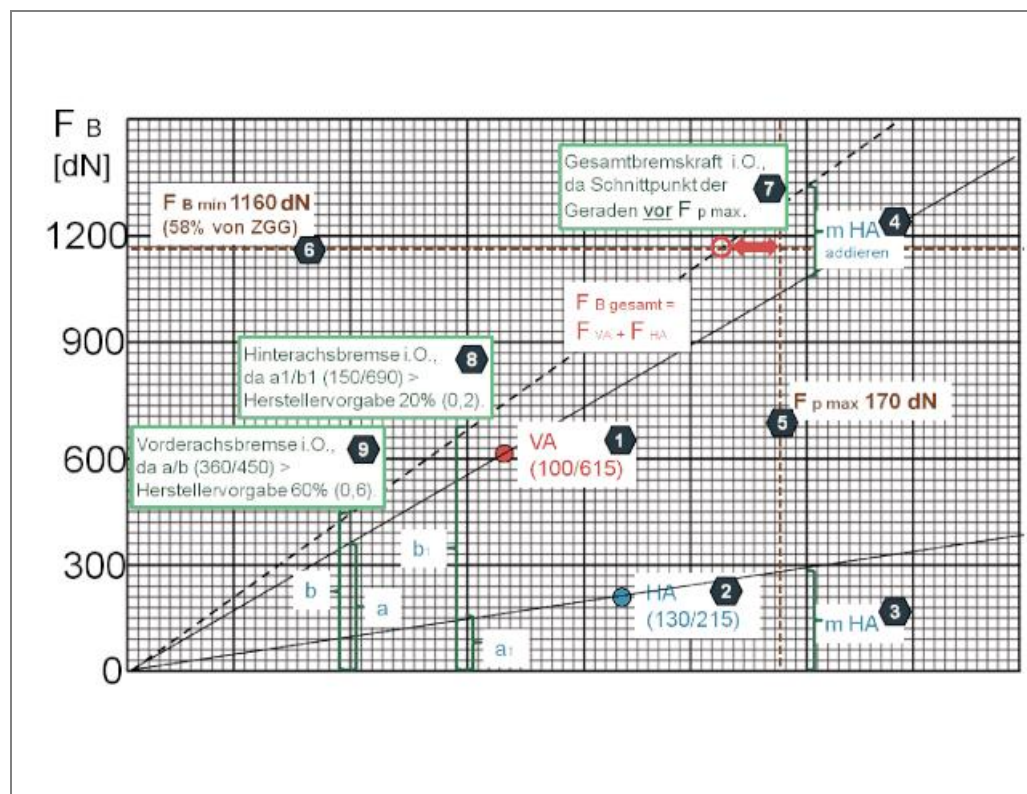
Formulas

Total brake force	F total	= F VA + F HA
Rise VA	mVA	= F VA / Fp VA
Rise HA	mHA	= F HA / Fp HA
Total rise	m total	= m VA + m HA
Minimum share VA%	VA min	= VA / m total
Minimum share HA%	HA min	= HA / m total
Minimum brake force	F B min	= ZGG x 0.58
Brake force with F p max	F total nominal	= m total x Fp max

Definitions

FB VA	=Total of brake forces of the left and right front wheel
FB HA	=Total of brake forces of the left and right rear wheel
Fp VA	= Brake pedal force at the time of brake force measurement on VA
Fp HA	= Brake pedal force at the time of brake force measurement on HA
zGG	= Approved total weight of the vehicle
Fp max	= Maximum permitted brake pedal force according to manufacturer specifications

Practical implementation with millimetre paper and computer.



Practical implementation in an Excel table calculation.

A	B	C	D	E	F	G
1						
2	Fahrzeug-Basis-Daten					
3	Kennzeichen					
4	M-XY-1234					
5	Fahrgestell-Nummer					
6	WBAUX91030A944382					
7	Kilometerstand					
8	123456					
9						
10	Messwerte in gelbe Felder eintragen			Berechnungsmodell		
11	Bremskraft VA links [dN]	zugehörige Pedalkraft VA	Steigung VA	6,15		
12	305	100	Steigung HA	1,65		
13	Bremskraft VA rechts [dN]		Gesamtsteigung	7,80		
14	310					
15						
16	Bremskraft HA links [dN]	zugehörige Pedalkraft HA	Re/Li Abweichung VA	1,63%		
17	105	130	Re/Li Abweichung HA	4,65%		
18	Bremskraft HA rechts [dN]					
19	110					
20						
21	Herstellervorgaben in gelbe Felder eintragen					
22	Zulässiges Gesamtgewicht [kg]		Bremskraft bei max. Pedalkraft	1326,65		
23	2000		Mindestens nötige Bremskraft	1160,00		
24	Maximal zulässige Pedalkraft [N]					
25	170		Anteil HA an Gesamtbremskraft	21,19%		
26	Mindestens Bremskraftanteil HA		Anteil VA an Gesamtbremskraft	78,81%		
27	20%					
28	Mindestens Bremskraftanteil VA					
29	60%					

Practical implementation in an Excel table calculation including display of the stored calculation formulas.

A	B	C	D	E	F	G
1						
2	Fahrzeug-Basis-Daten					
3	Kennzeichen					
4	M-XY-1234					
5	Fahrgestell-Nummer					
6	WBAUX91030A944382					
7	Kilometerstand					
8	123456					
9						
10	Messwerte in gelbe Felder eintragen			Berechnungsmodell		
11	Bremskraft VA links [dN]	zugehörige Pedalkraft VA	Steigung VA	=((B12+B14)/C12		
12	305	100	Steigung HA	=((B17+B19)/C17		
13	Bremskraft VA rechts [dN]		Gesamtsteigung	=F11+F12		
14	310					
15						
16	Bremskraft HA links [dN]	zugehörige Pedalkraft HA	Re/Li Abweichung VA	=ABS((B12-B14)/((B12+B14)/2))	=WENN(F15<25%,"0","<10")	
17	105	130	Re/Li Abweichung HA	=ABS((B17-B19)/((B17+B19)/2))	=WENN(F17<25%,"0","<10")	
18	Bremskraft HA rechts [dN]					
19	110					
20						
21	Herstellervorgaben in gelbe Felder eintragen					
22	Zulässiges Gesamtgewicht [kg]		Bremskraft bei max. Pedalkraft	=F13*B25	=WENN(F22<F23,"0","<10")	
23	2000		Mindestens nötige Bremskraft	=B23*0,58		
24	Maximal zulässige Pedalkraft [N]					
25	170		Anteil HA an Gesamtbremskraft	=F12/F13	=WENN(F25<B27,"0","<10")	
26	Mindestens Bremskraftanteil HA		Anteil VA an Gesamtbremskraft	=F11/F13	=WENN(F26<B28,"0","<10")	
27	0,2					
28	Mindestens Bremskraftanteil VA					
29	0,6					

**Important!**

Follow instructions for [Brake testing on test stand](#).

**Note:**

If deviations are identified during the following check, the parking brake must be adjusted:

Drive vehicle onto chassis dynamometer.

Warm up brakes.

Check handbrake.

0th tooth
(handbrake
released):

Vehicles with manual transmission: Shift lever in neutral position.

Vehicles with automatic transmission: Selector lever in "N" position.

- Without locking differential ≤ 150 N.
- With locking differential ≤ 200 N (possibly odd display).

1st tooth:

No increase in braking force with regard to 0th tooth. Indicator lamp can be lit.

2nd tooth:

Indicator lamp must be lit.

3rd tooth:

Increase in braking force.

5th tooth:

The brake force display must have reached ≥ 400 N.

Checking brake force differential at wheel:

Apply handbrake until a wheel circumferential force (measured on brake test stand) of min. 1000 N is reached.

Max. permitted brake force differential right/left ≤ 35 % (referred to greater brake value).

It must be possible to brake with locked wheels with the handbrake.

**Note:**

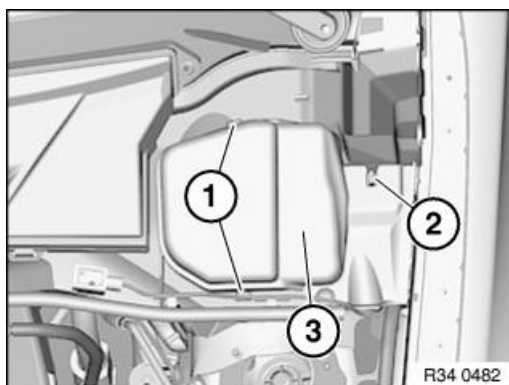
[Read and comply with General Information.](#)

The capacities are oil change quantities. See Electronics Parts Catalogue/Commercial Service Data (ETK/KSD) (capacities).

**Important!**

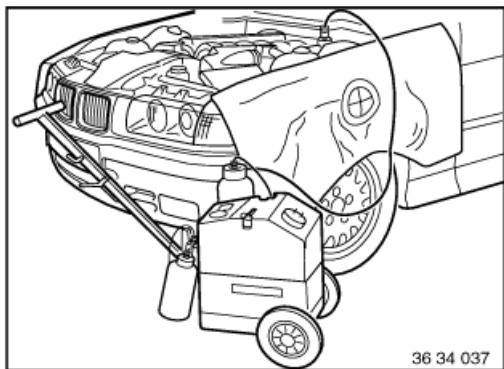
When carrying out repairs to the brake system, follow the procedure set out in [Bleeding brake system with DSC](#).

Use only BMW-approved brake fluids, see [BMW operating fluids](#).



Unclip retaining tabs (1).

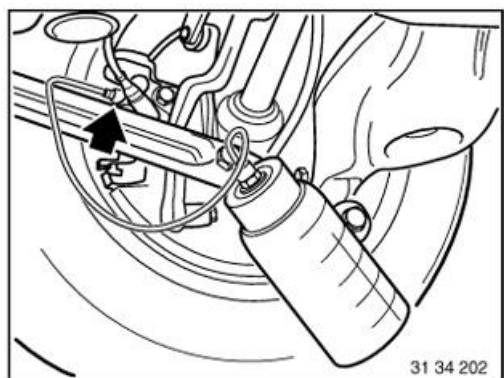
Pull cover (3) out of guide (2) and remove.



Connect brake fluid changer to expansion tank and switch on. **Note:**

Check relevant equipment manufacturer's operating instructions for each device.

Charging pressure should not exceed 2 bar.

**Fully rinse the brake system**

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Open bleeder valve and purge until clear, bubble-free brake fluid emerges.

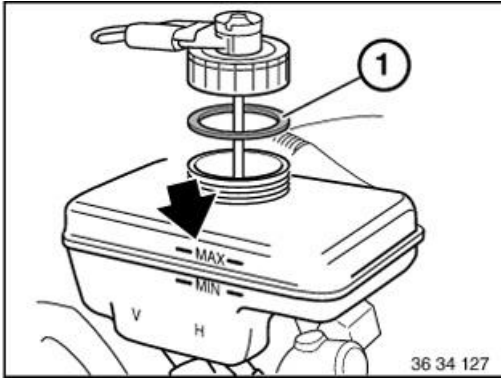
Close vent valve.

Follow same procedure on rear left, front right and front left wheel brake.



Note:

The clutch slave cylinder must also be scavenged in vehicles with manual transmissions.



Switch off brake fluid changer and remove from expansion tank.

Check brake fluid level. If necessary, top up/draw off to max. level.

Close expansion tank.

Note:

Pay attention to rubber seal (1) in sealing cap.



After installation:

- Reset [CBS display](#) according to factory specification

00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

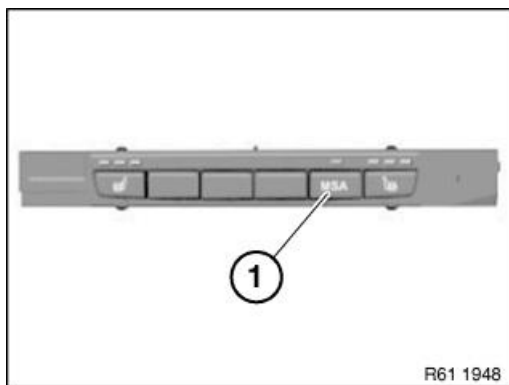
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

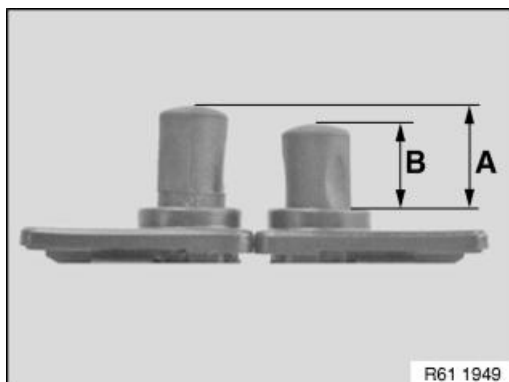
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
 $A = 10 \text{ mm}$
 - Basic setting (engine hood/bonnet open)
 $B = 7 \text{ mm}$

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool



Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) [Service Information \(bulletin\) 61 01 07 335](#)
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) [Service Information \(bulletin\) 61 01 10 629](#)

34 00 ... Table for the manufacturer type and/or series specific specified value for the service brake effect test for the official vehicle inspection

The following tables contain the values that are required for the calculation.

- Maximum brake pedal force for the statutory minimum braking force of 58 % in relation to the approved total vehicle weight.
- The percentages of minimum brake force shares for the front axle brake.
- The percentages of minimum brake force shares for the rear axle brake.

The specified value "Prüfbereich_Pedalkraft" for all vehicles: 50 – 150 N.

Vehicle specific value of the approved total weight for the evaluation of the statutory minimum brake force of 58 % on the vehicle to be tested. This value is included in the registration certificate, part 1 under column F1 and/or F2.

This only indicates the values for the basic models of the corresponding series, which means that the brake pedal forces that are listed for the minimum total brake force and percentage of minimum front and rear axle brake shares also apply to other types of this model and/or development series.

Baureihe	Basismodell	Bemerkung	zulässiges Gesamtgewicht [kg]	max. Pedalkraft zur Erreichung einer Verzögerung von 58 % in [N]	minimaler Vorderachs-bremskraftanteil in [%]	minimaler Hinterachs-bremskraftanteil in [%]
E31	840Gi	Coupe	2240	200	57,9	17,4
E32	730i	Limousine	2185	200	58,2	17,2
E34	518i	Limousine	1840	170	58,2	17,2
E34	518i	Touring	2015	200	55,7	18,7
E36/2	316i	Coupe	1735	170	57,0	17,9
E36/3	316i	Touring	1820	170	54,4	19,6
E36/4	316i	Limousine	1735	170	57,0	17,9
E36/5	316i	Compact	1680	170	60,4	16,0
E36/C	318i	Cabrio	1810	170	54,4	19,6
Z3	1.8i	Roadster	1490	170	57,6	17,6
E38	728i	Limousine	2300	200	57,2	17,2
E39	520i	Limousine	2010	200	57,2	17,0
E39/2	520i	Touring	2225	200	56,3	18,4
E39	M5	Limousine	2490	200	54,7	19,3
E46/2	316Gi	Coupe	1820	170	51,8	21,0
E46/3	316iT	Touring	1920	170	52,2	19,4
E46/4	316i	Limousine	1820	170	51,8	19,4
E46/5	316i	Compact	1820	170	51,8	21,0
E46	M3	Coupe	2000	200	50,8	20,1
E53	3.0i	X5	2620	240	55,8	17,6
E60	520i	Limousine	2000	200	51,6	19,5
E61	520iT	Touring	2160	200	51,6	19,5
E63	630Gi	Coupe	1960	170	52,9	19,5
E64	630i	Cabrio	2120	200	54,5	19,5
E65	730i	Limousine	2505	240	51,6	20,5

Baureihe	Basismodell	Bemerkung	zulässiges Gesamtgewicht [kg]	max. Pedalkraft zur Erreichung einer Verzögerung von 58 % in [N]	minimaler Vorderachs- bremskraftanteil in [%]	minimaler Hinterachs- bremskraftanteil in [%]
E70/71/72	3.0i	XS	2680	240	53,3	19,4
E83	2.0i	X3	2200	200	52,3	19,8
E81	116i	3-türer	1780	170	51,8	21,2
E82	120d	Coupe	1820	170	51,3	21,6
E87	116i	5-türer	1745	170	51,8	21,2
E88	118i	Cabrio	1885	170	50,4	21,2
E90	316i	Limousine	1860	170	51,0	19,6
E91	316i	Touring	1960	170	48,8	19,6
E92	316i	Coupe	1800	170	51,9	19,6
E93	320i	Cabrio	2055	200	52,7	19,6
F01/04	730i	Limousine	2505	240	53,1	20,4
F02	730Li	Limousine lang	2515	240	53,1	20,4
F07	530dA	GT	2590	240	53,0	20,4
F10	523i	Limousine	2235	200	52,2	18,7
F11	523iT	Touring	2365	200	52,2	18,7
F12	635dA EU5	Cabrio	2080	200	55,9	18,6
F13	635dA EU5	Coupe	1920	170	55,9	18,6
R55	Mini One	Clubman	1680	170	60,8	13,8
R56	Mini One	2-türer	1550	170	60,8	14,9
R57	Mini One	Cabrio	1630	170	60,8	14,9
R60	Cooper D	Countryman	1575	170	54,8	19,3
E89	74 2.0i	Roadster	1750	170	51,7	21,3
E84	sDrive 1.8i	X1	2010	200	50,5	22,1
F25	sDrive 2.3i	X3	2275	200	51,3	21,6
RR01	xxx	Phantom	3200	240	51,6	21,4
RR04	xxx	Ghost	2940	240	50,9	21,9

34 00 ... Testing AWD vehicles on dynamic brake and power analysers (E30, E34, E46, E53, E83, E60, E61, E90, E91, E92, E70, E71)



Note:

Running AWD vehicles on dynamic brake analysers is governed by different instructions, depending on the vehicle model.

Important!

Power measurements on single-axle roller dynamometers are generally not permitted as total failure of the transfer case can not be ruled out during such measurements.

In order to test AWD vehicles on dynamic brake analysers, it is essential to follow various measures in accordance with the special instructions in Appendices 1 to 9 for the vehicles in question:

1. [E30 AWD](#)
2. [E34 AWD](#)
3. [E46 AWD](#)
4. [E53 X5](#)
5. [E83 X3](#)
6. [E60 / E61 AWD](#)
7. [E90 / E91 / E92 AWD](#)
8. [E70 X5](#)
9. [E71 X6](#)

34 00 ... Testing of service brakes at the official periodic vehicle check according to EU Directive 2010/48/EU and Germany § 29_StVZO for vehicles with first registration beginning on July 28, 2010.

Series: 1: E81-E88; F20-F21 / 3: E90-E93; F30-F31 / 5: F07-F11; F18 / 6: F06,F12-F13 / 7: F01-F04; X1: E84 / X3: F25 / X5: E70 / X6: E71-E72 / Z4: E89 / MINI: R55-R61 / Rolls Royce

Situation:

For official periodic vehicle inspections according to EU Directive 2010/48/EU and § 29 of the German road traffic licensing regulations (StVZO) as per the revised directive, new inspection specifications apply beginning on 01.07.2012 for the functional test of the service brakes on EU Class M1 vehicles (passenger car up to 3.5 t permitted total weight) and first registered from 28.07.2010 onwards.

Prior the mechanical brake force measurement the electronic function check for the corresponding brake system must always be performed by way of evaluation of the system specific function control gauges in the instrument cluster and/or messages on the Check Control display (ABS, DSC, and brake pad wear and brake fluid display)!

Functional check of the service brake:

Prior to the brake test, the service brake must be conditioned by braking 2 or 3 times from increased walking speed to vehicle standstill.

For vehicles with combustion engines, the engine must run to maintain the vacuum for the power assistance of the service brake. For the same reason, the driving readiness ("ignition") must be switched on with electrical vehicles to ensure the electrical vacuum generation.

EU and Germany:

Vehicle braking (z) with the service brake **at least 58 % of the authorized vehicle total weight**, instead of the previous 50 %.

Reference value for this minimum braking action **is**, according to ECE Directive 13H, is a **brake pedal operating force of max. 500 N**.

Note: For M1 vehicles with a first registration date prior to July 28, 2010, a minimum brake force of 50% continues to be valid!

Braking according to the guidelines listed above is defined as:

$$z = \frac{\text{Total of brake forces of all wheels at the wheel output}}{\text{Weight force of the vehicle (zGG)}} \times 100 (\%)$$

Example: BMW X3 F25: approved total weight (zGG.): 2300 kg.

Measured brake force values on brake test stand:

Service brake	Front	Rear
Left	435 daN	335 daN
Right	434 daN	336 daN

Evaluation of service brake:

$$z = \frac{1540}{2300} \times 100 (\%) = 66.96 \% \text{ is OK because greater than } 58\%$$

Note:

Since the vehicles to be tested usually do not indicate the approved total weight at the time of the test, and the test stand rollers may prematurely switch off due to the lower axle weight before the possible higher brake

forces are reached as a result of the wheel roll slipping limit, the determined total brake force is often below the total brake force that is required to meet the statutory minimum braking.

This may result in a false evaluation (not OK) even though the brake system is intact.

To prevent such a "mis-evaluation" and eliminate the need for a general vehicle load to the approved total weight, the vehicle manufacturers will provide **a maximum pedal force as reference value for minimum brake action** type and/or series-specific in the future. See table in Appendix 1.

To correspond to the actual conditions especially when checking on the brake test stand, the vehicle manufactures are enhancing the series-specific input specification values, which means the brake pedal forces, with additional **"test stand suitable" brake pedal forces**, in which the actual measurements must be performed.

These are usually low brake pedal force reference values that are generally in front of the banding point of the brake servo reference line.

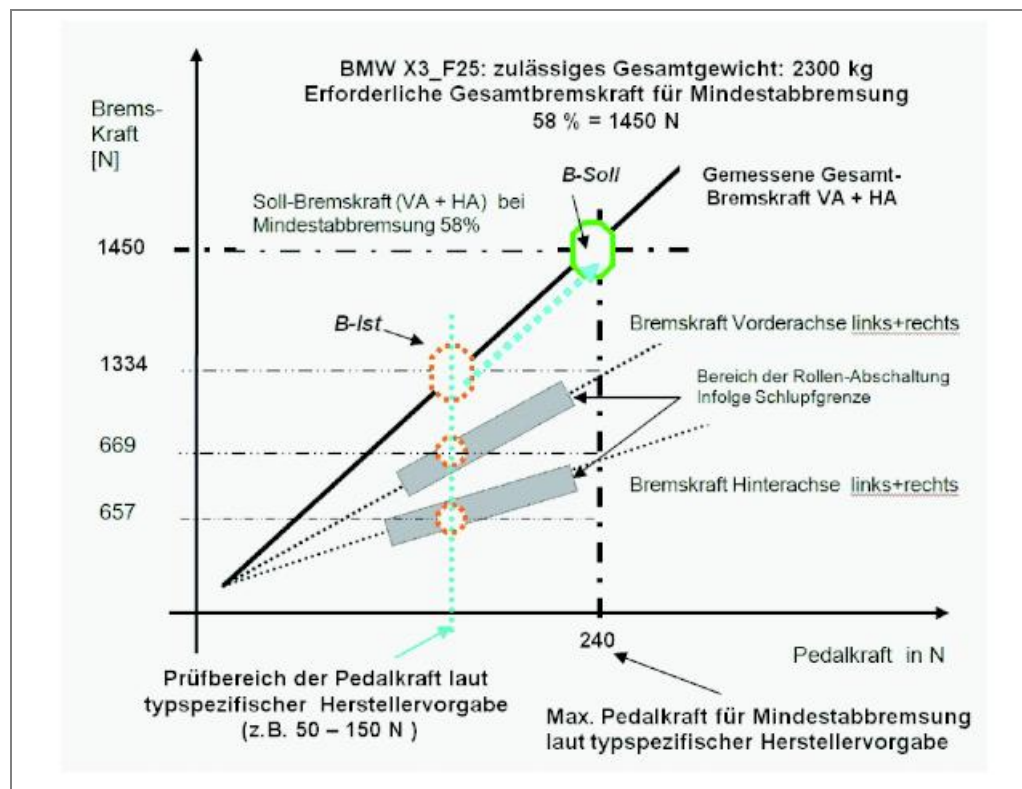
The brake force can thereby be measured in front of the blocking limit in most cases, which serves to preserve the tyres and provides a significantly more accurate approved right / left deviation in the upper test range.

In practice, this means:

When the measured total brake force "B Actual" is below the total value "B Target" for the required minimum braking due to premature shut down of the brake test stand or a vehicle test weight near the vehicle kerb weight, this actual value must be extrapolated on the line of the total brake force to the specified brake pedal force and then entered in reference to the approved total weight of the vehicle to be tested (see vehicle documentation). This new total value "B Target" will now be used to calculate the braking.

If this total brake value that was extrapolated to the specified maximum brake pedal force does not meet the required minimum brake force of 58%, the braking effect must be rated not OK.

The schematic graphic below clarifies this correlation:



Other statutory specifications EU and Germany:

Just as for vehicles first registered **before** 01.07.2012, the deviation of the wheel brake forces of each axle to each other may not exceed 25%.

Also valid for vehicles in Germany first registered from 01.07.2012 onwards:

Evaluation of the minimum brake force share of the front and rear axle in % to the total brake force of all wheels according to the vehicle manufacturer's specified values. See formulas below and type or series specific manufacturer values according the table in Appendix 1.

$$\text{1. Front axle share} = \frac{\text{Total front axle brake forces}}{\text{Total brake force of all axles}} \times 100 (\%)$$

Manufacturer specification:

The following calculation results from the previous example for the BMW X3:

$$\text{Front axle brake force share} = \frac{435 \text{ daN} + 434 \text{ daN}}{435 + 434 + 335 + 336 \text{ daN}} \times 100 (\%) = 56\% \text{ is OK because greater than } 51.3\%$$

$$\text{2. Rear axle brake share} = \frac{\text{Total rear axle brake forces}}{\text{Total brake force of all axles}} \times 100 (\%)$$

Manufacturer specification:

The following calculation results from the previous example for the BMW X3:

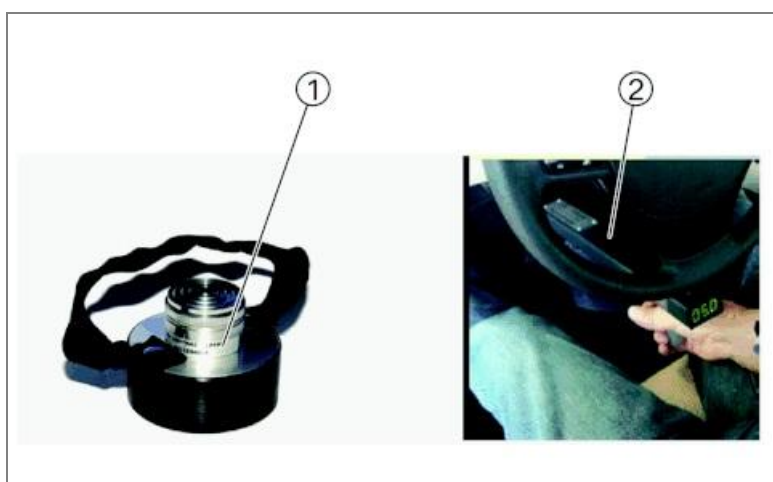
$$\text{Rear axle brake force share} = \frac{335 \text{ daN} + 336 \text{ daN}}{435 + 434 + 335 + 336 \text{ daN}} \times 100 (\%) = 44\% \text{ is OK because greater than } 21\%$$

General note:

This means that the official test of the service brake **absolutely requires the use of a brake pedal force measuring sensor**.

The manufacturers of brake test stands have been offering these items for many years as test stand accessory.

Examples are:



Position 1: MAHA, Haldenwang

Position 2: AHS, Bremen

02	02	0135/04000	210
- 04648		- 1881	
- 1661		01800 - 01800	
	00100		
147	002300	002300	
01080	01080		
01080	01280		
078	03000	074	
02400	0750	005	

The approved total weight of the vehicle must be derived from the registration Part 1 from column F1 or F2.

Since the law primarily requires that brake effect tests are performed on brake test stands, BMW Group vehicles **must be tested on roller test stands!**

Next, the statutory tolerance of the axle "right-left deviation, limit value max. 25%, must be determined in the upper range of the measured brake forces.

In addition, the minimum brake force shares must be determined separately for the front and rear axle in compliance with the additional German specifications and referenced to the manufacturer specifications.

General notes:

It is recommended to check the brakes as part of the manufacturer required vehicle inspection and **before** the official vehicle inspection according to the specified values indicated here.

To make work easier for the **referencing: Brake pedal force to brake force** we urgently recommend to have your test stand manufacturer set up an electronic measured value transmission from the brake pedal force measuring tool to the test stand computer.

The installation of a calculation program to determine the minimum total braking on the test stand computer to achieve the correct evaluation - especially when it is necessary to extrapolate the actual brake force in relation to the setpoint value at the corresponding brake pedal force - is also deemed absolutely necessary.

The integration of a database for the type specific vehicle specifications (brake pedal forces, front and rear axle brake shares) simplifies the overall brake test.

These specification will also be indicated in the technical data and/or repair instructions in the future as minimum values, which will only be updated and/or maintained model-specific there.

The test procedure for the mechanical or electrical operated parking brakes, and/or the regenerative valve for hybrid or electric vehicles are listed in the corresponding repair instructions.

In the event of specifications for the brake test that deviate from country authorities of EU states and/or newer issues of the German road traffic licensing regulations, or the application of manufacturer and/or type specific target data is prohibited, compliance with same is required.

In this case, we request that you will send the corresponding information to the publisher of this service information.

- Enclosure 1: [Type specific specifications to test the service brake](#)
- Enclosure 2: [Manual calculation of braking when this is not supported by the test stand.](#)

34 00 ... Checking brake discs



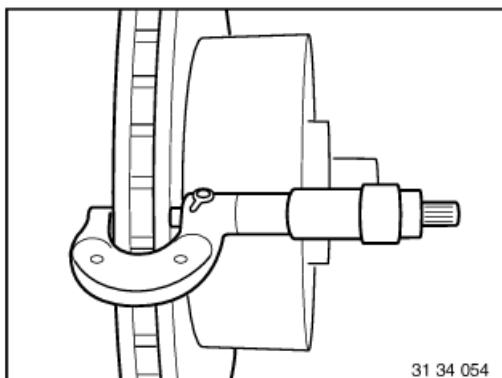
Special tools required:

- [34 1 280](#)



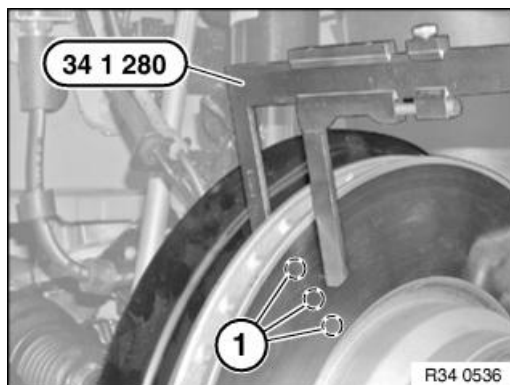
Necessary preliminary work:

- Remove [wheels](#).



Checking thickness difference:

- Measure thickness difference within brake surfaces at 8 point (spread over the circumference) with a micrometer gauge
- Compare measurement result with [setpoint value](#)



Check minimum brake disc thickness:

- Position special tool [34 1 280](#) at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with [setpoint value](#)



Special tools required:

- [00 9 316](#)



Warning!

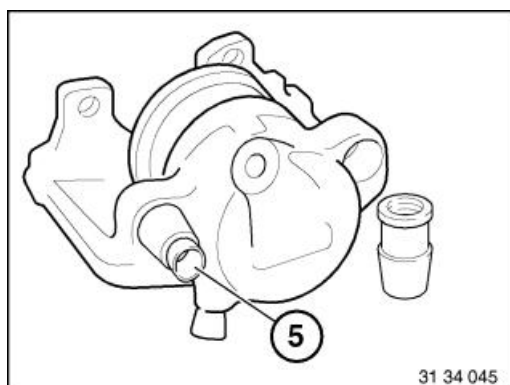
In the following work step, large forces occur at the brake caliper piston (up to more than 2800 N).

Risk of injury!

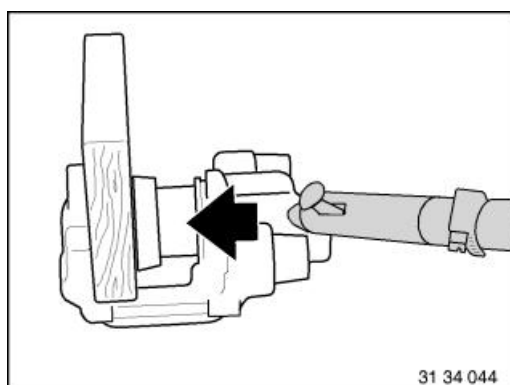


Note:

Use repair kit,
refer to BMW Parts Department.

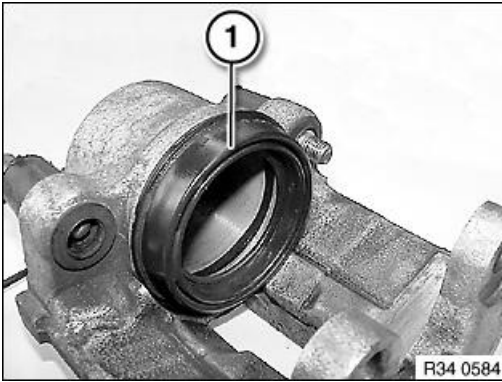


Check guide sleeves (5), fitting repair-kit guide sleeve if necessary.

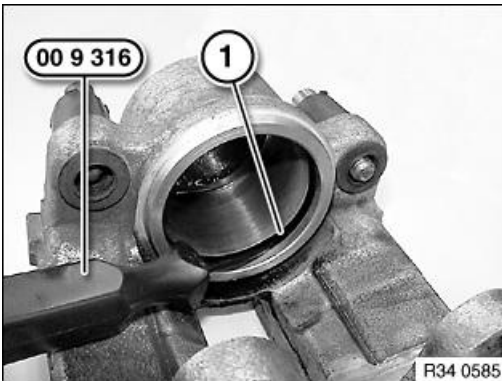


Carefully force piston out through connection bore with compressed air.
To protect piston, place a protective plate (e.g. hard wood or hard felt) in caliper recess.

Do not grip piston with fingers - risk of trapping!



Press off dust sleeve (1).



Carefully remove sealing ring (1) special tool [00 9 316](#).

Clean cylinder bores and parts with alcohol and dry with compressed air.

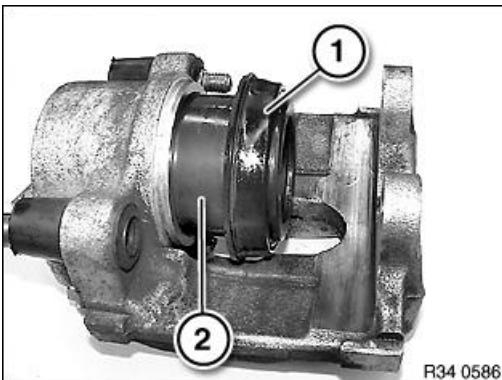
Thoroughly inspect cylinder bore, piston and flange surfaces. Machining of cylinders and pistons is not permitted.

Install new seal.

Installation:

Apply a light coat of [Ate brake cylinder paste](#) to cylinder bore, piston and seal,

refer to BMW Service Operating Fluids.



Fit dust sleeve (1) in annular groove of piston (2).

Important!

Do not twist brake piston.

Press piston into cylinder bore.

Evenly press dust sleeve (1) onto brake caliper housing as far as it will go.

Installation:

The area between the dust sleeve and the brake caliper housing must be kept dry. It must not come into contact with Ate brake cylinder paste or brake fluid so as to ensure that the dust sleeve is perfectly seated.

**Special tools required:**

- [00 9 316](#)

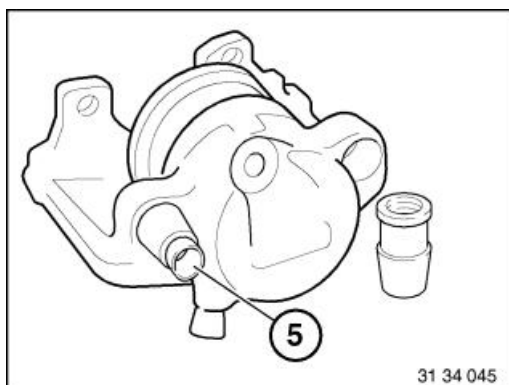
**Warning!**

In the following work step, large forces occur at the brake caliper piston (up to more than 2800 N).

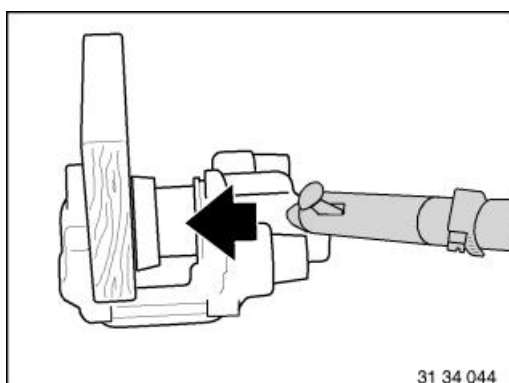
Risk of injury!

**Note:**

Use repair kit,
refer to BMW Parts Department.

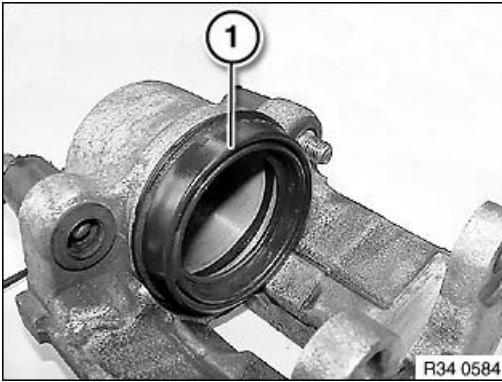


Check guide sleeves (5), fitting repair-kit guide sleeve if necessary.

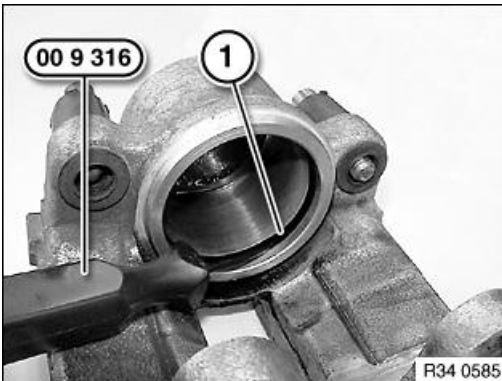


Carefully force piston out through connection bore with compressed air.
To protect piston, place a protective plate (e.g. hard wood or hard felt) in caliper recess.

Do not grip piston with fingers - risk of trapping!



Press off dust sleeve (1).



Carefully remove sealing ring (1) special tool [00 9 316](#).

Clean cylinder bores and parts with alcohol and dry with compressed air.

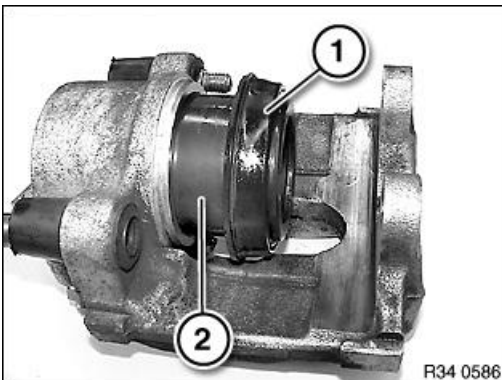
Thoroughly inspect cylinder bore, piston and flange surfaces. Machining of cylinders and pistons is not permitted.

Install new seal.

Installation:

Apply a light coat of [Ate brake cylinder paste](#) to cylinder bore, piston and seal,

refer to BMW Service Operating Fluids.



Fit dust sleeve (1) in annular groove of piston (2).

Press piston into cylinder bore.

Important!

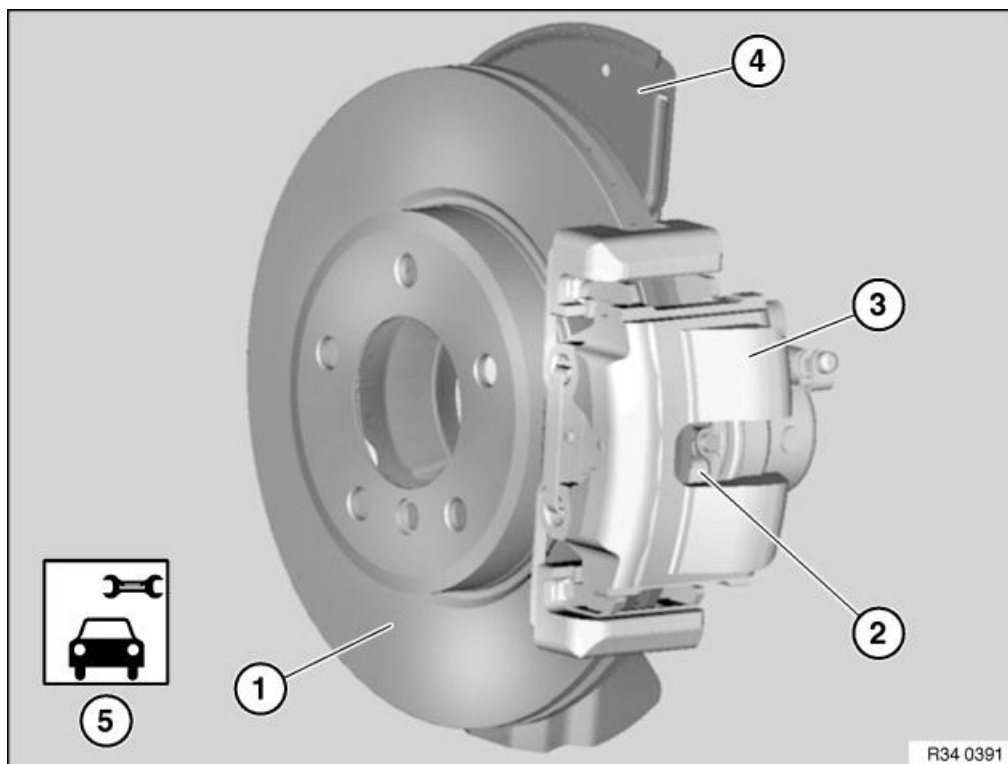
Do not twist brake piston.

Evenly press dust sleeve (1) onto brake caliper housing as far as it will go.

Installation:

The area between the dust sleeve and the brake caliper housing must be kept dry. It must not come into contact with Ate brake cylinder paste or brake fluid so as to ensure that the dust sleeve is perfectly seated.

34 11 ... Overview of front brakes



- | | |
|----------------------------------|---|
| 1 Brake disc | 4 Brake guard plate |
| 2 Brake pad | 5 Checking thickness of brake pad |
| 3 Brake calliper | |

**Attention!**

Always precision-turn both sides of both brake discs on one axle.

[Â maximum machining dimension per friction ring side](#)

[Minimum brake disc thickness \(MIN TH\)](#)

Brake discs of M models (Compound brake discs) must **not** be machined!

Only one brake pad set may be used up on brake discs which have been lathe-turned to [minimum thickness \(MIN TH\)](#).

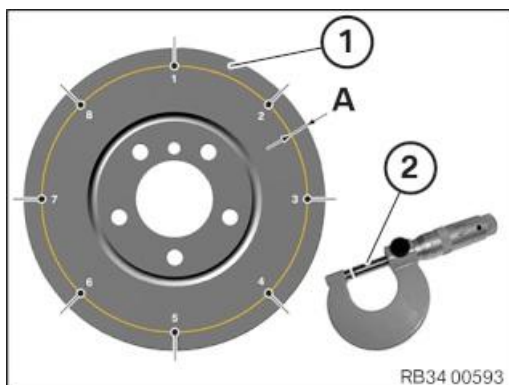
**Mobile brake disc lathe:****Attention!**

Only BMW-approved brake disc lathes may be used!

In the case of mobile brake disc lathes, the [brake caliper](#) and the caliper carrier must be removed.

The brake discs remain on the vehicle.

Please refer to the equipment manufacturer's operating instructions for the exact procedure.



After precision turning the brake disc, the [difference in thickness](#) must be measured at 8 different points (1) approx. 10 mm (dimension A) from the external periphery of the disc with a caliper gauge (2)!

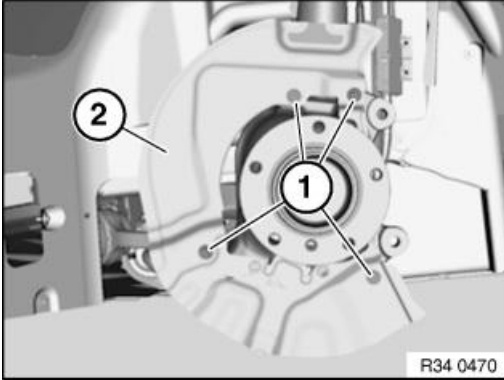
[Permissible difference in thickness: see Technical Data!](#)

34 11 250 Removing and installing / replacing a brake carrier / brake guard plate at front



Necessary preliminary tasks:

- Remove front [brake discs](#)



Release screws (1) and remove brake guard plate (2). *Installation:*
Tightening torque [34 11 3AZ](#).

34 11 000 Removing and installing or replacing brake pads on both front disc brakes (Teves floating caliper)



Special tools required:

- [34 1 050](#)
- [34 1 280](#)



Attention!

- Brake pad wear sensor: After removal it must be replaced (brake pad wear sensor loses its retention capability in the break pad).
- Retaining pins and expanding spring: for vehicles older than 48 months it is recommended to replace the retaining spring!

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket, but rather clean with brake cleaner BMW TI. number 83 19 2 154 780 and apply a thin coating of break pad paste BMW TI. number 83 19 2 158 851 (3 gr.) or 83 19 2 158 852 (100 gr.).

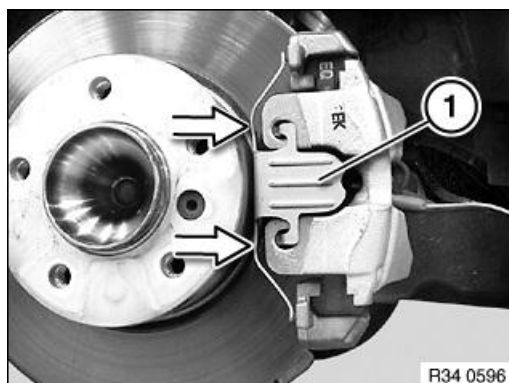
Spread brake pad paste onto the marked surfaces using a brush!

Observe [regulation on applying brake pad paste to brake pads and brake anchor plates!](#)

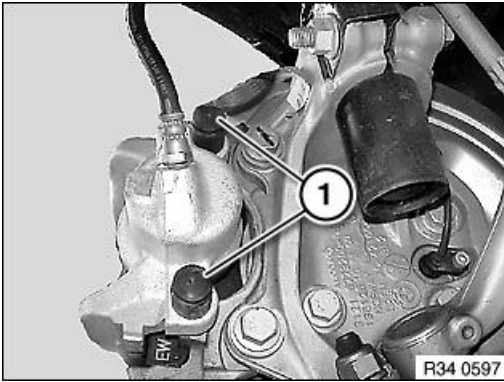


Necessary preliminary tasks:

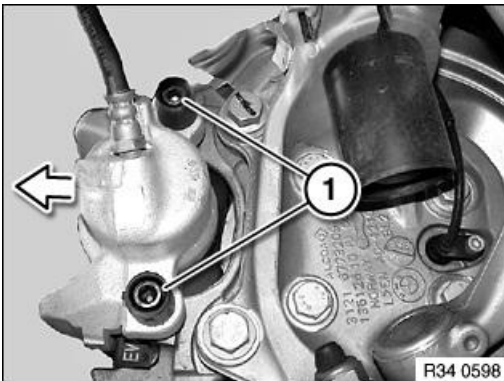
- [Remove wheels.](#)
- Remove [brake pad wear sensor](#)



Lift out retaining spring (1).



Remove plastic plugs (1).



Unfasten guide bolts (1) and lift out brake caliper towards rear of vehicle. *Installation note:*

Tightening torque [34 11 4AZ](#).

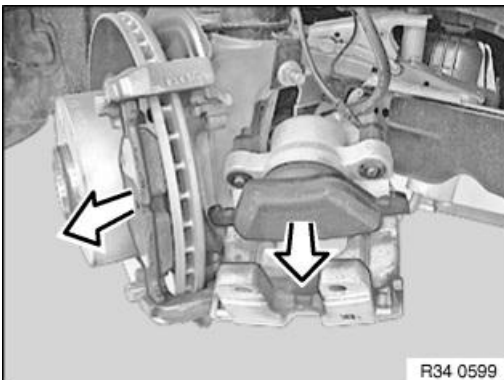
Clean guide screws only; do not grease.

Check threads.

Replace all guide screws which are not in perfect condition.

Attention!

Tie brake calliper back and do not allow to hang from brake hose.



Remove outer brake pad.

Inner brake pad is located with its spring in the piston.

Attention!

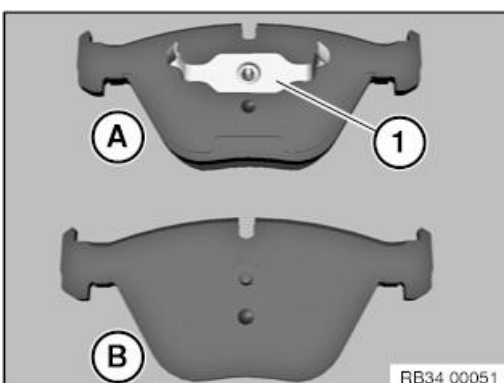
Mark any worn brake pads.

In the event of one-sided brake pad wear, do not change brake pads round.

Observe [minimum thickness of brake pads](#).

Clean brake pads.

Do not grease backs of brake pads sleeve.

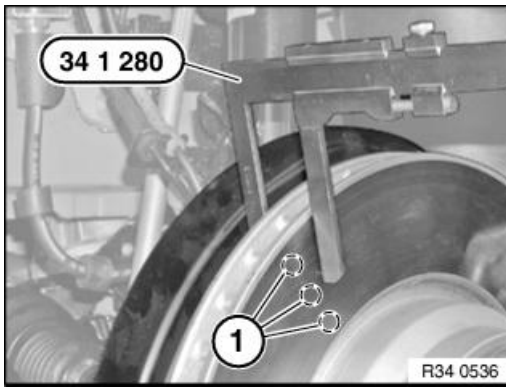


Note:

The outer brake pads gradually need to be changed as well.

The previous version (A) with retaining spring (1) is replaced by brake pads of version (B) without retaining spring!

Installing brake pad sets of equipment specification (A) with retaining spring continues to be permitted.



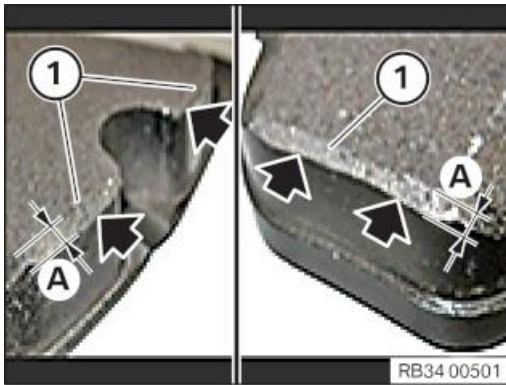
Check minimum brake disc thickness:

- Position special tool [34 1 280](#) at three measuring points in area (1) and measure.
- Compare measuring result and lowest value with [setpoint value](#).



Attention!

New brake pads may only be installed if the brake disc thickness is greater than the [minimum brake disc thickness](#).

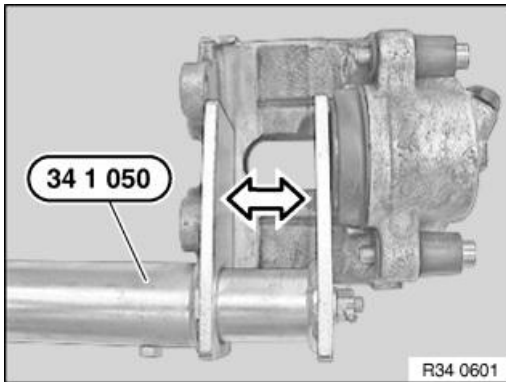


Attention!

If new brake pads are mounted on a brake disc, the following must be observed:

- Bevel edges in the area (1) slightly (dimension A must not exceed maximum 1 mm).

These procedures applies for all the following described brake systems.

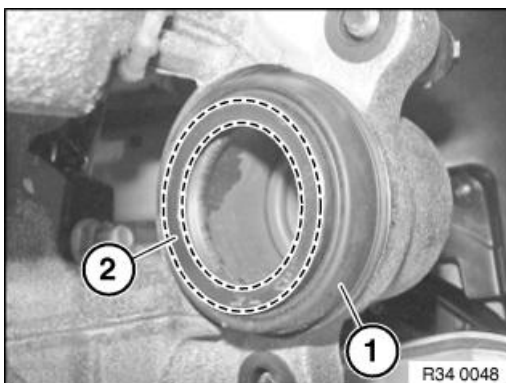


Attention!

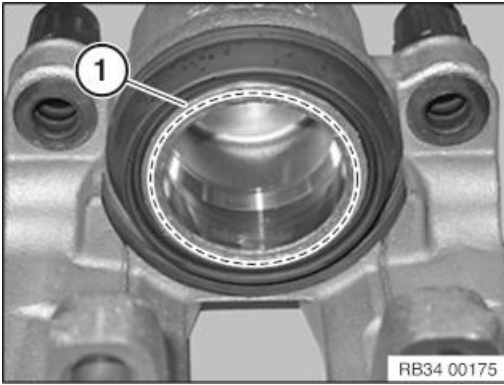
When pressing down piston, note brake fluid level in expansion tank.

Overflowing brake fluid will damage the paintwork.

Turn piston back fully with special tool [34 1 050](#).



Clean contact surface (2) of brake piston and apply a thin coating of brake pad paste.

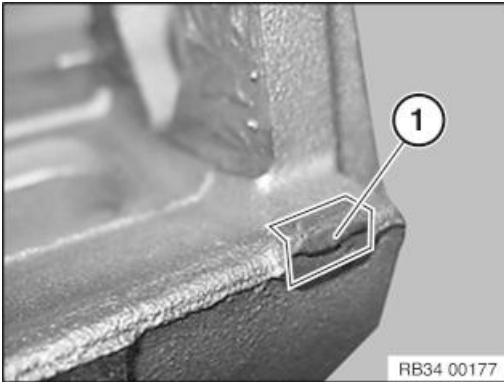


Check dust boot for damage and renew if necessary.

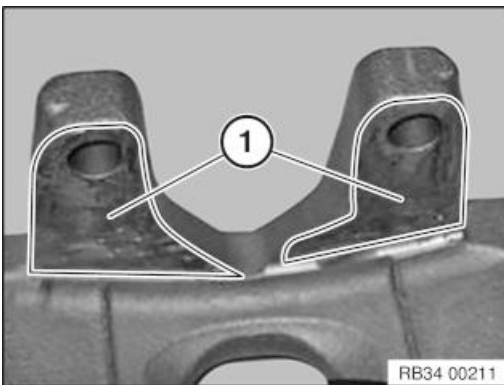
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

Attention!

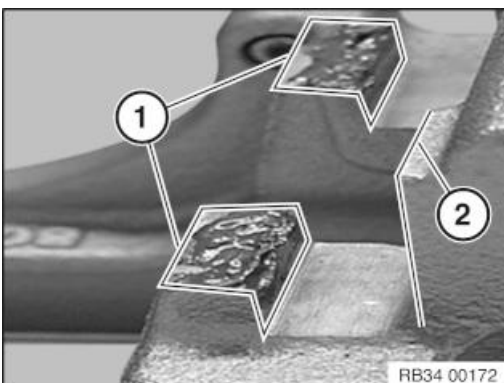
Dust boot must not come into contact with brake pad paste as this may cause the dust boot to swell.



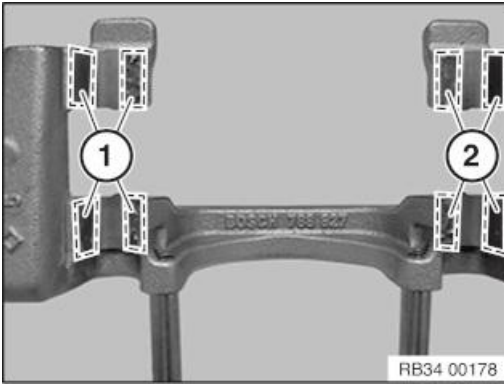
Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.



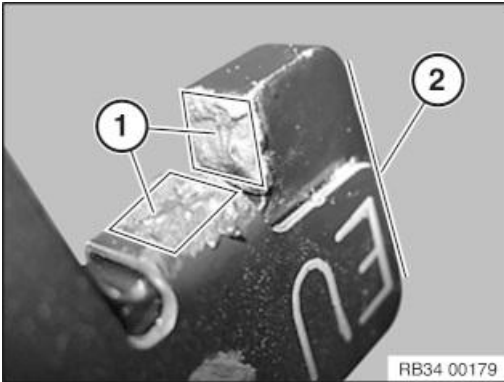
Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.



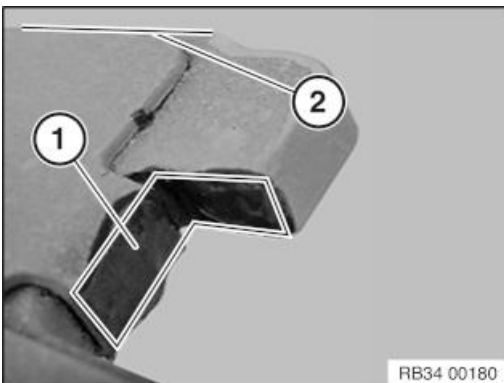
So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1) with brake cleaner and apply a thin coating of brake pad paste.



So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



Lightly coat the T-head of the inner brake pad with brake pad paste in area (1 and 2).



Lightly coat the T-head of the outer brake pad with brake pad paste in area (1 and 2).



Note:

After completing work:

- When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" mark.
- Fully depress brake pedal several times so that brake pads contact brake discs.
- Read and comply with notes on [braking in new brake discs / brake pads](#).
- When exchanging brake pads, reset CBS display in accordance with factory specification.

34 11 020 Removing and installing or replacing front left or right brake caliper (Teves)



Important!

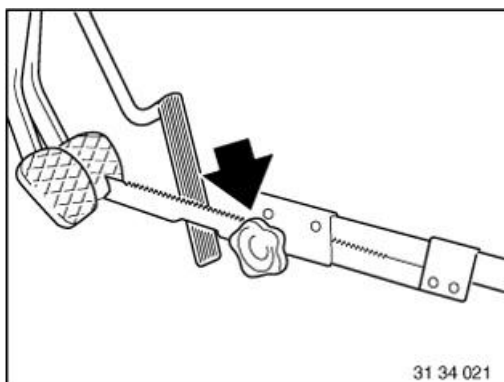
The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).



Necessary preliminary tasks:

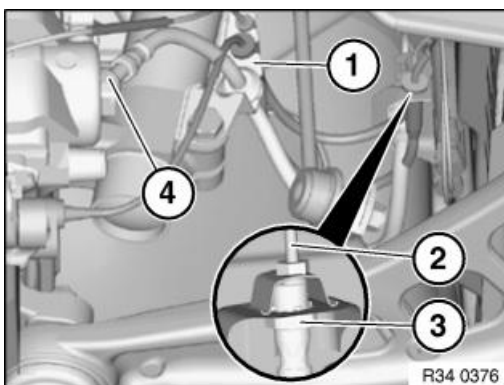
- Remove [wheels](#).
- Read and comply with [General Information](#).

After completing work: [Bleed braking system](#)



Press brake pedal down to floor and secure with pedal support. *Note:* The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



If necessary, pull brake hose out of holder (1).

Important!

Grip brake hose at square head (3) to prevent connecting piece from turning in retaining bracket.

Disconnect brake hose from brake line (2).

Installation note:

Tightening torque [34 32 1AZ](#).

Detach brake hose from brake caliper (4).

Installation note:

Tightening torque [34 32 2AZ](#).



Important!

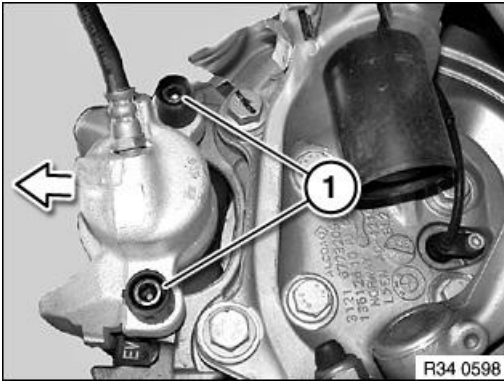
Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

Note:

First tighten brake hose on brake caliper.

Move wheels into straight-ahead position.

Insert brake hose in bracket and screw onto brake pipe.



Unscrew guide bolts (1).

Remove brake caliper by pulling upwards.

Installation note:

Clean guide screws only; do not grease.

Check threads.

Replace all guide screws which are not in perfect condition.

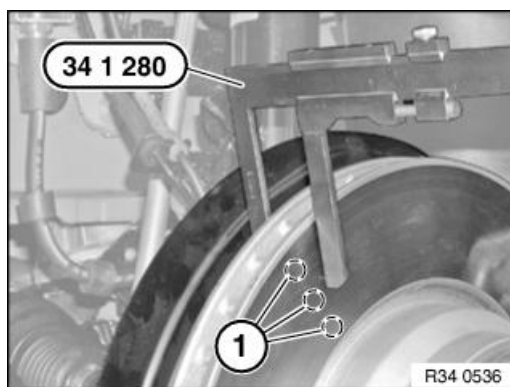
Tightening torque [34 11 4AZ](#).

**Special tools required:**

- [34 1 280](#)

**Necessary preliminary tasks:**

- Remove [wheels](#).
- Remove and clean [brake pads](#)

**Check minimum brake disc thickness:**

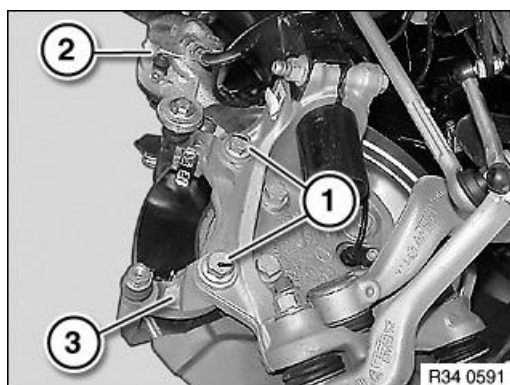
- Position special tool [34 1 280](#) at three measuring points in area (1) and measure.
- Compare measuring result and lowest value with [setpoint value](#).

If the brake discs are replaced, you must also fit new brake pads.

Brake discs may only be replaced in pairs (on each axle).

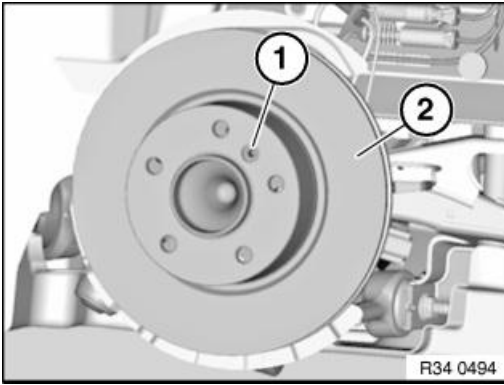
**Important!**

New brake pads may only be fitted if the brake disc thickness is greater than the [minimum brake disc thickness](#) (MIN TH).



Release screws (1), remove brake caliper (2) with brake anchor plate (3) and tie back. *Installation note:* Tightening torque [34 11 2AZ](#).

Check that brake hose is correctly fitted in holder.



Important!

To release brake disc: Do not under any circumstances strike friction ring with a hammer or similar!

If necessary, carefully tap on base of brake disc chamber with a rubber mallet.

Clean contact surface of brake disc at wheel hub thoroughly and remove traces of corrosion.

Unevenness on contact surface may result in distortion of brake disc!

Release screw (1) and remove brake disc (2). *Installation note:*
Replace screw.

Tightening torque [34 11 1AZ](#).



After installation:

- Read and comply with notes on [braking in new brake discs / brake pads](#).

34 00 ... Checking brake discs



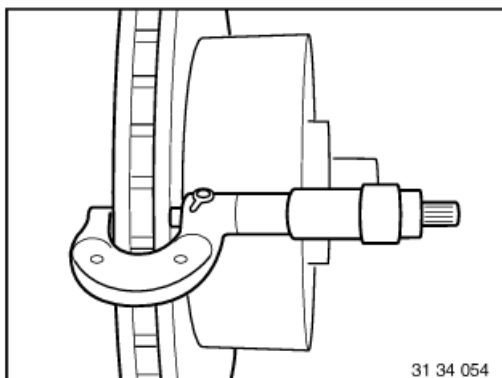
Special tools required:

- [34 1 280](#)



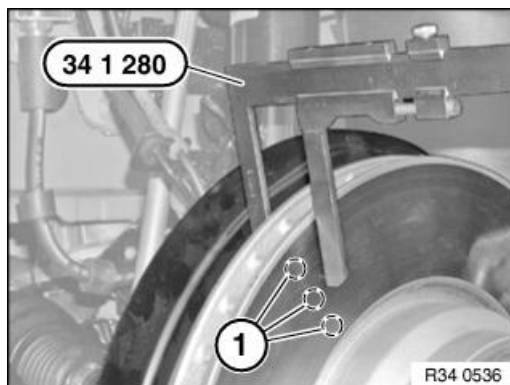
Necessary preliminary work:

- Remove [wheels](#).



Checking thickness difference:

- Measure thickness difference within brake surfaces at 8 point (spread over the circumference) with a micrometer gauge
- Compare measurement result with [setpoint value](#)



Check minimum brake disc thickness:

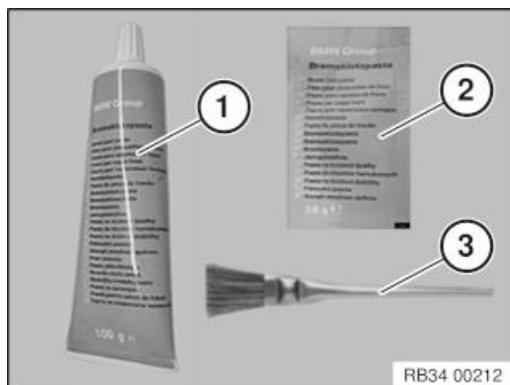
- Position special tool [34 1 280](#) at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with [setpoint value](#)



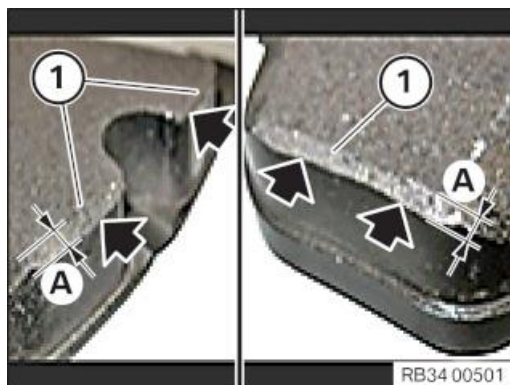
Attention!

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket, but rather clean with brake cleaner BMW TI. Clean number 83 19 2 154 780 and apply a thin coating of BMW TI break pad paste. Coat number 83 19 2 158 851 (3 gr.) or 83 19 2 158 852 (100 gr.).

Spread brake pad paste onto the marked surfaces using a brush!



- (1) Brake pad paste 100 gr. BMW TI. Number 83 19 2 158 852
- (2) Brake pad paste 3 gr. BMW TI. Number 83 19 2 158 851
- (3) Brush for spreading brake pad paste over the marked areas.



Attention!

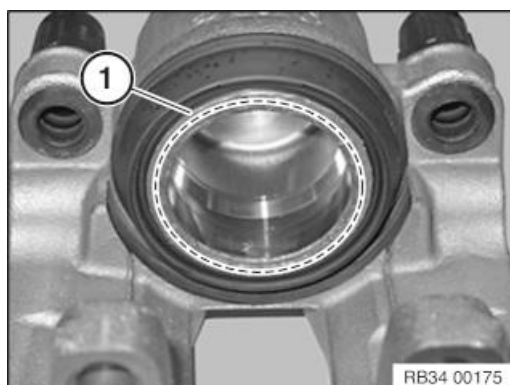
If new brake pads are mounted on a brake disc, the following must be observed:

- Bevel edges in the area (1) slightly (dimension A must not exceed maximum 1 mm).

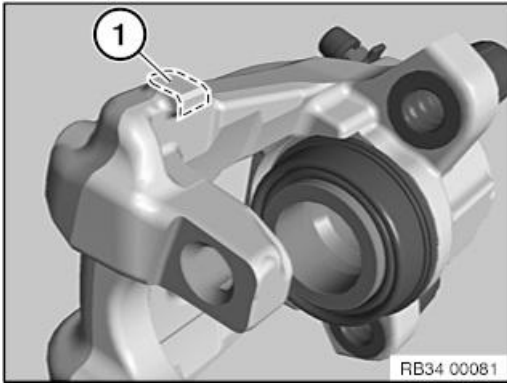
These procedures applies for all the following described brake systems.



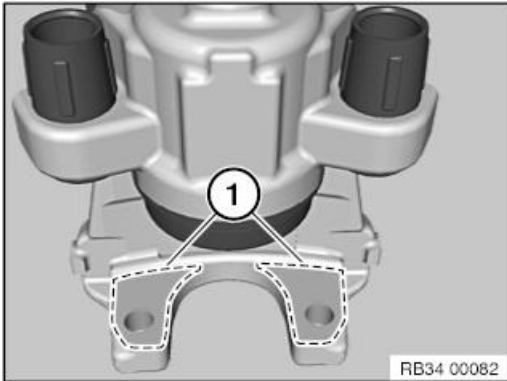
IPS brake (made by CBI), 1-piston floating caliper brake (model ranges: 1-Series, 3-Series, 4-Series, X3)



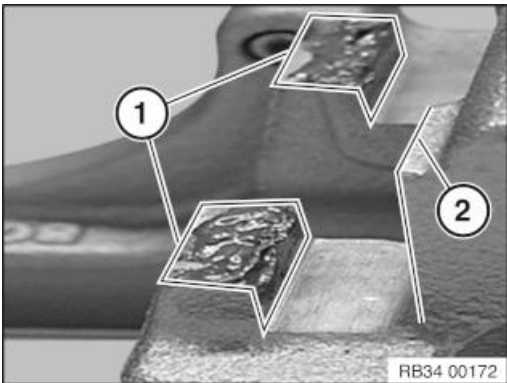
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.



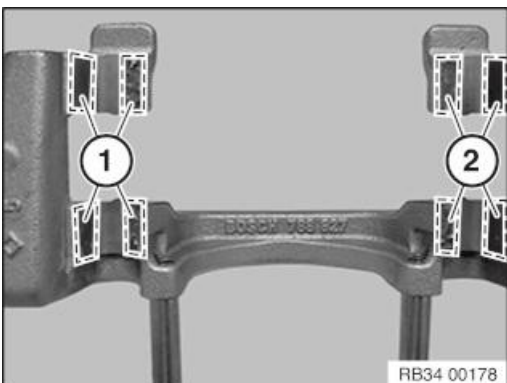
Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.



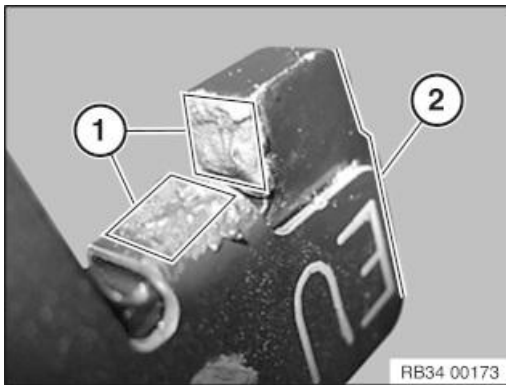
Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.



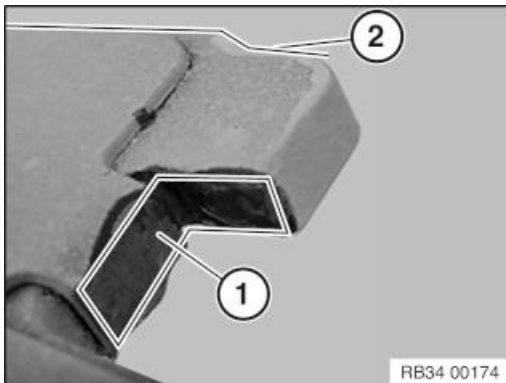
So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



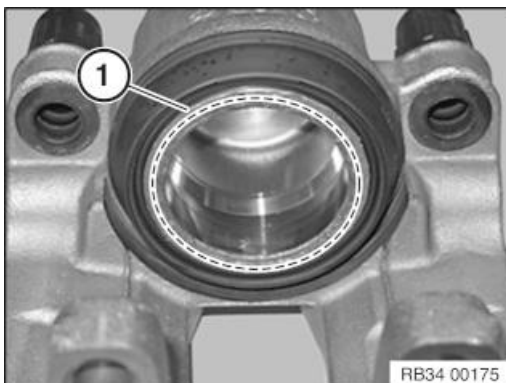
Apply a thin coating of brake pad paste to T-head of inner brake pad in area (1) and (2).



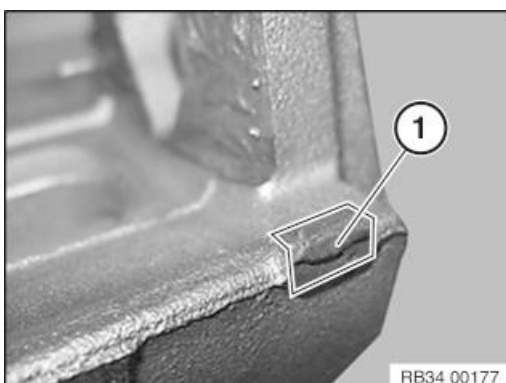
Apply a thin coating of brake pad paste to T-head of outer brake pad in area (1) and (2).



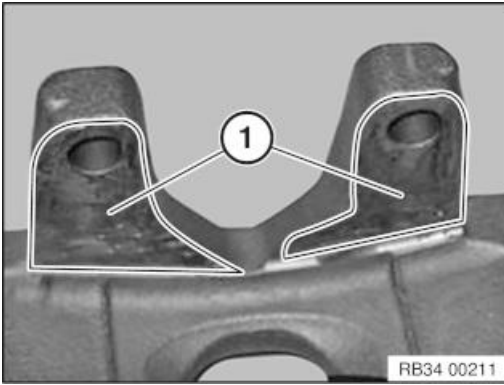
FN brake (made by Continental Teves), 1-piston floating caliper brake (model ranges: 5-Series, 6-Series, 7-Series, 8-Series, X1, X3, X5, Z4, Rolls-Royce)



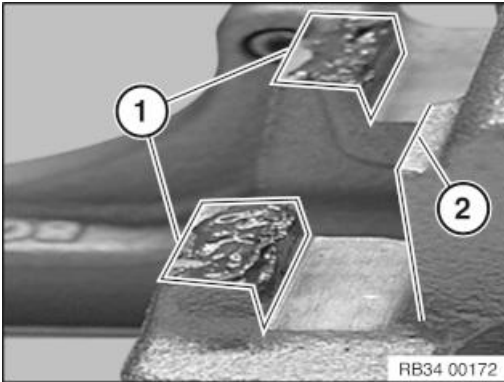
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.



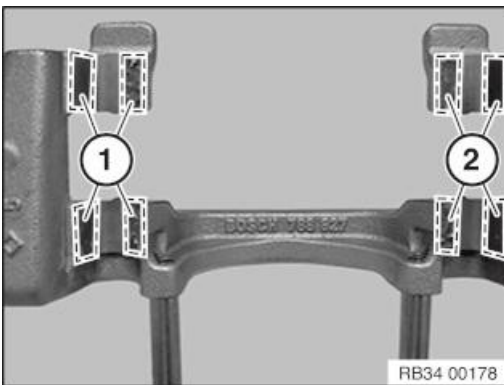
Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.



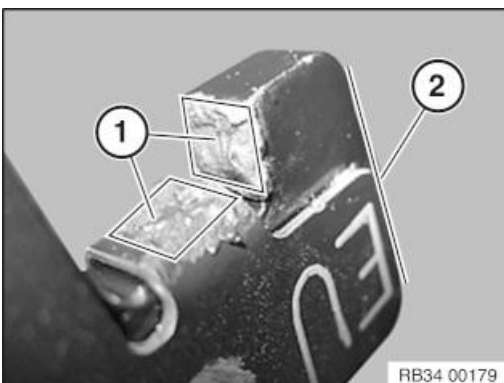
Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.



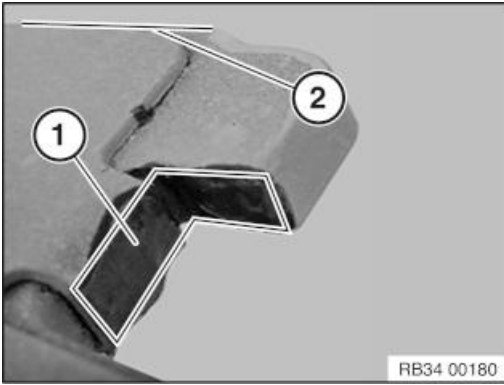
So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1) with brake cleaner and apply a thin coating of brake pad paste.



So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



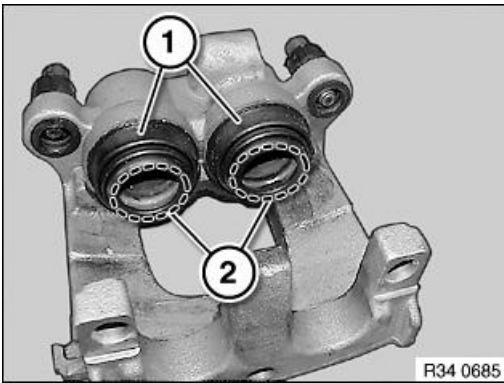
Lightly coat the T-head of the inner brake pad with brake pad paste in area (1 and 2).



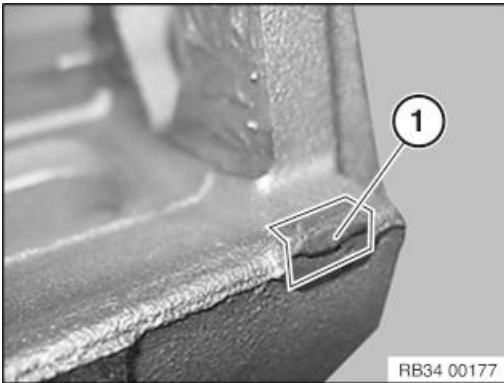
Lightly coat the T-head of the outer brake pad with brake pad paste in area (1 and 2).



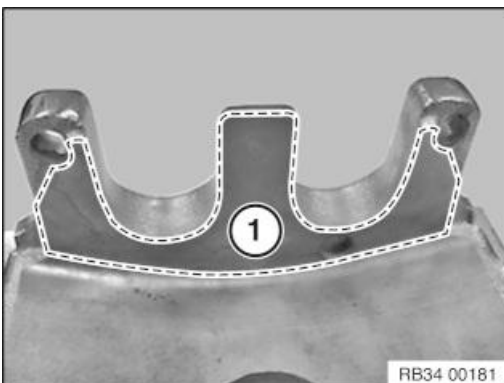
FN brake (made by Continental Teves), 2-piston floating caliper brake (model ranges: 5-Series, 6-Series, 7-Series, 8-Series, X5, Rolls-Royce)



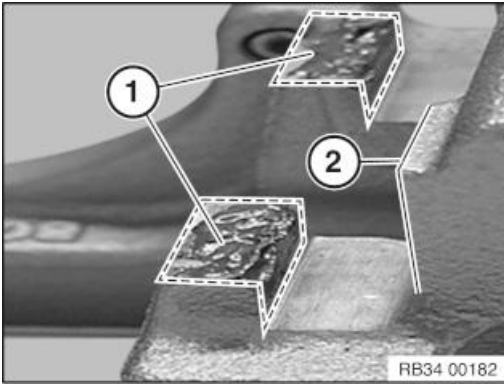
Clean contact surface (2) of brake piston with brake cleaner and apply a thin coating of brake pad paste.



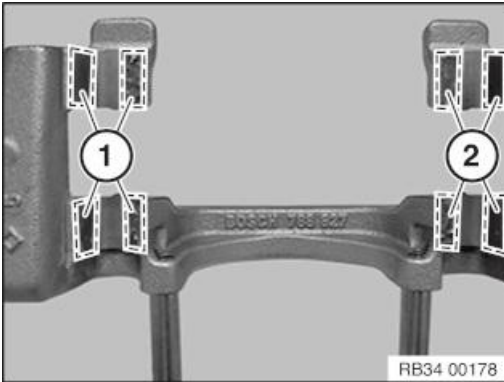
Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.



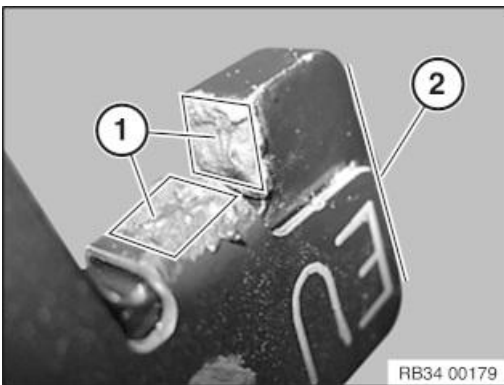
Clean contact surface (1) and brake caliper with brake cleaner and apply a thin coating of brake pad paste.



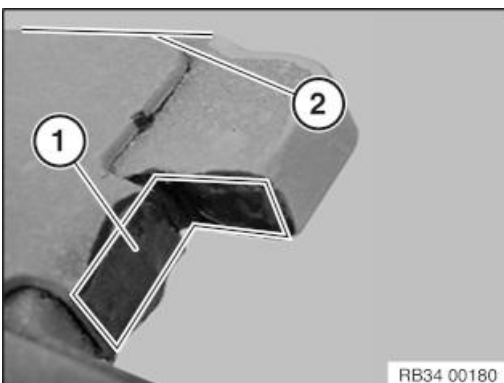
So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



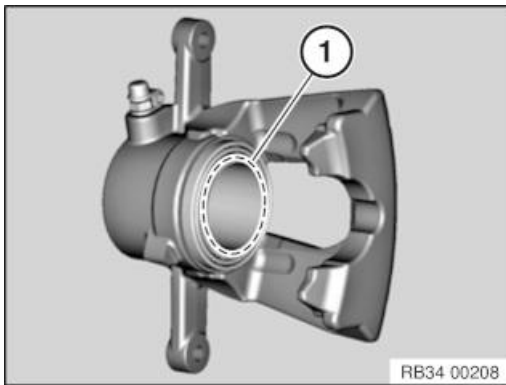
Lightly coat the T-head of the inner brake pad with brake pad paste in area (1 and 2).



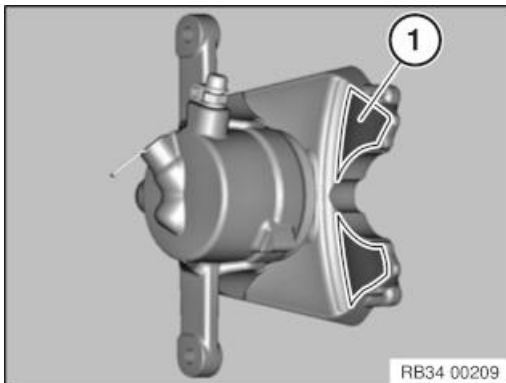
Lightly coat the T-head of the outer brake pad with brake pad paste in area (1 and 2).



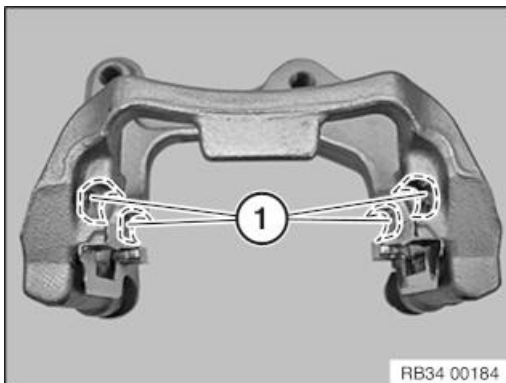
Collette brake (made by TRW), 1-piston brake caliper (model ranges: MINI, 1-Series, 5-Series, 6-Series, Z4)



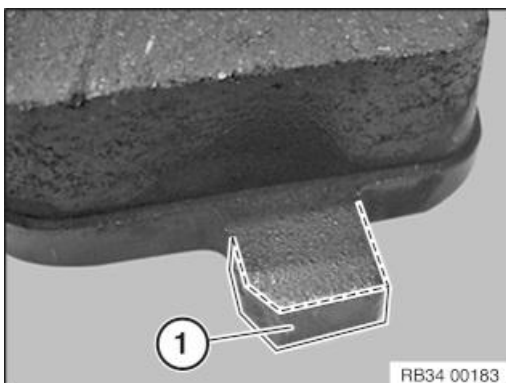
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.



Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.



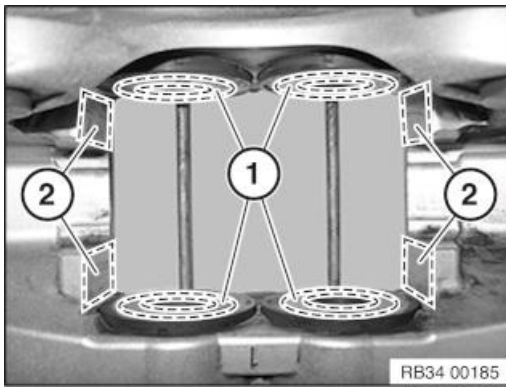
So as not to damage the surface coating, if possible do not mechanically clean the guide surface (1) for the brake pads on the brake caliper mounting bracket. Clean guide surface (1) with brake cleaner and apply a thin coating of brake pad paste.



Apply a thin coating of brake pad paste to both sides of T-head of brake pad in area (1).



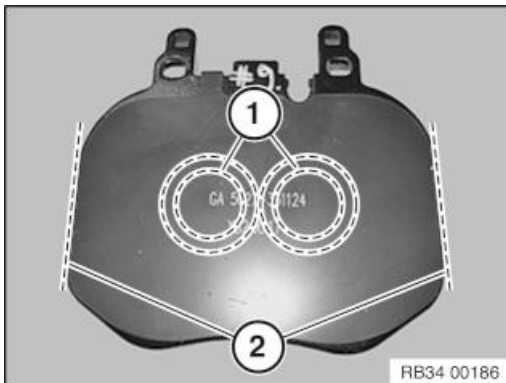
P 4.40 brake (made by Brembo), 4-piston fixed caliper brake (model ranges: MINI, 1-Series, 3-Series, 4-Series, 5-Series, 6-Series, 7-Series, 8-Series, X5, Rolls-Royce)



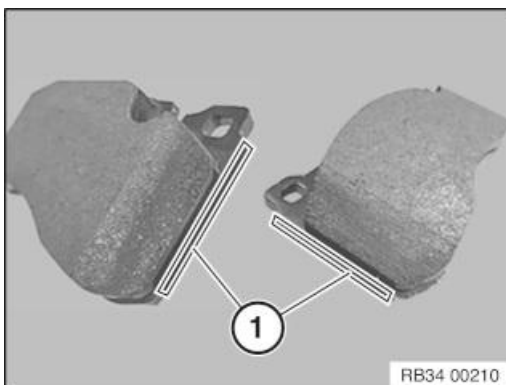
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (2) for the brake pads on the brake calliper mounting bracket. Clean guide surface (2) with brake cleaner and apply a thin coating of brake pad paste.

Clean both inner and outer guide surfaces (2) and apply a thin coating of brake pad paste.



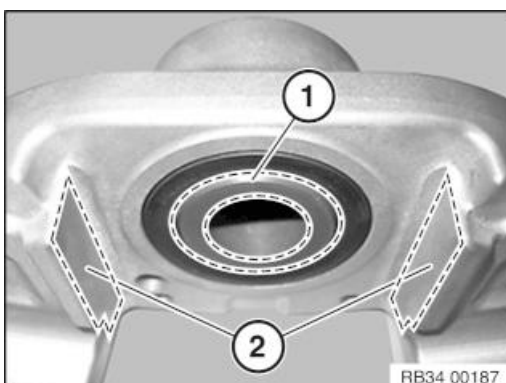
Lightly coat both sides of the contact surface in area (1 and 2) with brake pad paste.



Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.



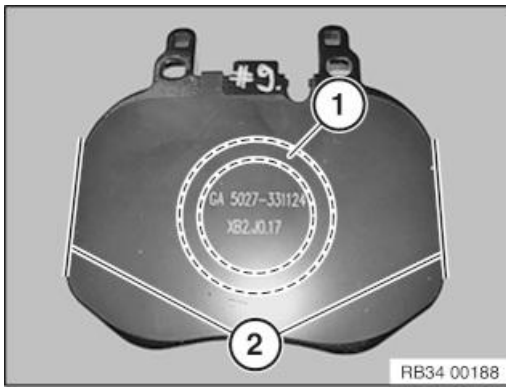
P 4.40 brake (made by Brembo), 2-piston fixed caliper brake (model ranges: 1 Series, 2 Series, 3 Series; does not apply to M2 F87)



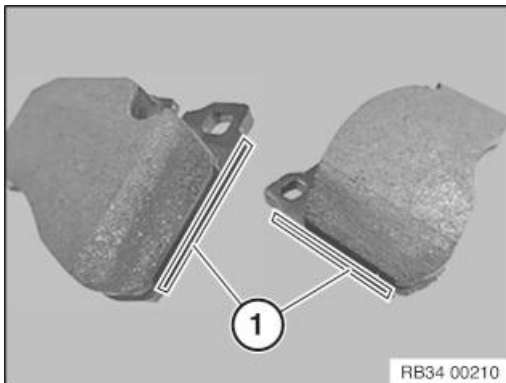
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (2) for the brake pads on the brake calliper mounting bracket. Clean guide surface (2) with brake cleaner and apply a thin coating of brake pad paste.

Clean both inner and outer guide surfaces (2) and apply a thin coating of brake pad paste.



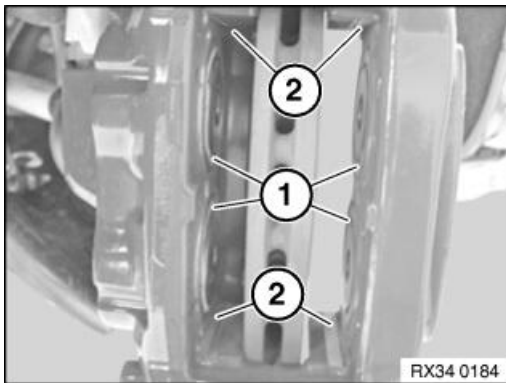
Lightly coat both sides of the contact surface in area (1 and 2) with brake pad paste.



Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.

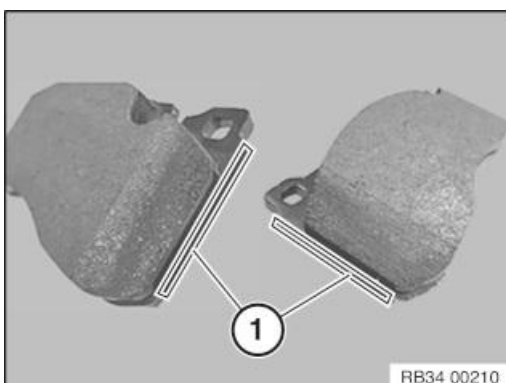


Brake (made by Brembo), 4-piston fixed caliper brake (model ranges: MINI F5x sport brake)



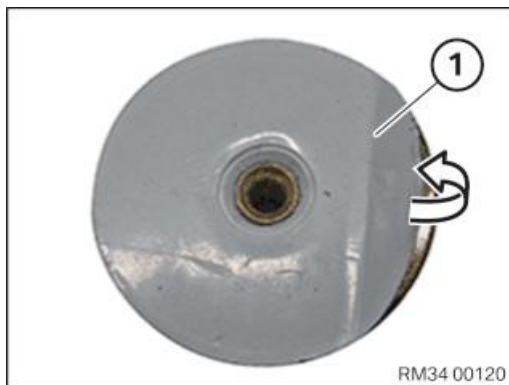
Check dust boot (1) for damage and replace if necessary.

Clean brake caliper compartments (2) and apply a thin coating of brake pad paste.



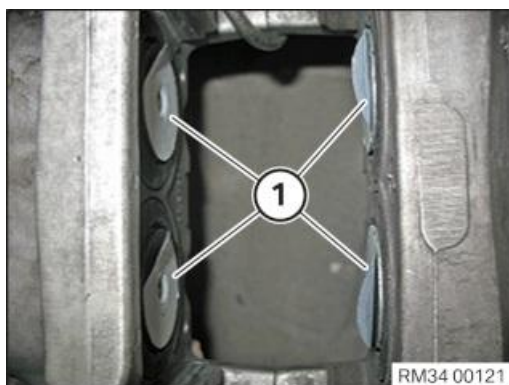
Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.

Do not grease the brake lining backplate and thoroughly clean it with brake cleaner!

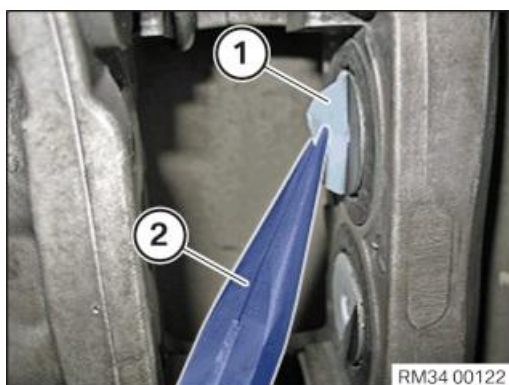


Only use new claw plates!

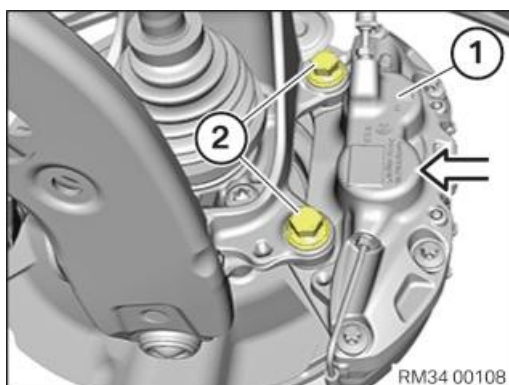
Slightly raise the protective film (1) at a place.



Insert the claw plates (1) into the brake pistons.



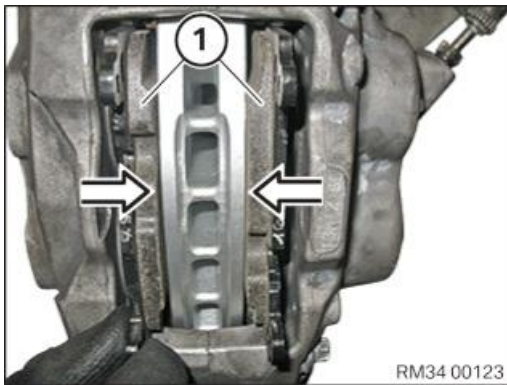
Pull off the protective film (1) with long-nose pliers (2). **Attention!**
The bonding surface of the claw plates must not be touched!



Install the brake caliper (1) in direction of arrow.

Parts: Replace screws (2).

Insert screws (2) and tighten.



Install the brake pad (1). **Attention!**

The brake pads must not touch the bonding surface of the claw plates when inserting!

Apply the brake pads to the brake disc and insert.

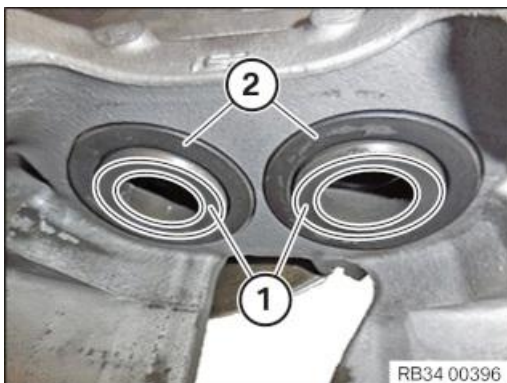


In order to ensure a complete bonding of the claw plates with the brake pads, the following instruction must be strictly adhered to:

Strongly press the brake pedal and hold it for at least 1 min!

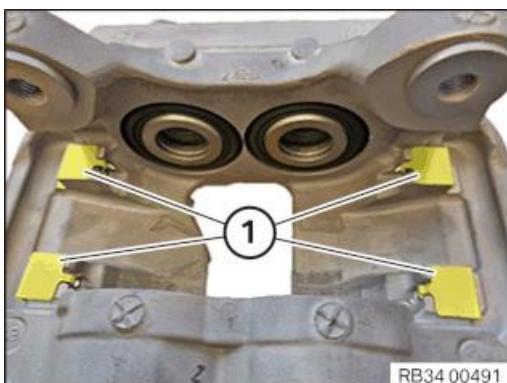


Brake (made by Continental), 4-piston fixed caliper brake (model ranges: 7-Series (G11, G12))



Clean the contact surface (1) of the brake piston (4 pieces) with brake cleaner.

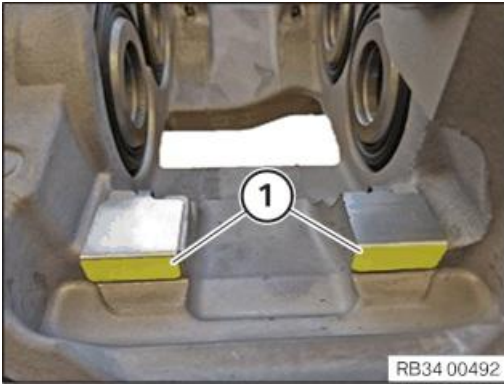
Check the dust boots (2) and renew as necessary.



Always renew retaining plates 1!

Mount retaining plate 1.

It is paramount that the slide panels are correctly positioned in the guides!

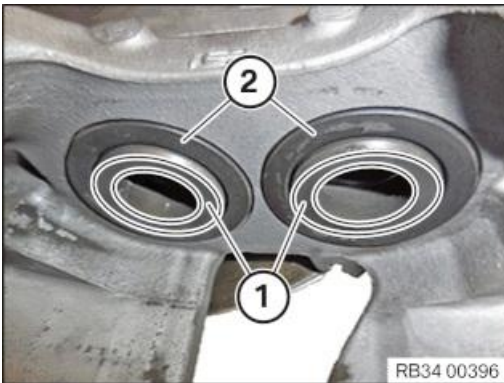


So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket.

Apply a thin layer of brake pad paste to the surfaces of the sliding plates (1).



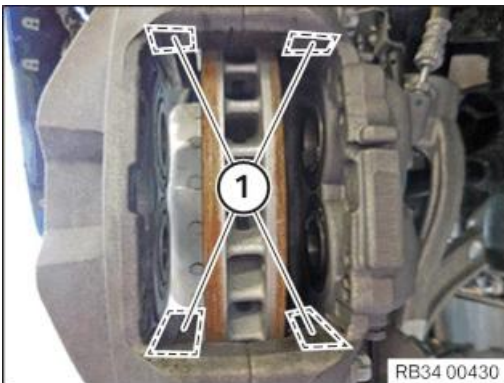
Brake (made by Brembo), 4-piston fixed caliper brake (model ranges: 7-Series (G11, G12))



Clean the contact surface (1) of the brake piston (4 pieces) with brake cleaner.

Adhesive residues must be completely removed.

Check the dust boots (2) and renew as necessary.



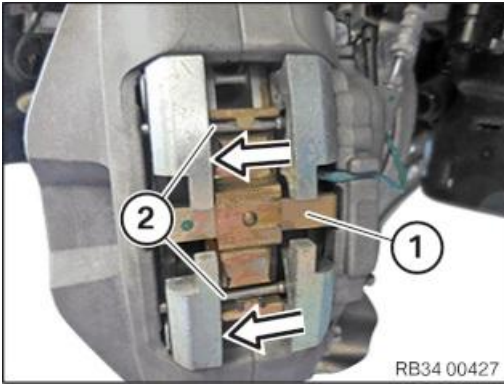
To prevent damage to the surface coating, do not clean the guide surfaces (1) for the brake pads on the brake calliper mechanically, if possible.

Clean guide surfaces (1) with brake cleaner and apply a thin coating of brake pad paste.



Remove the protective film of the adhesive layer (1) from the brake pads.

Do not touch the adhesive layer!



Insert brake pads in the brake caliper, making sure the adhesive layer does not touch the brake pistons.

Fit retaining clip (1).

Drive in the locking pins (2) in the direction of the arrow.

Attention!

After the brake pads have been installed they must immediately be bonded to the brake pistons:

- Step on the brake pedal to the floor and hold the pressure for one minute. This causes the brake pads to adhere to the brake pistons.

**Special tools required:**

- [00 9 316](#)

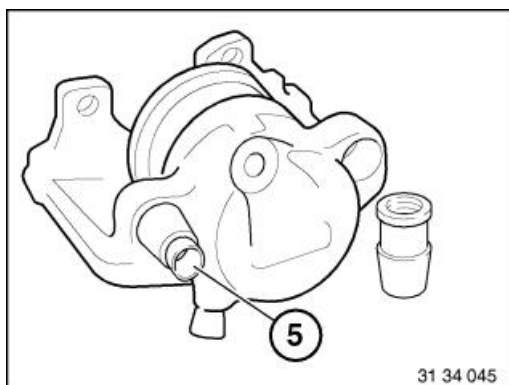
**Warning!**

In the following work step, large forces occur at the brake caliper piston (up to more than 2800 N).

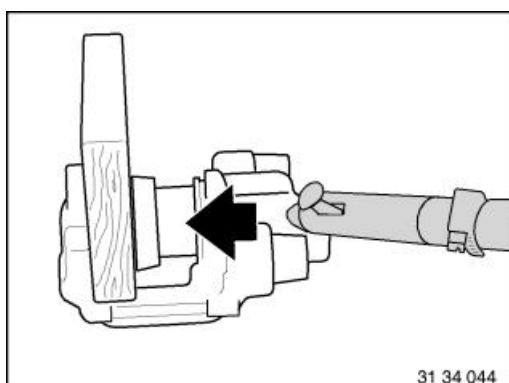
Risk of injury!

**Note:**

Use repair kit,
refer to BMW Parts Department.

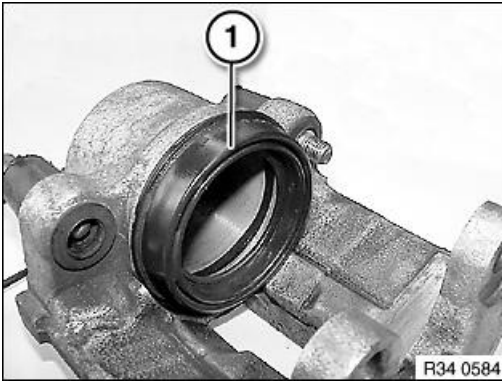


Check guide sleeves (5), fitting repair-kit guide sleeve if necessary.

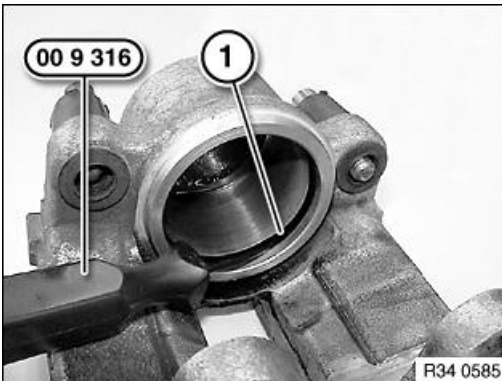


Carefully force piston out through connection bore with compressed air.
To protect piston, place a protective plate (e.g. hard wood or hard felt) in caliper recess.

Do not grip piston with fingers - risk of trapping!



Press off dust sleeve (1).



Carefully remove sealing ring (1) special tool [00 9 316](#).

Clean cylinder bores and parts with alcohol and dry with compressed air.

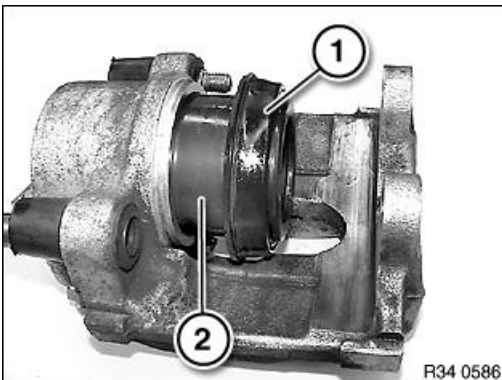
Thoroughly inspect cylinder bore, piston and flange surfaces. Machining of cylinders and pistons is not permitted.

Install new seal.

Installation:

Apply a light coat of [Ate brake cylinder paste](#) to cylinder bore, piston and seal,

refer to BMW Service Operating Fluids.



Fit dust sleeve (1) in annular groove of piston (2).

Press piston into cylinder bore.

Important!

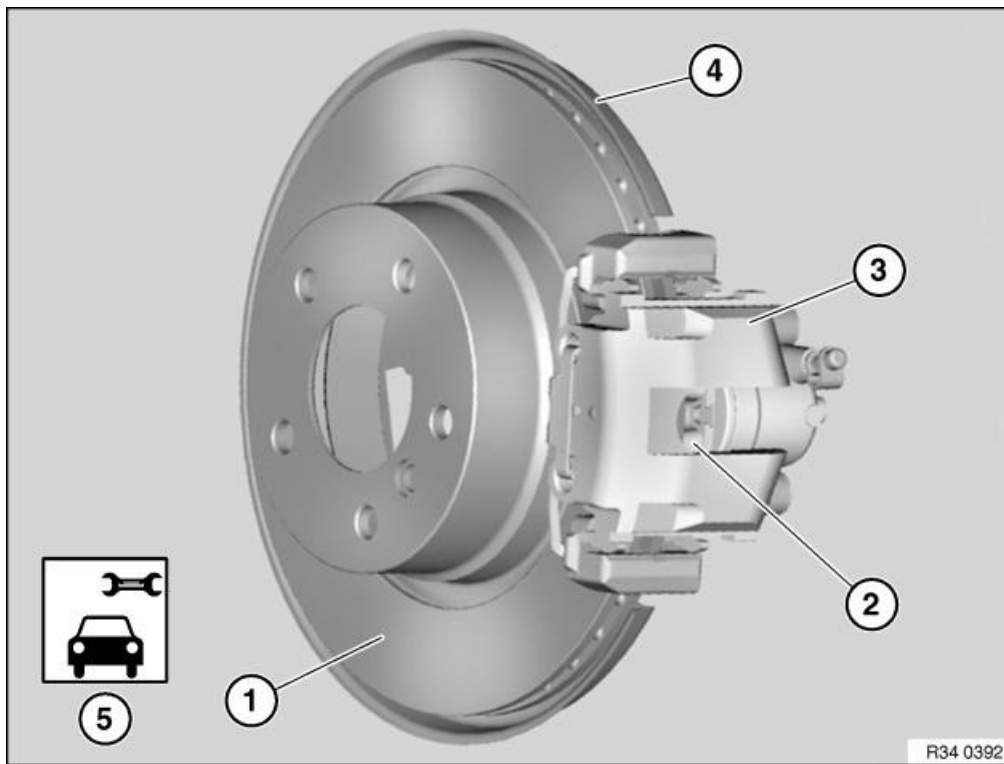
Do not twist brake piston.

Evenly press dust sleeve (1) onto brake caliper housing as far as it will go.

Installation:

The area between the dust sleeve and the brake caliper housing must be kept dry. It must not come into contact with Ate brake cylinder paste or brake fluid so as to ensure that the dust sleeve is perfectly seated.

34 21 ... Overview of rear brake



- 1 [Brake disc](#)
- 2 [Brake pad](#)
- 3 [Brake calliper](#)
- 4 [Brake guard plate](#)
- 5 [Checking thickness of brake pad](#)

**Attention!**

Always precision-turn both sides of both brake discs on one axle.

Observe [Max. machining dimension per friction ring side](#)

[Minimum brake disc thickness \(MIN TH\)](#)

Brake discs of M models (Compound brake discs) must **not** be machined!

Only one brake pad set may be used up on brake discs which have been lathe-turned to [minimum thickness \(MIN TH\)](#).

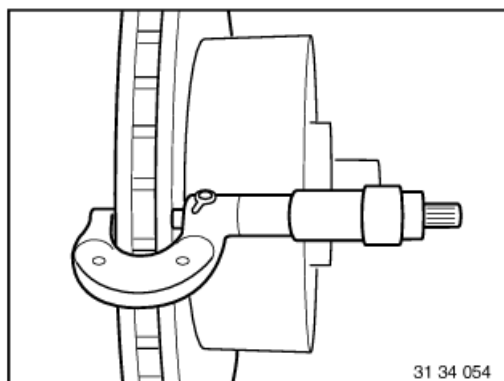
**Mobile brake disc lathe:****Attention!**

Only BMW-approved brake disc lathes may be used!

In the case of mobile brake disc lathes, the [brake caliper](#) and the brake anchor plate must be removed.

The brake discs remain on the vehicle.

Please refer to the equipment manufacturer's operating instructions for the exact procedure.



After fine-grinding the brake discs, measure the [thickness difference](#) inside the braking surfaces at 8 points with a caliper gauge.

34 21 200 Removing and installing or replacing brake pads on both rear disc brakes (Teves floating caliper)



Special tools required:

- [34 1 050](#)
- [34 1 280](#)
- [2 352 960](#)



Caution!

- **Brake pad wear sensor:** After removal it must be replaced (brake pad wear sensor loses its retention capability in the break pad).
- **Retaining pin and expanding spring:** for vehicles older than 48 months it is recommended to replace the retaining spring!

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket, but rather clean with brake cleaner BMW TI. number 83 19 2 154 780 and apply a thin coating of brake pad paste BMW TI. number 83 19 2 158 851 (3 gr.) or 83 19 2 158 852 (100 gr.).

Spread brake pad paste onto the marked surfaces using a brush!

Observe [regulation on applying brake pad paste to brake pads and brake anchor plates](#)!



Caution!

European version only.

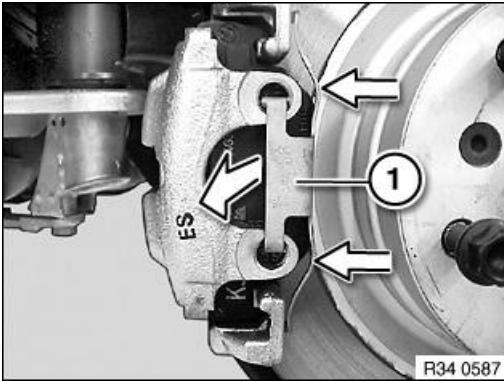
Sport brake pads for M3:

- Due to the increased strain on the brake discs, we recommend that you also replace the [brake discs](#) when fitting a new set of brake pads
- It is absolutely essential to exchange the [brake discs](#) if cracked ≥ 13 mm even before the brake pad is worn

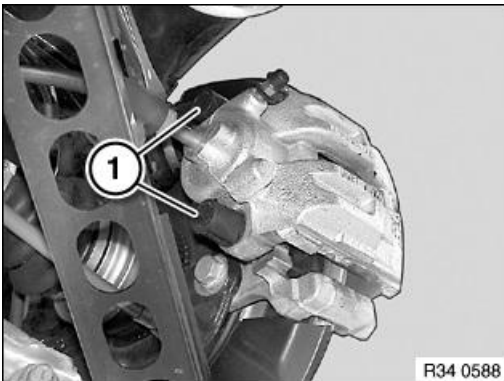


Necessary preliminary work:

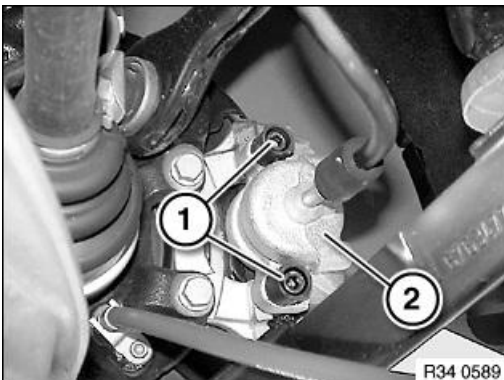
- Remove [wheels](#).
- Remove [brake pad wear sensor](#)



Lift out retaining spring (1).



Remove cover plug (1).



Caution!

Tie brake calliper back and do not allow to hang from brake hose.

Unscrew guide bolts (1).

Remove brake caliper (2) by pulling forward.

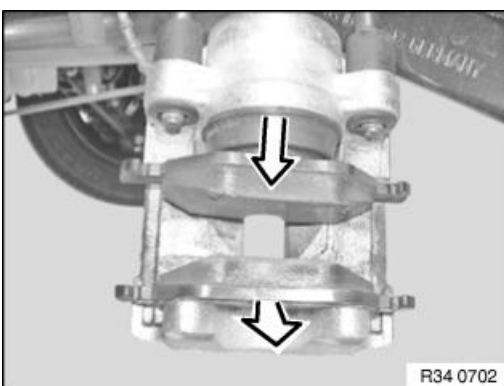
Installation note:

Tightening torque [34 21 4AZ](#).

Clean guide screws only; do not grease.

Check threads.

Replace all guide screws which are not in perfect condition.



Remove outer brake pad.

Inner brake pad is located with its spring in the piston.

Caution!

Mark any worn brake pads.

In the event of one-sided brake pad wear, do not change brake pads round.

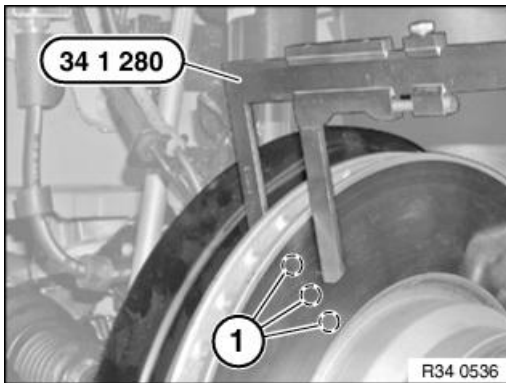
Clean brake pads.

Do not grease backs of brake pads sleeve.



Press back brake pads and piston with special tool [2 352 960](#). **Caution!**
When forcing piston back:

- Pay attention to brake fluid level in expansion tank; brake fluid that spills over will damage paintwork.



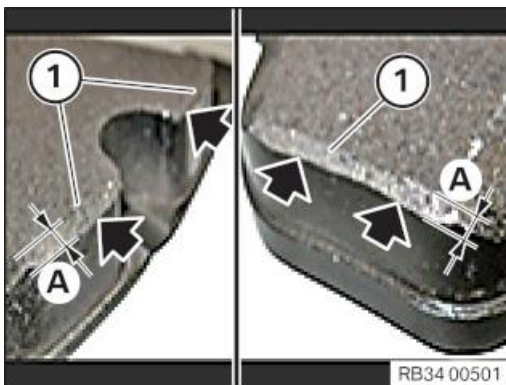
Check minimum brake disc thickness:

- Position special tool [34 1 280](#) at three measuring points in area (1) and measure.
- Compare measuring result and lowest value with [setpoint value](#).



Caution!

New brake pads may only be installed if the brake disk thickness is greater than the [minimum brake disc thickness](#).

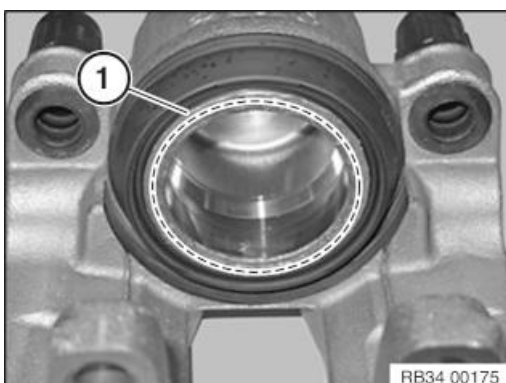


Caution!

If new brake pads are mounted on a brake disc, the following must be observed:

- Bevel edges in the area (1) slightly (dimension A must not exceed maximum 1 mm).

These procedures applies for all the following described brake systems.

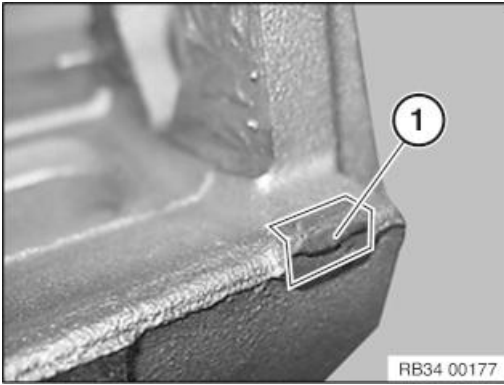


Check dust boot for damage and renew if necessary.

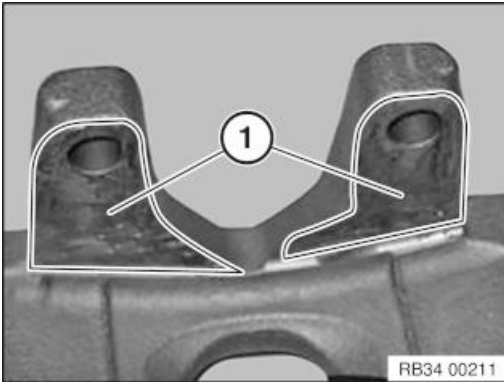
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

Caution!

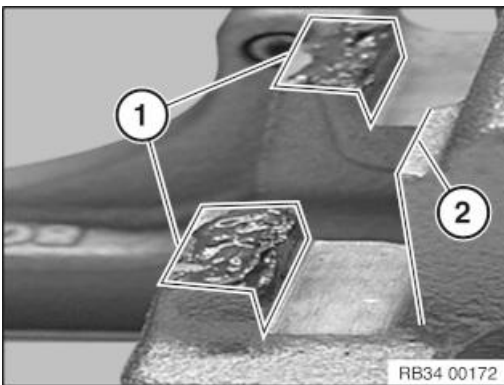
Dust boot must not come into contact with brake pad paste as this may cause the dust boot to swell.



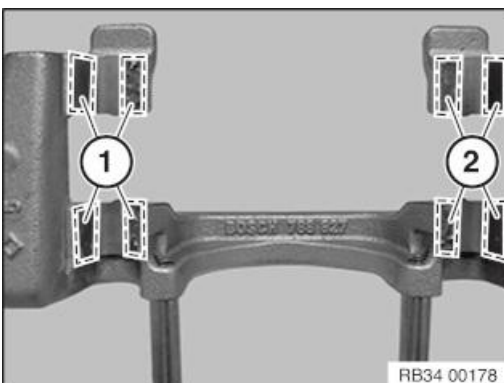
Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.



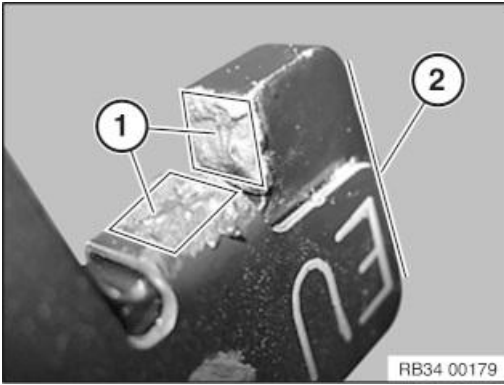
Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.



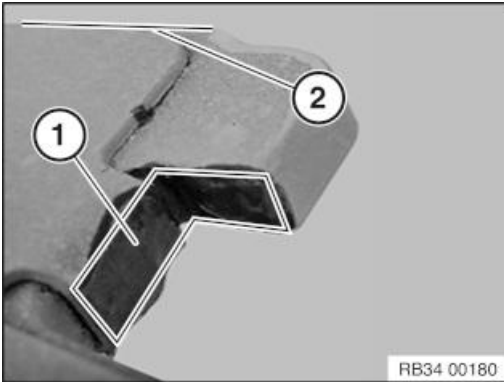
So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1) with brake cleaner and apply a thin coating of brake pad paste.



So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



Lightly coat the T-head of the inner brake pad with brake pad paste in area (1 and 2).



Lightly coat the T-head of the outer brake pad with brake pad paste in area (1 and 2).



Note:

After completing repair work:

- Fully depress brake pedal several times so that brake pads contact brake discs.
- When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking.
- Read and comply with notes on [braking in new brake discs / brake pads](#).
- When exchanging brake pads, reset CBS display in accordance with factory specification.



Important!

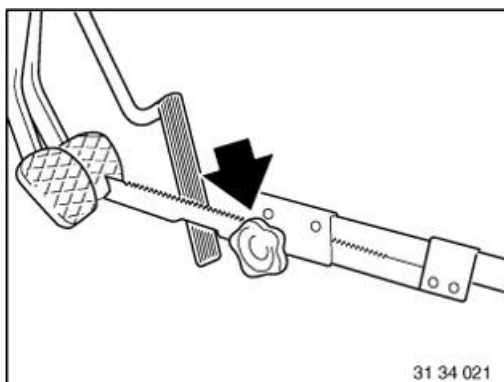
The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).



Necessary preliminary tasks:

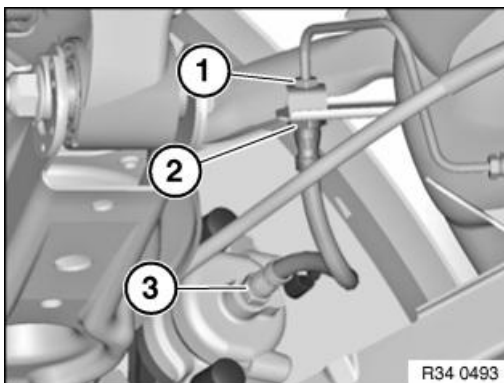
- Remove [wheel](#)
- Read and comply with [General Information](#).

After completing work: [Bleed brake system](#).



Press brake pedal down to floor and secure with pedal support. *Note:* The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



Important!

Grip brake hose at square head (2) so that connecting piece can not rotate in retaining bracket.

Disconnect brake hose from brake line (1).

Installation note:

Tightening torque [34 32 1AZ](#).

Detach brake hose from brake caliper (3).

Installation note:

Tightening torque [34 32 3AZ](#).



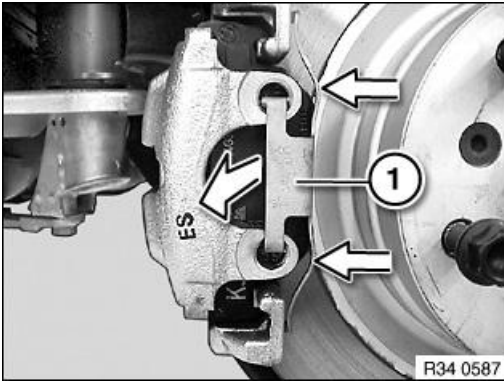
Important!

Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

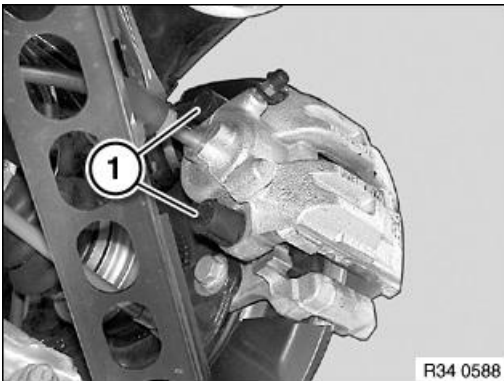
Note:

First tighten brake hose on brake caliper.

Insert brake hose in bracket and screw onto brake pipe.



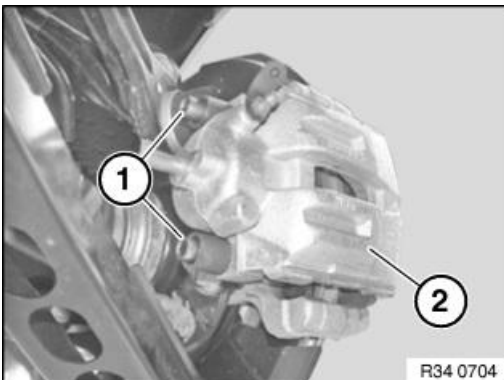
Lift out retaining spring (1).



Remove cover plug (1).

Pull brake pad wear sensor out of brake pad (right side only).

If necessary, replace brake pad wear sensor.



Unscrew guide bolts (1).

Remove brake caliper (2) by pulling forward.

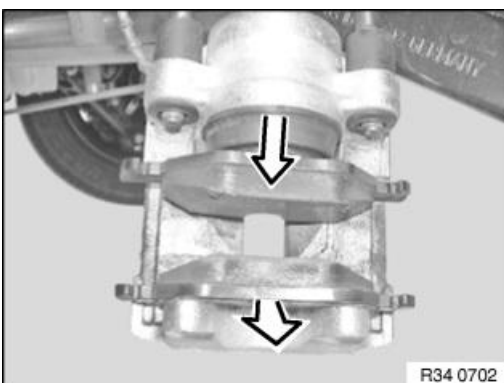
Installation note:

Tightening torque [34 21 4AZ](#).

Clean guide screws only; do not grease.

Check threads.

Replace all guide screws which are not in perfect condition.



Important!

Mark any worn brake pads.

In the event of one-sided brake pad wear, do not change brake pads round.

Remove outer brake pad.

Inner brake pad is located with its spring in the piston.

Clean brake pads.

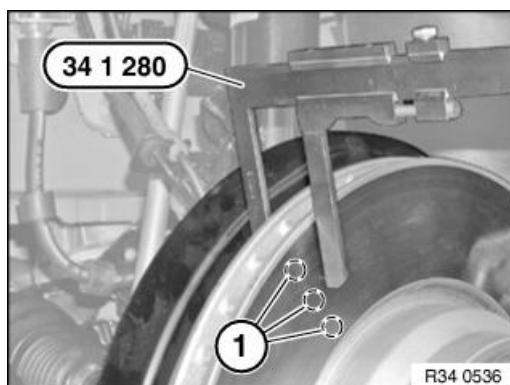
Do not grease backs of brake pads sleeve.

**Special tools required:**

- [34 1 280](#)

**Necessary preliminary tasks:**

- Remove [wheels](#).
- Remove and clean [brake pads](#)

**Check minimum brake disc thickness:**

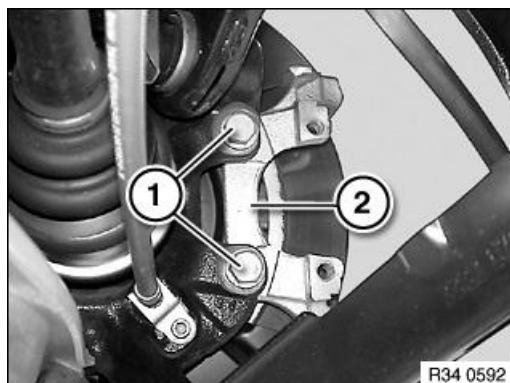
- Position special tool [34 1 280](#) at three measuring points in area (1) and measure.
- Compare measuring result and lowest value with [setpoint value](#).

If the brake discs are replaced, you must also fit new brake pads.

Always replace brake discs in pairs.

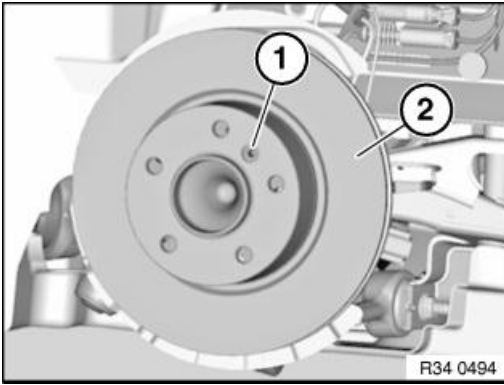
**Important!**

New brake pads may only be fitted if the brake disc thickness is greater than the [minimum brake disc thickness](#) (MIN TH).



Release bolts (1) and detach brake anchor plate. *Installation note:*
Replace screws.

Tightening torque [34 21 2AZ](#).



Important!

To release brake disc: Do not under any circumstances strike friction ring with a hammer or similar!

If necessary, carefully tap on base of brake disc chamber with a rubber mallet.

Clean contact surface of brake disc at wheel hub thoroughly and remove traces of corrosion.

Unevenness on contact surface may result in distortion of brake disc!

Release screw (1) and remove brake disc (2). *Installation note:*
Replace screw.

Tightening torque [34 21 1AZ](#).

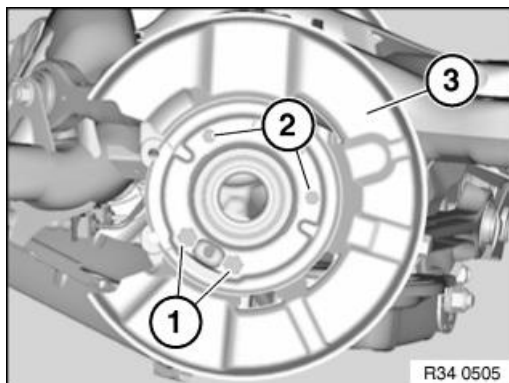


After installation:

- Adjusting [parking brake](#)
- Read and comply with notes on [braking in new brake discs / brake pads](#).

**Necessary preliminary tasks:**

- Remove [expander lock](#)
- Remove [wheel hub](#)



Release screws (1).

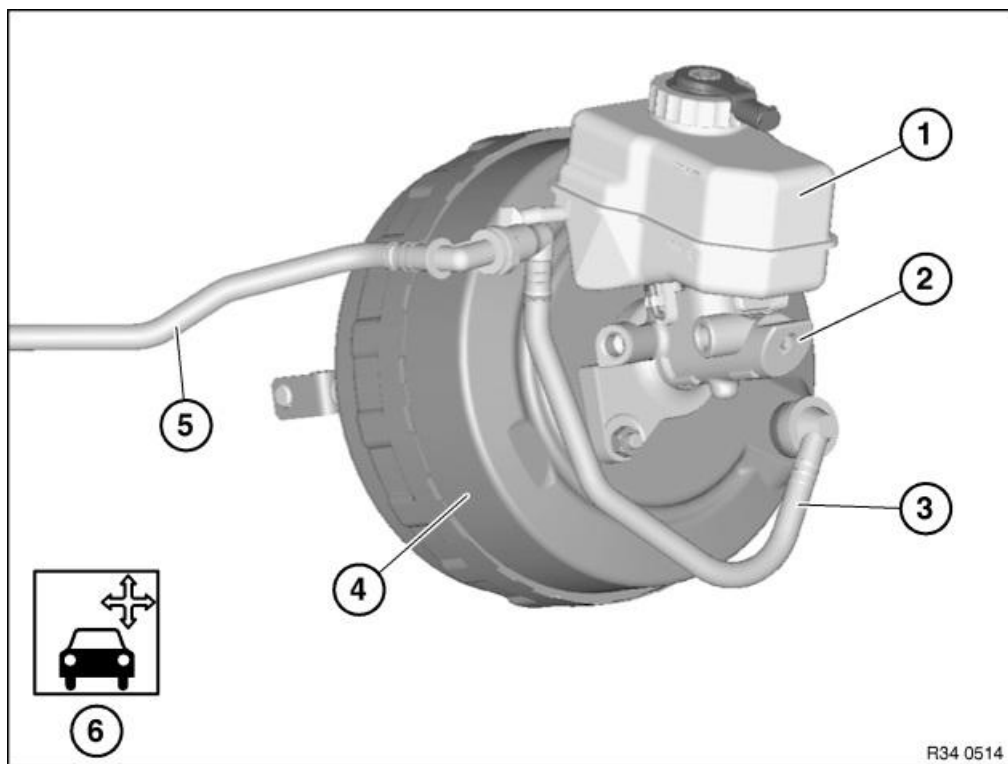
Installation:

Tightening torque [34 21 3AZ](#).

Release screws (2) and remove brake carrier (3).

Installation:

Tightening torque [34 21 3AZ](#).



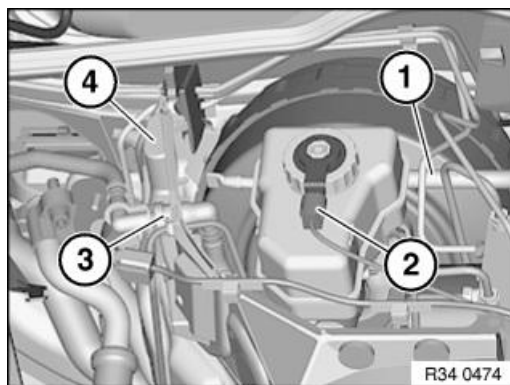
- | | |
|---|--|
| 1 Expansion tank | 4 Brake servo |
| 2 Brake master cylinder | 5 Vacuum hose |
| 3 Non-return valve | 6 Bleed braking system |

34 31 181 Removing and installing / replacing expansion tank for hydraulic brake actuation



Necessary preliminary tasks:

- Read and comply with [General Information](#).
- Remove [lower section of microfilter housing](#)



Note:

Extract brake fluid out of expansion tank. Use a suction bottle used exclusively for drawing off brake fluid.

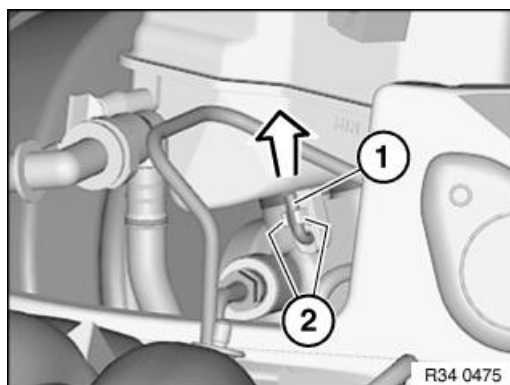
Do not reuse drawn out brake fluid.

Pull off supply hose (1) of clutch hydraulic system if necessary.

Unfasten plug connection (2) and disconnect.

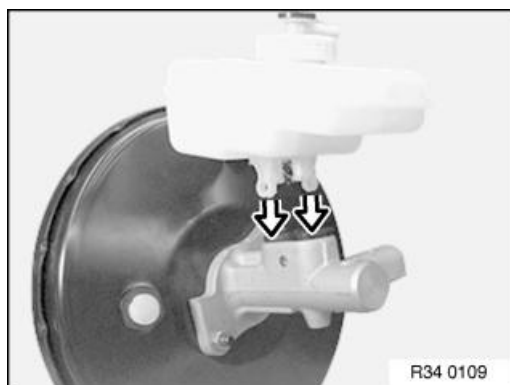
Unlock quick-release fastener (3) and disconnect vacuum line.

Feed brake line out of rubber grommet and remove cover (4).



Unclip locking pin (1) from retaining lugs (2) and pull out locking pin.

Pull expansion tank in direction of arrow vertically out of brake master cylinder.



Important!

Check rubber plug in brake master cylinder for damage and replace if necessary.

Push the expansion tank vertically onto the master brake cylinder.



After installation:

- [Bleed braking system](#)

**Special tools required:**

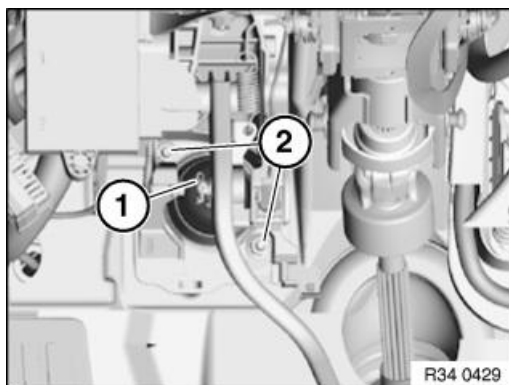
- [32 1 270](#)

**Necessary preliminary work:**

- Remove [expansion tank](#).
- Remove [footwell trim](#).
- Read and comply with [General Information](#).

Important!

Before beginning work, fully press the brake pedal several times to reduce the vacuum pressure in the brake servo.

**Important!**

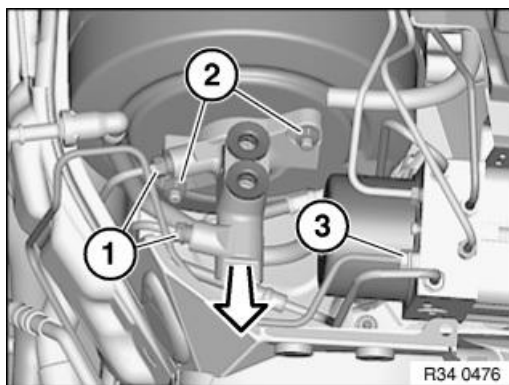
The brake servo must be slackened so that the brake master cylinder can be removed and installed without tilting!

Remove retaining clip (1) and disengage and pull out locking pin. Slacken nuts (2).

Installation note:

Replace self-locking nuts.

Tightening torque [35 11 1AZ](#).

**Important!**

Do not bend brake lines.

Unfasten brake lines (1).

Installation note:

Tightening torque [34 32 1AZ](#).

Close off brake lines and brake master cylinder with seal plugs [32 1 270](#).

If necessary, detach line (3) from hydraulic unit and press downwards slightly.

Installation note:

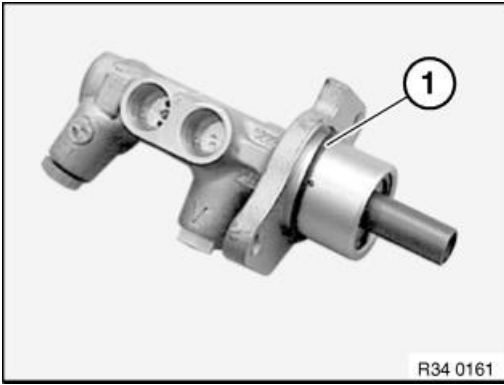
Tightening torque [34 32 1AZ](#).

Release nuts (2) and feed brake master cylinder out of brake booster.

Installation note:

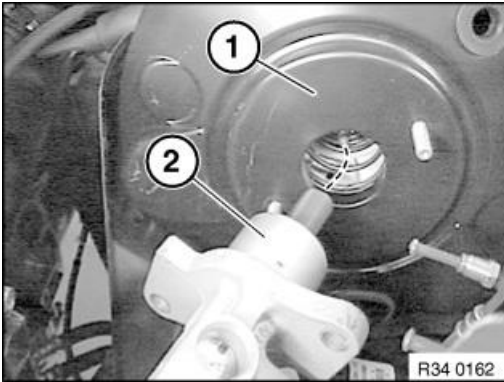
Replace self-locking nuts.

Tightening torque [34 31 1AZ](#).



Installation note:

Replace sealing ring.



Installation note:

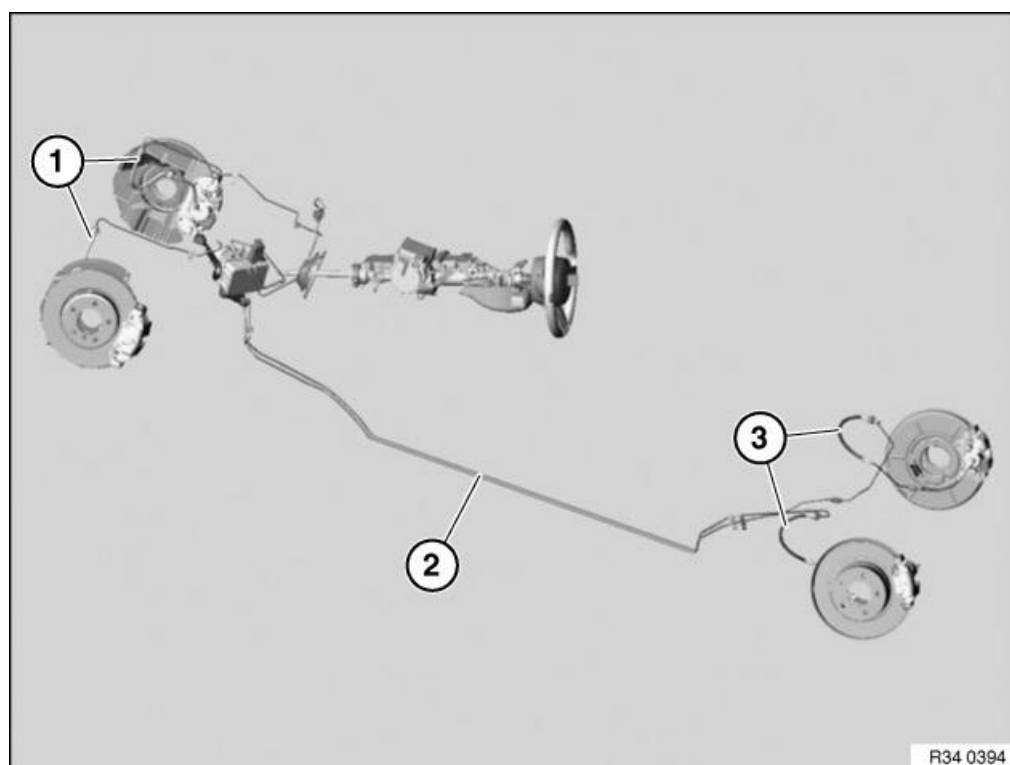
When inserting the brake master cylinder (2) into the brake booster (1), make sure the pressure rod of the brake booster and that of the brake master cylinder meet each other on one level.



After installation:

- [Bleeding brake system with DSC](#)

34 32 ... Overview of brake lines



1 [Brake hose, front](#) 3 [Brake hose, rear](#)

2 [Brake tubes](#)

**Special tools required:**

- [34 5 100](#)

**Note:**

The brake lines are only supplied in the straight version and correct length with connecting nipple.

Read and comply with [General Information](#).

After completing work, [bleed brake system](#).

[Observe safety instructions on raising the vehicle](#).



The new brake lines are bent into shape with bending tool [34 5 100](#).

Removed brake lines can be used as templates for bending.

Important!

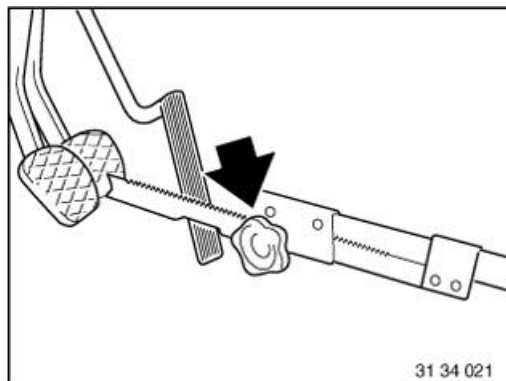
- Protective coating of brake line must not be damaged during bending.
- Do not kink or bend back brake lines.
- Watch distances to rigid and movable vehicle parts.
 - Minimum of 5 mm to vehicle components fixed rigidly to body.
 - Minimum of 10 mm to moving vehicle components.
 - Minimum of 10 mm to vehicle components fixed rigidly to body, if brake line is fastened to moving vehicle components (e.g. axle support).
- Brake lines may not make contact or rub.
- Tighten down brake line couplings with torque wrench.

Installation note: Tightening torque [34 32 1AZ](#).

**Note:**

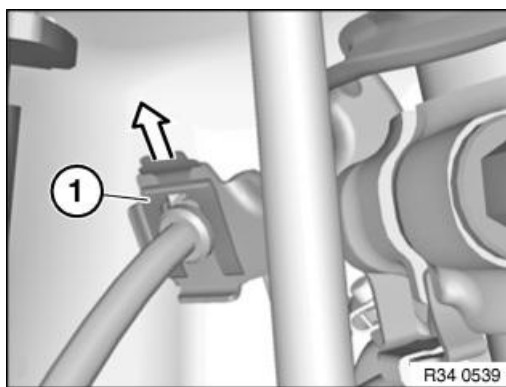
Read and comply with [General Information](#).

After completing work: [Bleed brake system](#).



Press brake pedal down to floor and secure with pedal support. *Note:* The pedal support may only be released when the brake lines are reconnected.

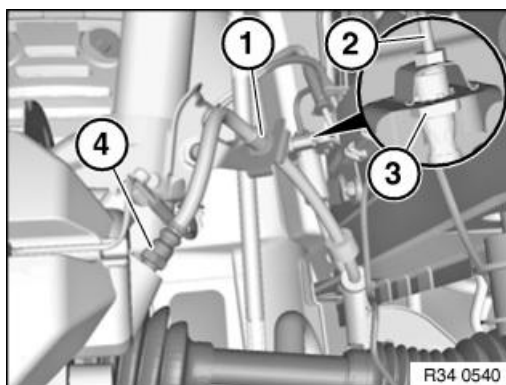
This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



Detach clamp (1) from holder on spring strut in top direction. *Installation note:*

clamp (1) must be felt and heard to snap into place.

Ensure correct fit in guide.



Pull brake hose out of holder (1).

Important!

Grip brake hose at square head (3) to prevent connecting piece from turning in retaining bracket.

Detach brake hose from brake line (2).

Installation note:

Tightening torque [34 32 1AZ](#).

Detach brake hose from brake caliper (4).

Installation note:

Tightening torque [34 32 2AZ](#).

**Important!**

First tighten brake hose on brake caliper.

Move wheels into straight-ahead position.

Insert brake hose in bracket and screw onto brake line.

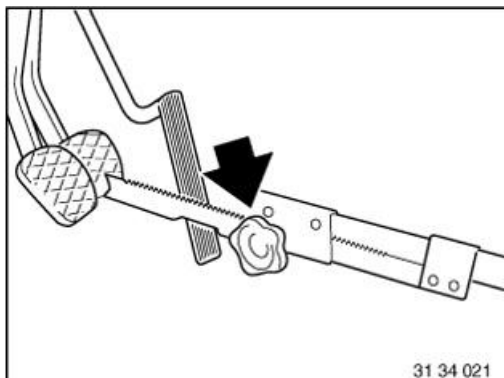
Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.



Note:

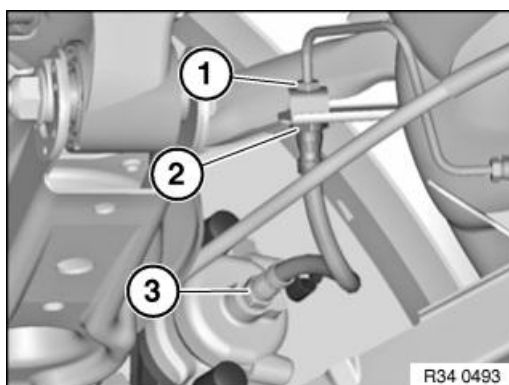
- Read and comply with [General Information](#).

After completing work: [Bleed braking system](#)



Press brake pedal down to floor and secure with pedal support. *Note:* The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



Important!

Grip brake hose at square head (2) so that connecting piece can not rotate in retaining bracket.

Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

Disconnect brake hose from brake line (1).

Installation note:

Tightening torque [34 32 1AZ](#).

Detach brake hose from brake caliper (3).

Installation note:

Tightening torque [34 32 3AZ](#).



Installation note:

First tighten brake hose on brake caliper.

Insert brake hose in bracket and screw onto brake pipe.



Special tools required:

- [34 3 170](#)



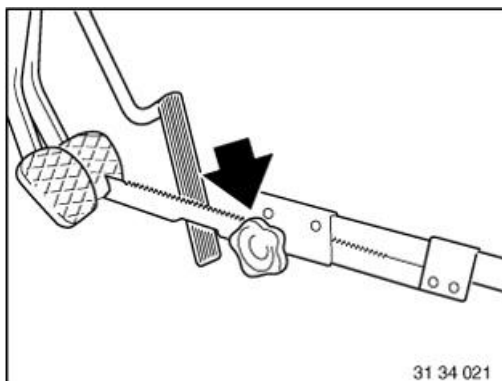
Necessary preliminary tasks:

- Remove [rear left wheel](#)

Note:

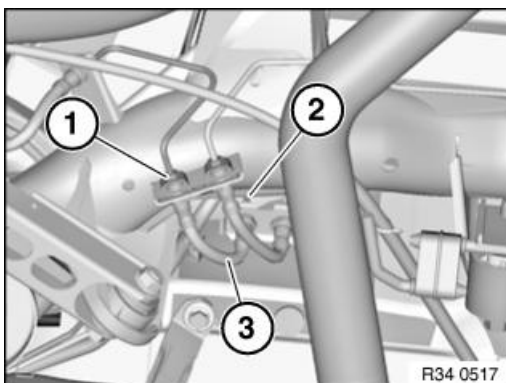
Read and comply with [General Notes](#).

After completing work: [Bleed brake system](#).



Press brake pedal down to floor and secure with pedal support. *Note:* The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



Important!

Grip brake hose at square drive to prevent connector from turning in retaining bracket.

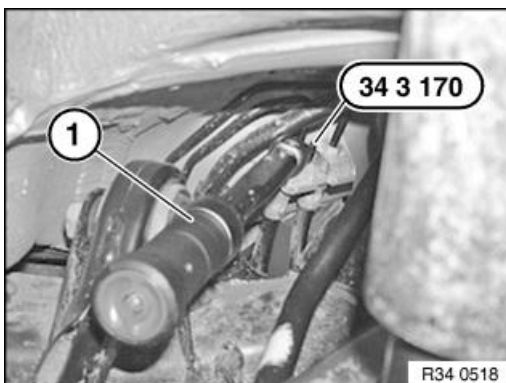
Never twist brake hose (3) when installing it and avoid all contact with parts attached rigidly to the body.

Disconnect brake hose from brake line (1).

Detach brake hose from brake line (2) and remove brake hose (3).

Installation note:

Tightening torque [34 32 1AZ](#).



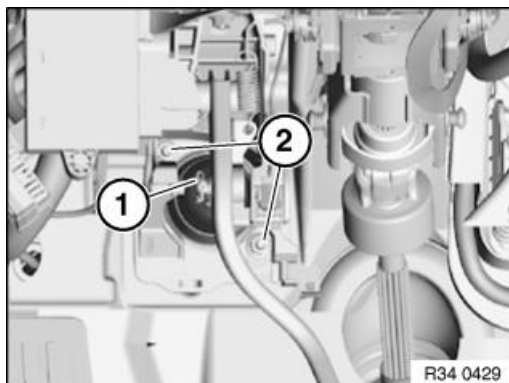
Installation note:

Use torque wrench (Hazet 6282--1CT with reversible ratchet head).

Tighten brake line using torque wrench (1) and special tool [34 3 170](#).

**Necessary preliminary tasks:**

- Read and comply with [General Information](#).
- Remove [brake master cylinder](#)
- Remove [hydraulic unit](#)
- Remove left [footwell trim](#)



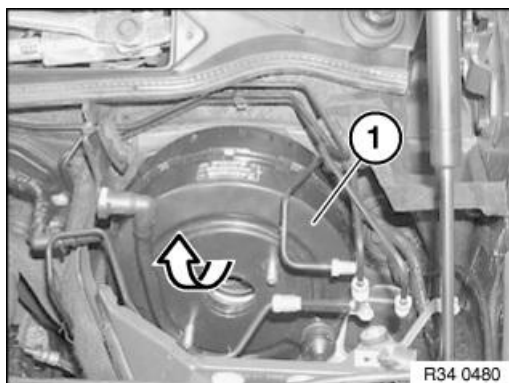
Detach locking clip (1) from brake pedal, disengage and pull out locking pin.

Unscrew nuts (2).

Installation:

Replace self-locking nuts.

Tightening torque [35 11 1AZ](#).

**Important!**

Do not use any force when removing and installing the brake unit; the brake unit can be damaged under certain circumstances.

Brake lines must not be bent.

Carefully pull brake booster (1) out of bulkhead and tilt out.

If necessary, disengage brake line from holder on bulkhead and press slightly to one side.

Replacement:

Modify [non-return valve](#).



Necessary preliminary tasks:

- Read and comply with [General Information](#).
- Remove [hydraulic unit](#)

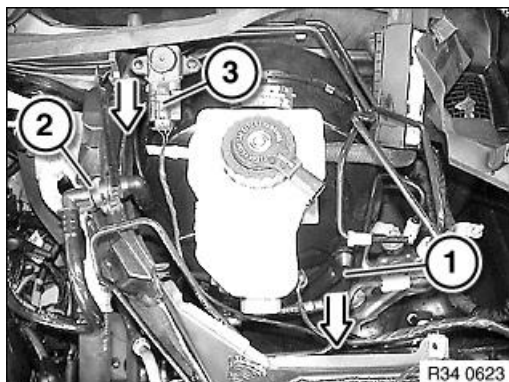
Important!

- If a rubber vacuum hose is fitted, it can be replaced individually.
- If a plastic vacuum line is fitted, it can only be replaced as a single unit together with the non-return valve.



Note:

Before beginning work, fully press the brake pedal several times to reduce the vacuum pressure in the brake servo. This makes it easier to remove the non-return valve.



Remove non-return valve (1) from brake servo.

Unlock quick-release coupling (2) and detach vacuum line.

If necessary, disconnect plug connection (3) and remove differential pressure sensor.

Feed out vacuum line.

Installation note:

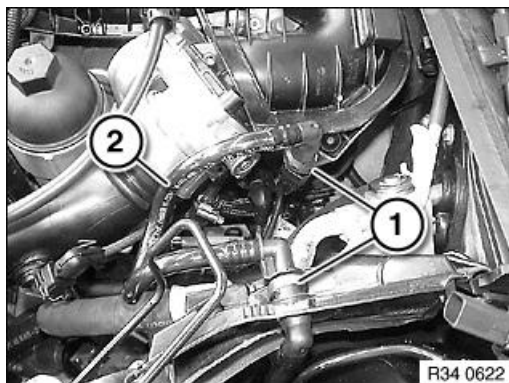
Check sealing ring in brake servo and replace if necessary.

**Necessary preliminary tasks:**

- Read and comply with [General Information](#).
- Remove [lower section of microfilter housing](#)

Important!

Before beginning work, fully press the brake pedal several times to reduce the vacuum pressure in the brake booster.



Release quick-release fasteners (1) and detach vacuum line (2).

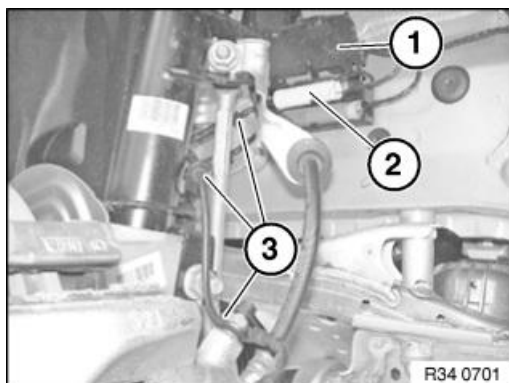
**Important!**

The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

If a brake pad sensor that has already been ground has to be replaced even though the minimum brake pad thickness has not yet been reached, you must observe the following: The new sliding contact must be filed down with a file to the same length as the ground sliding contact.

**Necessary preliminary tasks:**

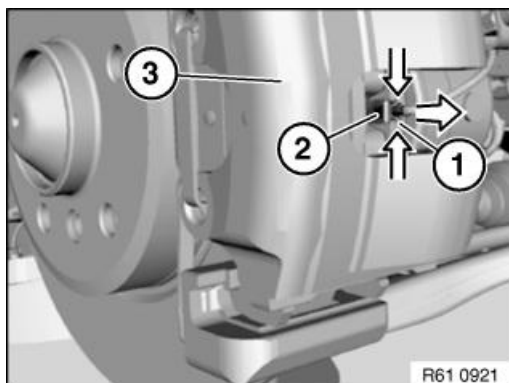
- Remove [wheel](#)



Open plug housing (1).

Disconnect plug connection (2).

Feed brake pad sensor out of holders (3).



Press clip (1) together and detach brake pad sensor (2) in direction of arrow from brake pad (3).

Installation:

Make sure clip (1) and brake pad sensor (2) are correctly seated in brake pad (3).

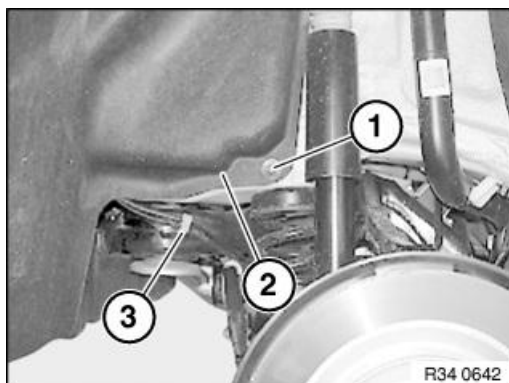
**Important!**

The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

If a brake pad wear sensor that has already been ground has to be replaced even though the minimum brake pad thickness has not yet been reached, you must observe the following: The new sliding contact must be filed down with a file to the same length as the ground sliding contact.

**Necessary preliminary tasks:**

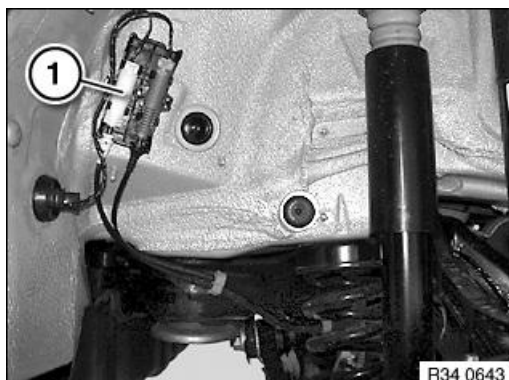
- Remove rear right [wheel](#)



Slacken nut (1).

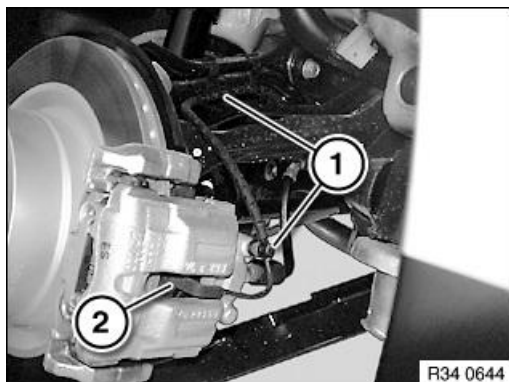
Pull wheel arch trim (2) gently to one side.

Disengage cable from holders (3).



Disconnect plug connection (1). *Installation:*

Ensure proper locking of the plug connector and proper seating of the cable in the brackets.



Disengage cable from holders (1).

Detach brake pad wear sensor (2) in direction of arrow from brake caliper (3).

Installation:

Make sure holders (1) and brake pad wear sensor (2) are correctly seated in brake caliper.

34 10 014 Adjusting handbrake



Special tools required:

- [32 1 030](#)

Perform inspection in the following manner:

When 1st ratchet is engaged, no braking force should be exerted.

The difference in wheel circumferential forces between the left and right wheels may deviate by max. 30 % from the greater value (measured on brake test stand).

In event of larger deviations of wheel circumferential force: carry out readjustment.

Braking with locked wheels must be possible with the parking brake.

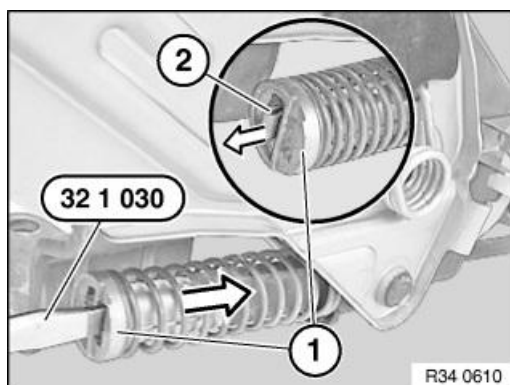
The parking brake must be reset if the actuation stroke is greater than 10 teeth.

Note:

Accurate adjustment of the parking brake is only possible if the parking brake Bowden cables and all moving parts on the parking brake move easily and function correctly.

Basic setting of the parking brake is required:

- Parking brake shoes and add-on parts are replaced
- Brake discs are replaced
- In event of excessive actuation stroke (10 teeth)
- When replacing parking brake Bowden cables



1. Adjusting instructions for brake pads (basic setting)

Unclip [gaiter](#) for parking brake lever.

Lock adjustment unit (ASZE).

Actuate parking brake lever. Insert special tool [32 1 030](#). Press limit position (1) of adjusting spring back to such an extent that retaining hook (2) engages in limit position (1).

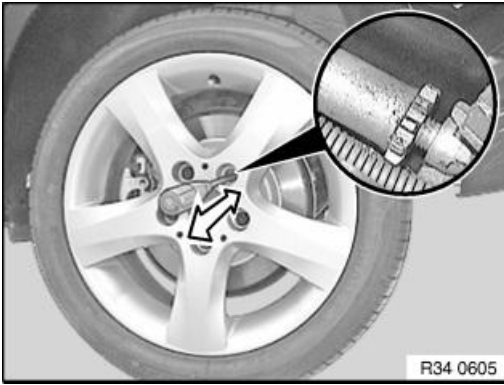


Completely unscrew one wheel stud on each rear wheel.

Installation note:

Tightening torque [36 10 1AZ](#).

Turn wheel until adjustment screw is visible in threaded hole.



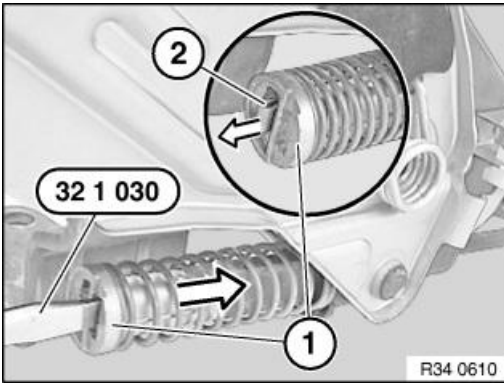
Turn adjusting screw with a screwdriver until wheel can not be turned anymore by hand.

Then at adjusting screw:

- Release 185 dia. duo-servo brake 8 notches
- Release 160 dia. duo-servo brake 9 notches

Important!

Basic adjustment with fewer than 8 notches on the duo-servo brake may lead to the brake pads being damaged. Reducing the number of notches on the duo-servo brake to shorten lever travel is not permitted.



Unlock adjustment unit (ASZE).

Lever out restraining hook (2) with a suitable screwdriver.

Restraining hook (2) must detach from limit position (1) of adjusting spring.



Important!

Follow notes for [Brake testing](#) for test stand.

2. Adjusting instructions for parking brake Bowden cables

The parking brake lever must be applied 5 times with medium hand force.

2.1 On brake test stand

0th tooth (parking brake released):

Vehicles with manual transmission: Shift lever in neutral position.

Vehicles with automatic transmission: Selector lever position "N".

- Without locking differential ≤ 150 N.
- With locking differential ≤ 200 N (possibly odd display).

1st tooth:

No increase in braking force with regard to 0th tooth. Indicator lamp can be lit.

2nd tooth:

Indicator lamp must be lit.

3rd tooth:

Increase in braking force.

5th tooth:

The brake force display must have reached ≥ 400 N.

Checking brake force differential at wheel:

Apply parking brake until a wheel circumferential force (brake force display) of min. 1000 N is reached.

Max. permitted brake force differential right/left ≤ 35 % (referred to greater brake value).

3. Bedding in the duo-servo parking brake

The following bedding-in instructions are applicable in case of insufficient braking effect or after replacing brake discs and/or brake pads.

3.1 On brake test stand

Apply parking brake lever until wheel circumferential force at first wheel is 800 N.

Lock parking brake lever in next lower tooth.

Important!

Brake bedding-in time max. 2 minutes!

3.2 When driving on road

(If possible on company grounds or on an unused road)

When driving at low speed (max. 40 km/h) apply parking brake lever until a braking effect can be felt.

Pull parking brake lever into the next detent and continue driving for max. approx. 400 metres (max. 40 km/h).

A basic requirement is that parking brake is adjusted uniformly.

Note:

If necessary, repeat bedding-in procedure.

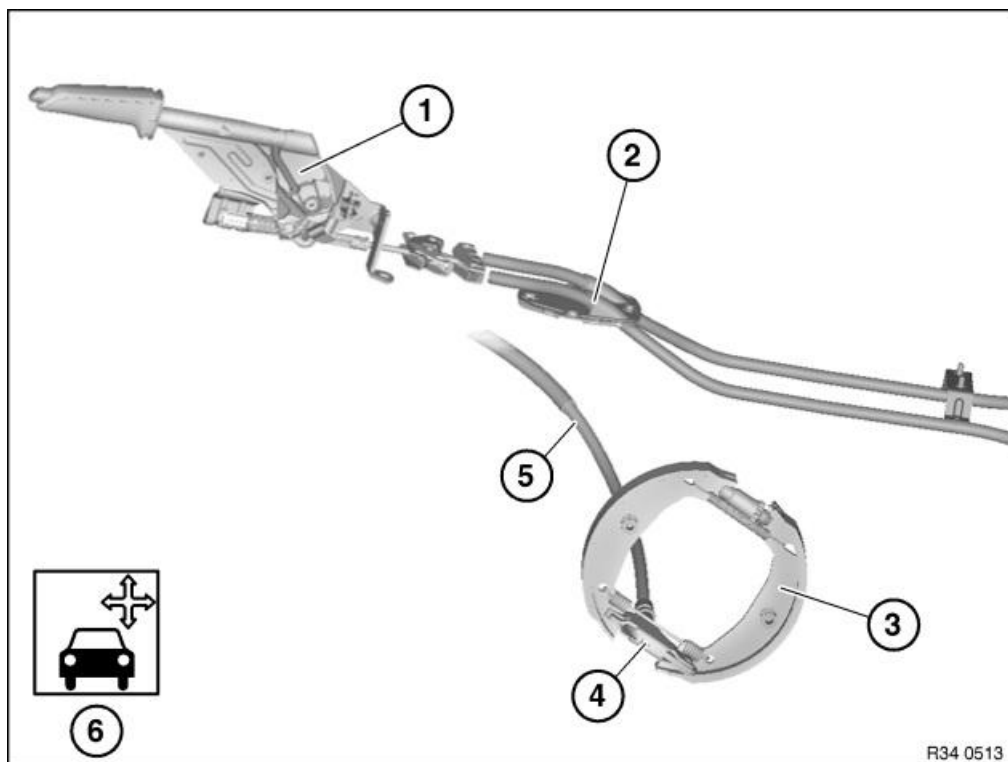
Allow brake to cool down sufficiently.

**Important!**

After completing work:

- Carry out function check on brake test stand to ensure that the brakes comply with legal requirements.
- Carry out test braking while driving at low speed; the effectiveness of the brakes may be reduced during the initial braking operations.
- Exaggerated drastic and continuous braking operations for faster braking in are not permitted.
- Advise the customer not to perform any wilful drastic braking in the first 200 km after brake replacement.
- Attach mirror tag to interior rearview mirror.

34 41 ... Overview of handbrake



- | | |
|-----------------------------------|---|
| 1 Handbrake lever | 4 Expander lock |
| 2 Guide tube | 5 Handbrake Bowden cables |
| 3 Handbrake shoes | 6 Adjusting handbrake |

**Special tools required:**

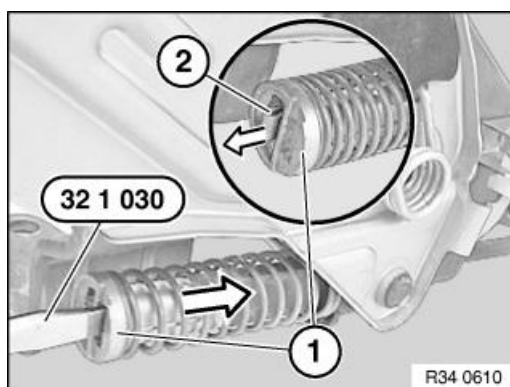
- [32 1 030](#)

**Necessary preliminary tasks:**

- Disconnect [battery negative lead](#)
- Remove [airbag control unit](#)

Note:

If the parking brake lever is replaced, the handbrake lever grip must also be replaced.



Lock adjuster unit (ASZE).

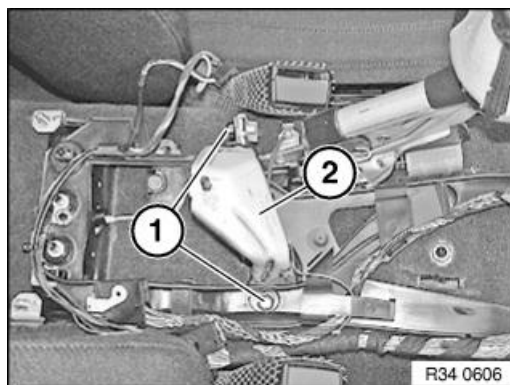
Actuate parking brake lever. Connect special tool [32 1 030](#). Press stop (1) of adjusting spring back to such an extent that retaining hook (2) engages in stop (1).

Installation:

Unlock adjuster unit (ASZE).

Lever out restraining hook (2) with a suitable screwdriver.

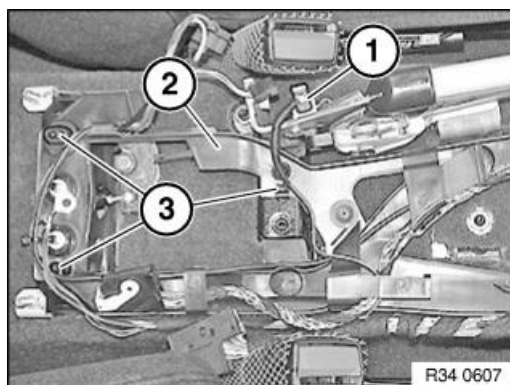
Restraining hook (2) must detach from stop (1) of adjusting spring.



Release screws (1).

Tightening torque [34 41 5AZ](#).

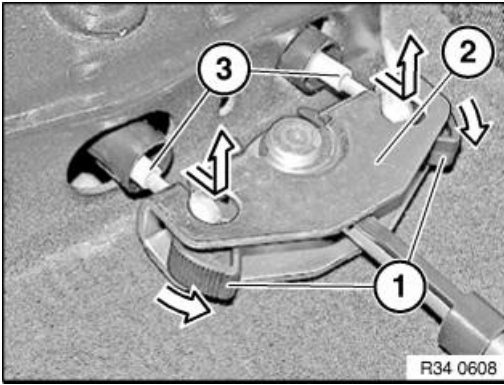
Remove bracket for centre console (2).



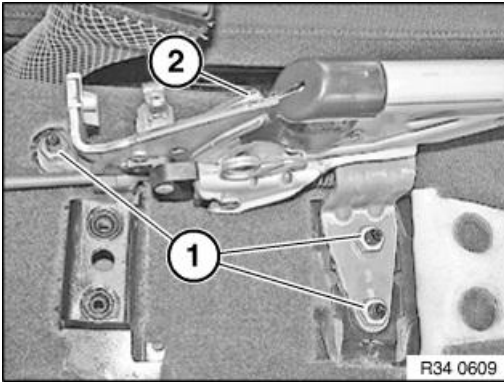
Disconnect cable (1) from handbrake check switch.

Unclip cable bracket (2) at point (3).

Remove cable bracket and place forward.



Press retainer (1) in balance arm (2) forward in direction of arrow.
Detach handbrake Bowden cables (3) from balance arm (2).



Release nuts (1) and remove parking brake lever (2). *Installation:*
Replace self-locking nuts.

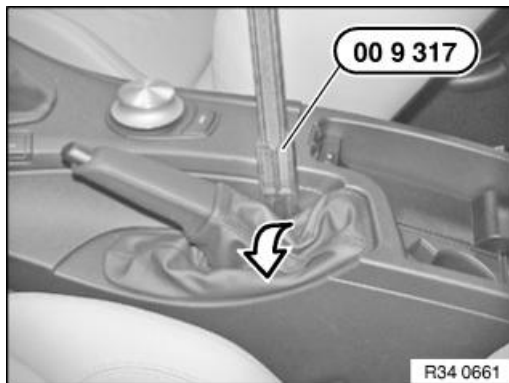
Tightening torque [34 41 1AZ](#).

Parking brake lever and adjustment unit (ASZE) are only exchanged completely as a single unit.

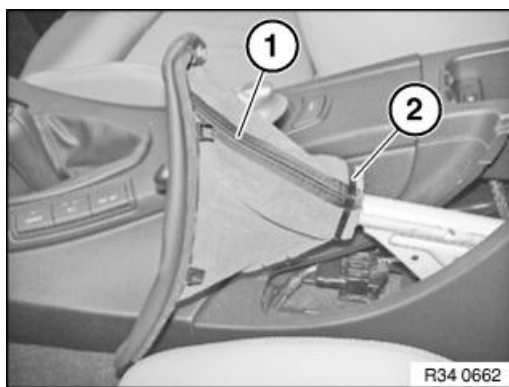


Special tools required:

- [00 9 317](#)



Unclip gaiter with special tool [00 9 317](#).



Pull gaiter (1) over handbrake lever.

Cut cable ties (2) and remove gaiter.

Installation:

Eye of cable tie must face downward



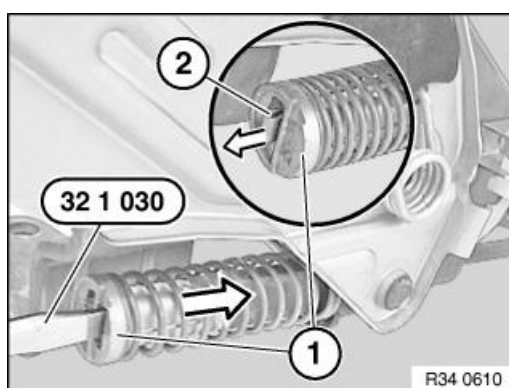
Special tools required:

- [32 1 030](#)



Necessary preliminary tasks:

- Disconnect [negative battery cable](#)
- Remove [airbag control unit](#)
- Remove [propeller shaft](#)



Lock adjustment unit (ASZE).

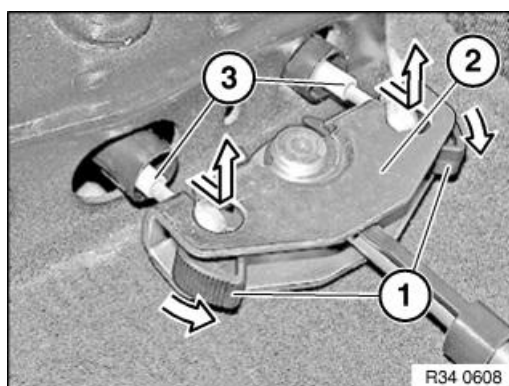
Actuate parking brake lever. Connect special tool [32 1 030](#) . Press limit position (1) of adjusting spring back to such an extent that retaining hook (2) engages in limit position (1).

Installation note:

Unlock adjustment unit (ASZE).

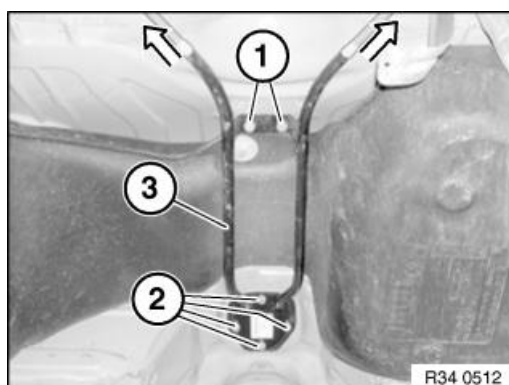
Lever out restraining hook (2) with a suitable screwdriver.

Restraining hook (2) must detach from limit position (1) of adjusting spring.



Press retainer (1) in balance arm (2) forward in direction of arrow.

Detach parking brake Bowden cables (3) from balance arm (2).



Pull parking brake Bowden cables out of guide tube.

Release screws (1).

Release screws (2) and feed out guide tube (3) towards bottom.

Installation note:

Replace gasket.

Tightening torque [34 41 4AZ](#).



After installation:

- Adjusting [parking brake](#)

**Special tools required:**

- [32 1 030](#)
- [34 4 000](#)

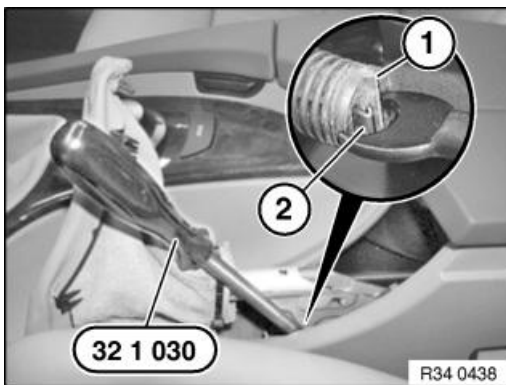
**Necessary preliminary tasks:**

- [Remove](#) rear brake disk.

Note:

During replacement of the hand brake coverings, the following components must also be renewed:

- Brake shoe expander
- Adjusting screw
- Spring set



Lock adjustment unit (ASZE).

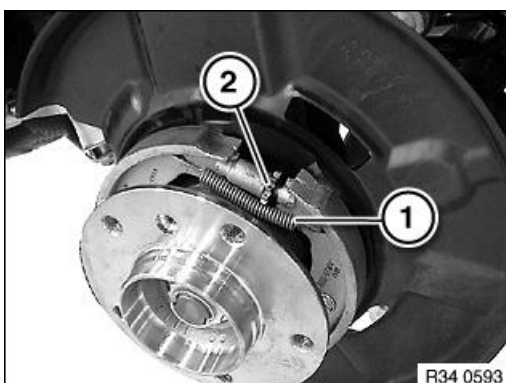
Actuate parking brake lever. Connect special tool [32 1 030](#). Press limit position (1) of adjusting spring back to such an extent that retaining hook (2) engages in limit position (1).

Installation note:

Unlock adjustment unit (ASZE).

Lever out restraining hook (2) with a suitable screwdriver.

Restraining hook (2) must detach from limit position (1) of adjusting spring.

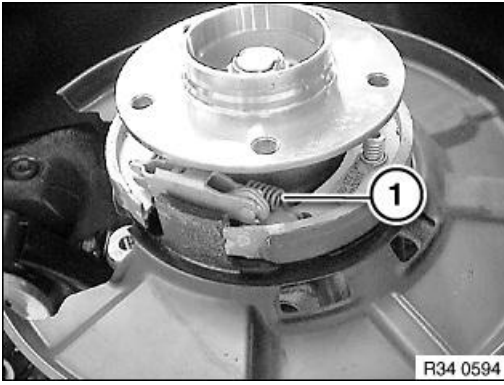


Disconnect return spring (1) with brake spring pliers. *Installation note:* Return spring (1) must not be overelongated.

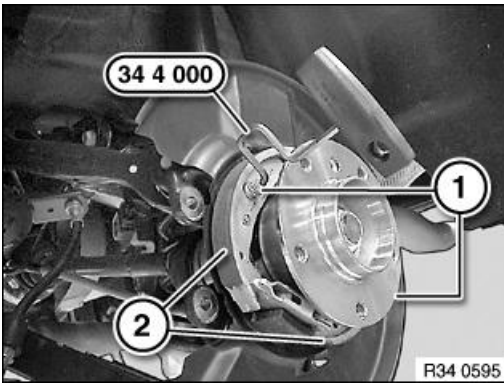
Check and if necessary replace return spring (1).

Pay attention to installation position of adjusting screw (2).

Apply a thin coat of [grease](#) to bush and screw threads.



Disconnect return spring (1) with brake spring pliers. *Installation note:* Return spring (1) must not be overelongated.
Check and if necessary replace return spring (1).



Twist roll pins (1) 90° with special tool [34 4 000](#) and detach.
Remove brake pads (2).



After installation:

- Adjusting [parking brake](#)



Special tools required:

- [32 1 030](#)



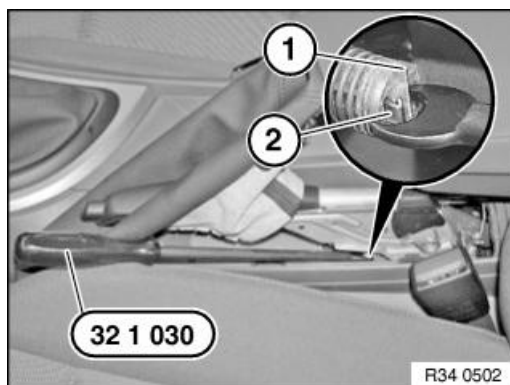
Necessary preliminary work:

- Remove [airbag control unit](#)

Note:

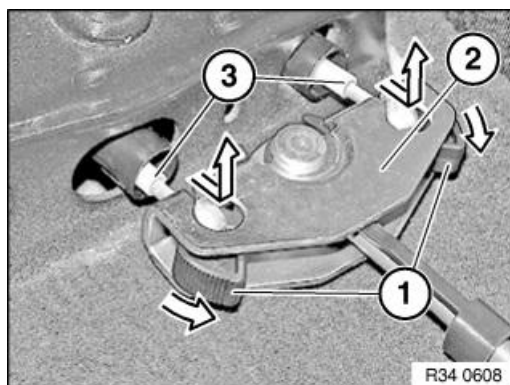
After completing work:

- Adjusting [parking brake](#)



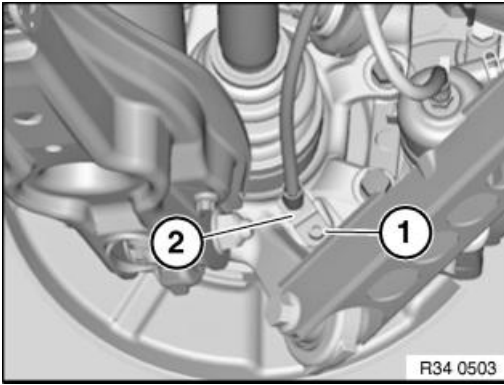
Lock adjustment unit (ASZE).

Actuate parking brake lever. Connect special tool [32 1 030](#) . Press limit position (1) of adjusting spring back to such an extent that retaining hook (2) engages in limit position (1).



Press retainer (1) in balance arm (2) forward in direction of arrow.

Detach parking brake Bowden cables (3) from balance arm (2).



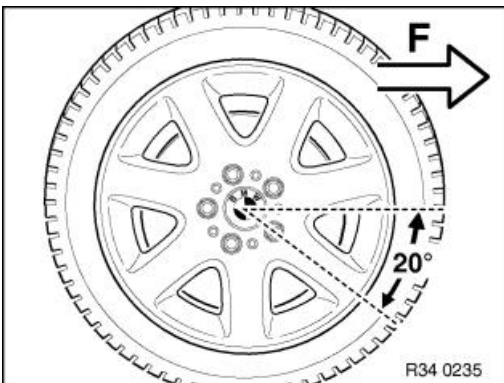
Release screw (1) and remove holder (2). *Installation note:*
Tightening torque [34 41 2AZ](#).



Note:

To unlock the parking brake bowden cable from the brake shoe expander, it is necessary to remove the [brake disc](#) on the following vehicles:

- E90 320xd, 325xi, 328xi, 330i, 330xi, 330d, 330xd, 335i, 335xi, 335d, M3
- All E91
- E92 320xd, 325xi, 325d, 328xi, 330i, 330xi, 330d, 330xd, 335i, 335xi, 335d, M3
- E93 320i, 323i, 325i, 325d, 328i, 330i, 330d, 335i, M3
- All E84



Release one wheel stud.

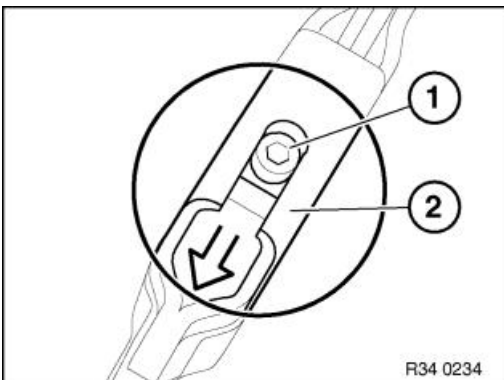
Bring wheel into position (threaded hole turned down approx. 20° from horizontal).

F = direction of travel

Installation note:

Reinstall wheel stud only after handbrake has been adjusted.

Tightening torque [36 10 1AZ](#).



Nipple (1) and brake shoe expander lock (2) are visible through threaded hole.

Push in core of parking brake Bowden cable in direction of brake shoe expander to limit position and grip firmly.

Press nipple (1) downwards through threaded hole with a screwdriver.

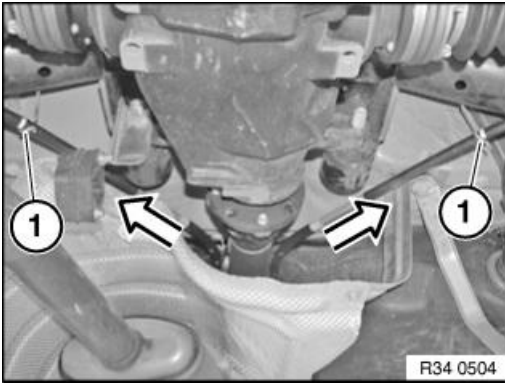
Pull parking brake Bowden cables out of wheel carrier.



Installation note:

Insert parking brake Bowden cable into caliper carrier/brake guard plate. Sleeve must be inserted up to stop.

Nipple of parking brake Bowden cable must audibly snap into place in brake shoe expander.



Disconnect parking brake Bowden cables from holders (1).

Pull parking brake Bowden cables rearwards out of guide tube.



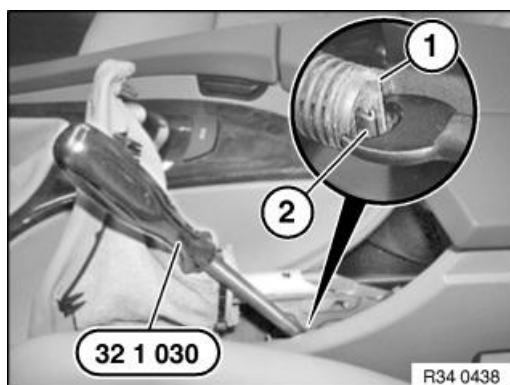
Special tools required:

- [32 1 030](#)



Necessary preliminary tasks:

- Remove [parking brake shoes](#)



Lock adjuster unit (ASZE).

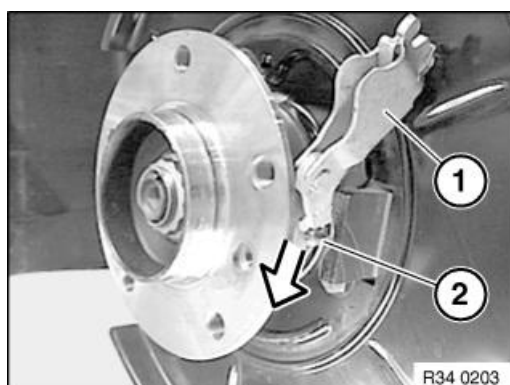
Actuate parking brake lever. Insert special tool [32 1 030](#). Press stop (1) of adjusting spring back to such an extent that retaining hook (2) engages in stop (1).

Installation:

Unlock adjuster unit (ASZE).

Lever out restraining hook (2) with a suitable screwdriver.

Restraining hook (2) must detach from stop (1) of adjusting spring.



Pull brake shoe expander (1) forward, disconnect parking brake Bowden cable (2) and remove brake shoe expander.

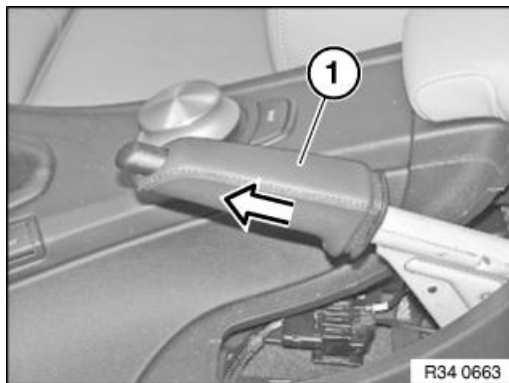


After installation:

- Adjusting [parking brake](#)

**Necessary preliminary tasks:**

- Remove [gaiter for handbrake lever](#)



Pull off handle for handbrake lever (1) in direction of arrow. *Installation:* Handbrake lever grip (1) must snap audibly into place.

**Necessary preliminary tasks:**

- Read and comply with [General Information](#).
- Remove [lower section of microfilter housing](#)
- Extract brake fluid

Note:

Extract brake fluid out of expansion tank. Use a suction bottle used exclusively for drawing off brake fluid.

Do not reuse drawn out brake fluid.

After completing work:

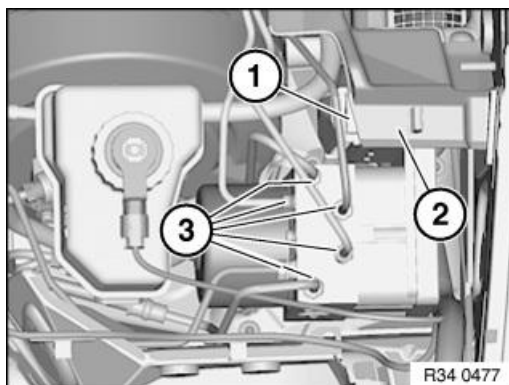
- Bleed [braking system](#)

**Important!**

Do not mix up brake lines.

If necessary, mark before removal.

Close off connecting bores with seal plugs.

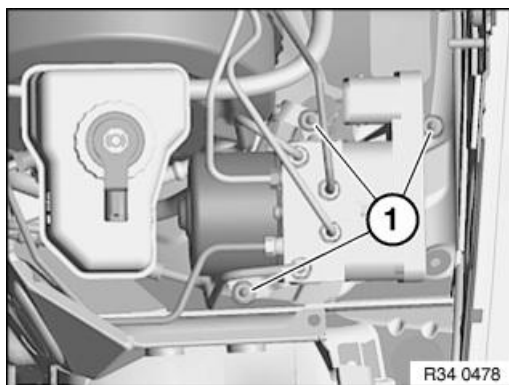


Press cover (2) slightly to one side and disconnect plug connection (1).

Unfasten brake lines (3).

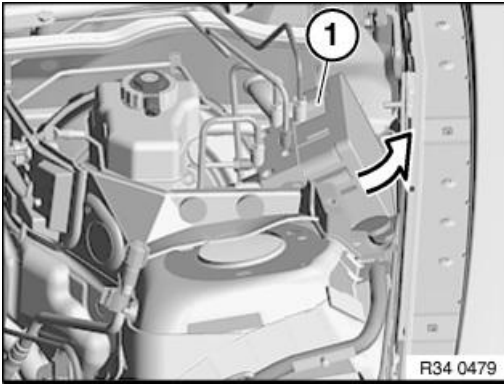
Installation note:

Tightening torque [34 32 1AZ](#).



Unscrew nuts (1). **Installation note:**

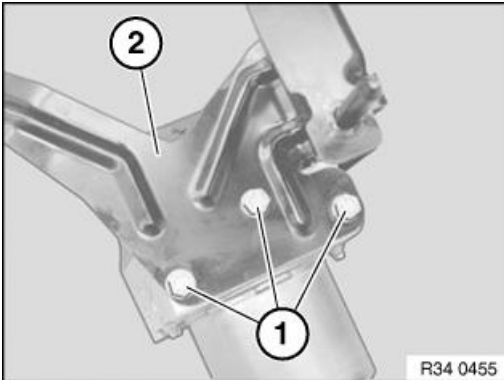
Tightening torque [34 51 6AZ](#).



Important!

If necessary, release brake lines from holder on bulkhead.
Brake lines must not be bent!

Tilt out hydraulic unit (1) in direction of side wall.



When replacing hydraulic unit:

Release screws (1) and convert holder (2).

Installation note:

Tightening torque [34 51 5AZ](#).

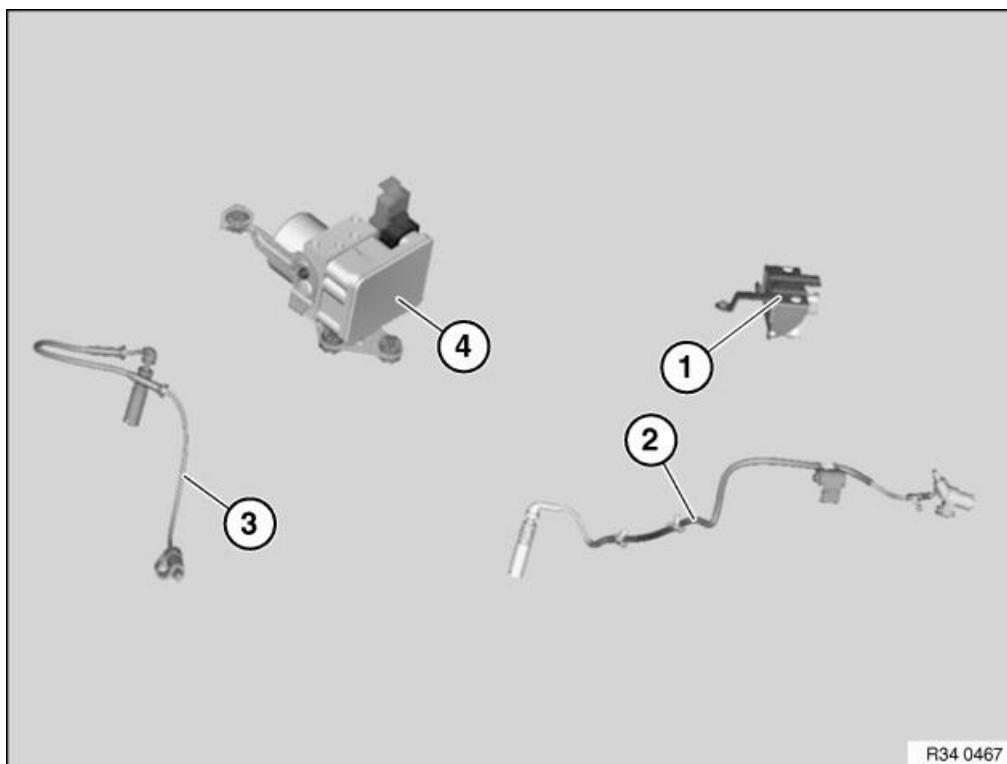
Modify [DSC control unit](#).



When replacing control unit:

- Carry out [programming/coding](#)
- [Adjustment of steering angle sensor](#)
- Brake line mix-up test:

34 52 ... Overview of electronic components



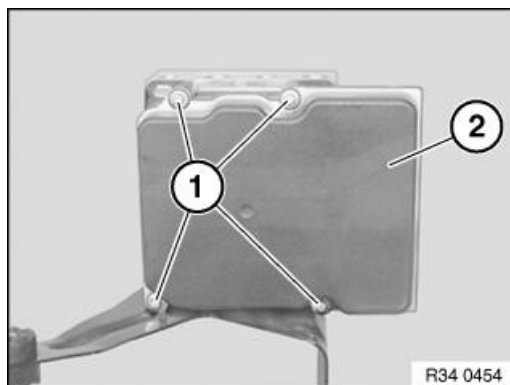
- 1 [DSC sensor](#)
- 2 [Pulse sensor, rear](#)
- 3 [Pulse sensor, front](#)
- 4 [DSC control unit](#)

**Important!**

Read and comply with notes on [protection against electrostatic discharge \(ESD protection\)](#).

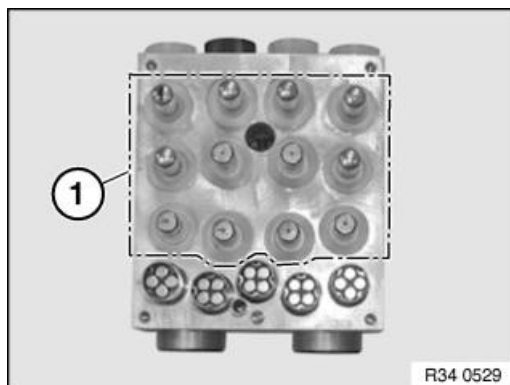
**Necessary preliminary tasks:**

- Remove [hydraulic unit](#)

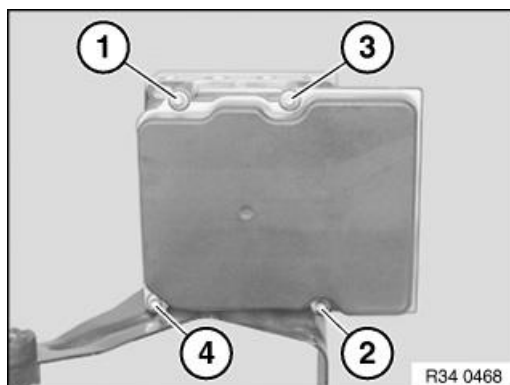
**Important!**

Risk of damage to the contacts when removing and installing the hydraulic unit.

Release screws (1) and carefully detach control unit (2) towards front.

**Important!**

Replace all seals in area (1).

**Installation:**

Keep sealing faces clean.

Replace screws.

Observe tightening sequence (1-4).

Tightening torque [34 51 1AZ](#).



Replacement:

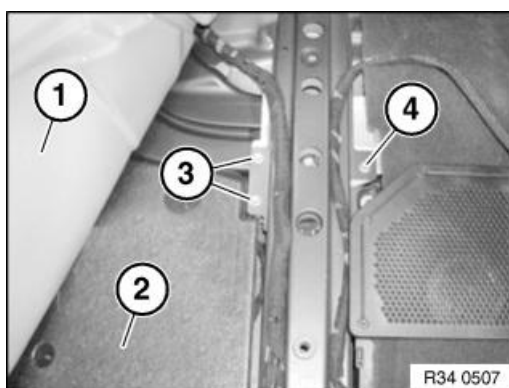
- Carry out [programming/encoding](#)
- [Steering angle sensor adjustment](#)
or
[adjustment for active steering](#)
- Brake line interchange check:
- Function check, hydraulic unit

**Important!**

Read and comply with notes on [protection against electrostatic discharge \(ESD protection\)](#).

**Necessary preliminary tasks:**

- Remove [left front seat](#)
- Remove [front left entrance cover strip](#)



Lift carpet (1) and fold back to side.

Remove underlay (2).

Disconnect plug connection.

Installation:

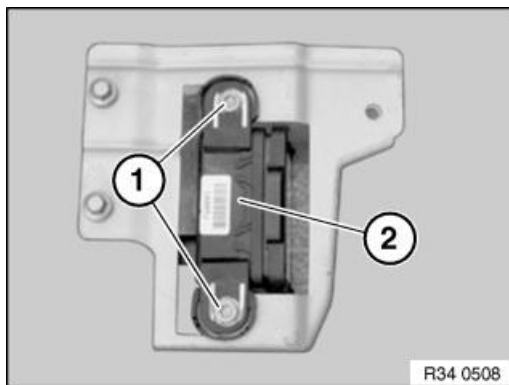
Ensure proper locking of plug connector.

Slacken screws (3)

Release screws (4) and remove bracket with yaw sensor.

Installation:

Tightening torque [34 51 3AZ](#).



When replacing DSC sensor:

Release screws (1) and modify DSC sensor (2).

Installation:

Tightening torque [34 51 2AZ](#).



Carry out calibration/adjustment of DSC sensor.

**Important!**

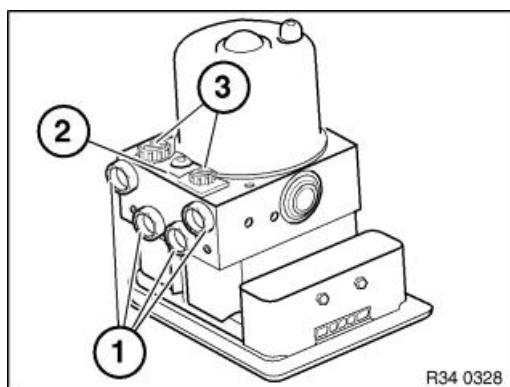
Read and comply with notes on [protection against electrostatic discharge \(ESD protection\)](#).

**Necessary preliminary tasks:**

- Remove [hydraulic unit](#).

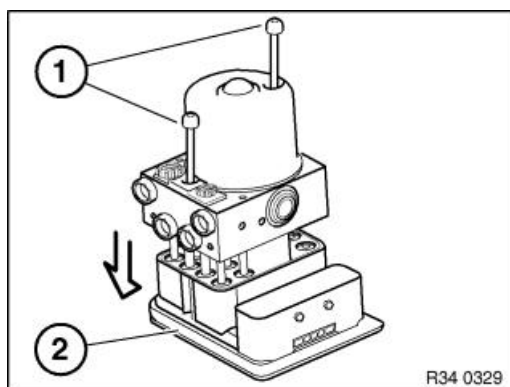
**Important!**

Removing pump motor from valve block is not permitted!
Do not twist pump motor.

**Important!**

Secure provided retaining lugs (2) from repair kit for control unit with aid of plugs (3).

Close off pipe connections with plugs (1).

**Important!**

Control unit must not come into contact with dirt or moisture.
Contacts must not be bent!

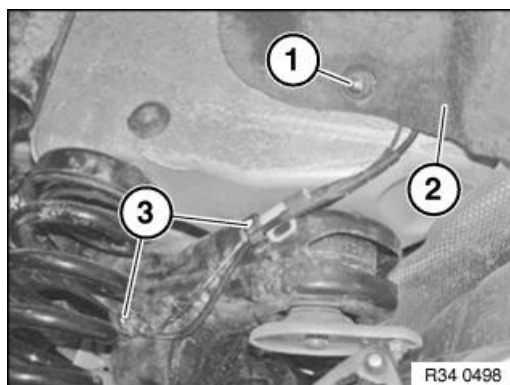
Release screws (1) and carefully remove control unit (2). *Installation:*
Tightening torque [34 51 1AZ](#).

**Replacement:**

- Carry out [programming/encoding](#)
- [Adjustment of steering angle sensor](#)
- Brake line interchange check:

**Necessary preliminary tasks:**

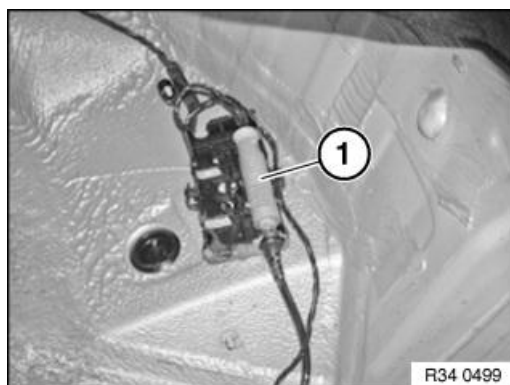
- Remove [wheels](#).
- Read and comply with [General Information](#).



Slacken nut (1).

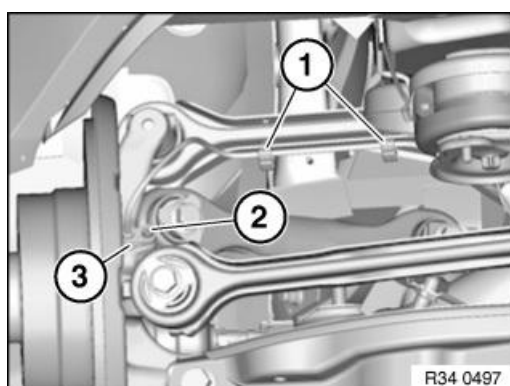
Pull wheel arch trim (2) gently to one side.

Disengage cable from holders (3).



Disconnect plug connection (1). *Installation:*

Ensure proper locking of the plug connector and proper seating of the cable in the brackets.



Disengage cable from holders (1).

Unfasten socket head cap screw (2).

Withdraw wheel speed sensor (3) from bore hole.

Installation:

Tightening torque [34 51 4AZ](#).

Clean bore for pulse generator and lubricate with Staburags NBU 12/K grease.

Important!

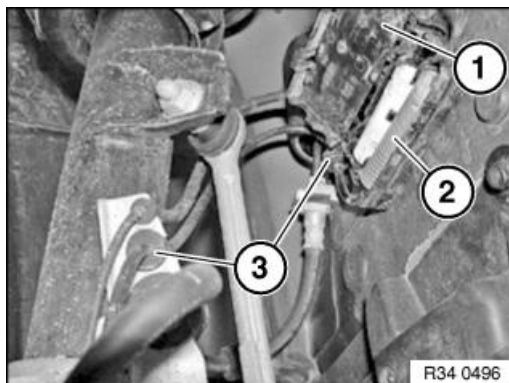
Check sensor head prior to installation for external damage, replacing if necessary.

34 52 525 Replacing one front pulse sensor



Note:

Read and comply with [General Information](#).

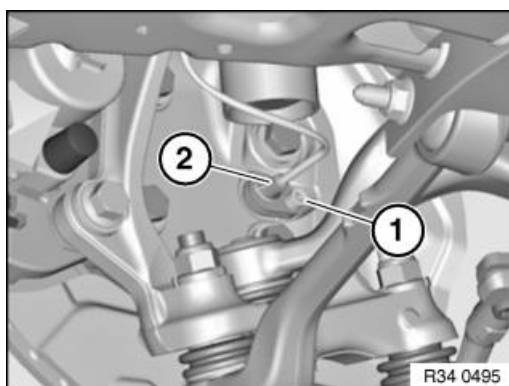


Open plug housing (1), pull plug connection (2) out of bracket and disconnect.

Pull cable with rubber grommet out of holders (3).

Installation:

Ensure proper locking of plug connector and proper seating of rubber grommets.



Release hexagon socket head cap screw (1) and pull wheel speed sensor (2) out of bore.

Installation:

Tightening torque [34 51 4AZ](#).

Clean bore for pulse generator and lubricate with Staburags NBU 12/K grease.

Important!

Check sensor head prior to installation for external damage, replacing if necessary.

34 52 535 Replacing one rear wheel speed sensor \PREMIUM

PRELIMINARY WORK

1 – Remove rear left or right wheel



► Removing the wheel

- If several wheels are removed simultaneously: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Unscrew the wheel bolts and remove the wheel.

Use the matching adapter from tool set **0 492 518 (36 1 300)** (wheel bolt adapter set) to loosen and tighten down the wheel bolt with security code.

MAIN WORK

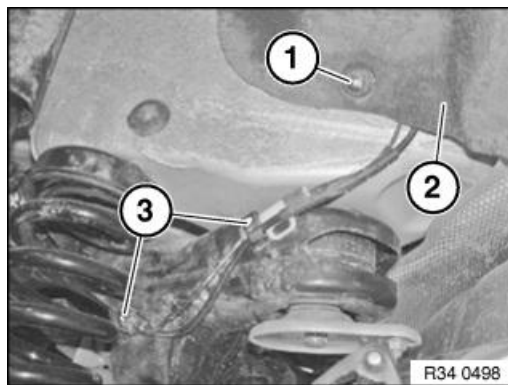
2 – Removing a rear wheel speed sensor



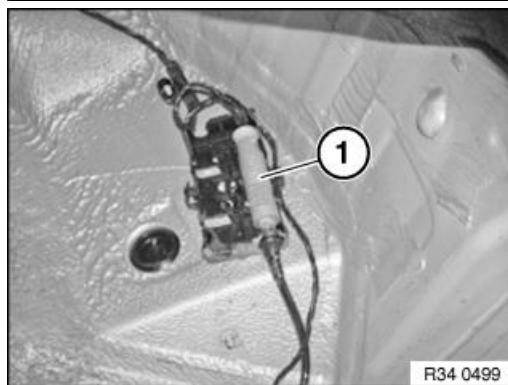
TECHNICAL INFORMATION

Before beginning work on the brake system, observe the general information.

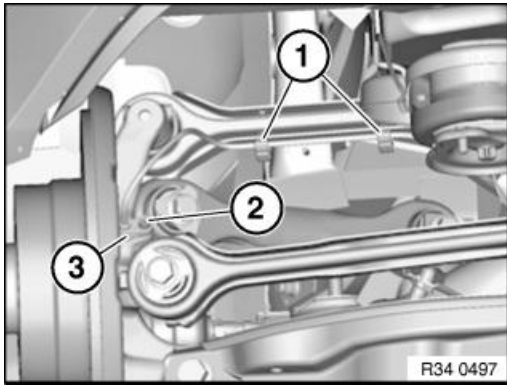
For additional information see: 34 00 ... General information



- Unfasten nut (1).
- Pull wheel arch cover (2) gently to one side.
- Detach cable from brackets (3).

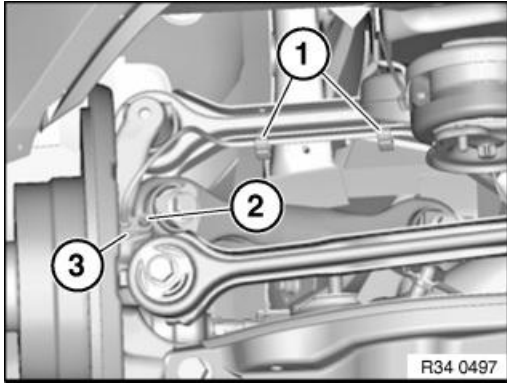


- Unlock plug connection (1) and disconnect.



- Detach cable from brackets (1).
- Release the hexagon socket screw (2).
- Pull out wheel speed sensor (3) from bore hole.

3 – Installing a rear wheel speed sensor



- Clean bore hole for the wheel speed sensor and coat lightly.

Expendable materials

Lubricating grease Staburags NBU 12K	100 g, Tube	83 23 9 407 810
--------------------------------------	-------------	-----------------

- Prior to installation, check wheel speed sensor for damage and renew if necessary.

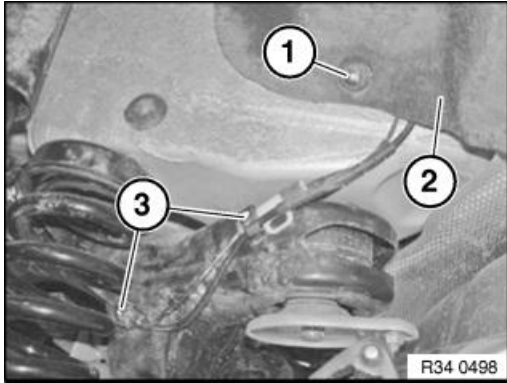
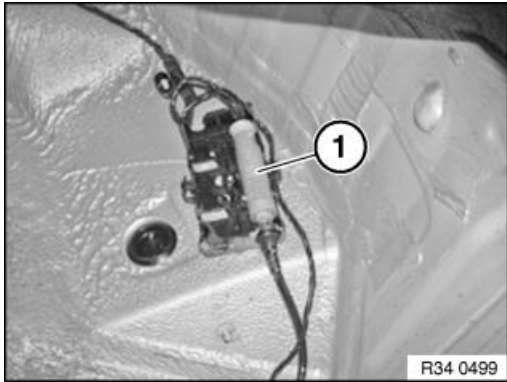
Parts: Wheel speed sensor

- Install wheel speed sensor (3) into the bore hole.
- Tighten hexagon socket screw (2).

Wheel speed sensor to swivel bearing/wheel carrier

M6			8 Nm
----	--	--	------

- Secure the cables on the brackets (1).
- Connect the plug connection (1).
The plug connection must snap audibly into place.
- Mount plug connection (1) into bracket.
- Check the correct position of the plug connection in the bracket.
- Check correct locking of plug connection.



- Secure the cables on the brackets (3).
- Mount the wheel arch cover (2).
- Tighten nut (1).

Wheel arch cover

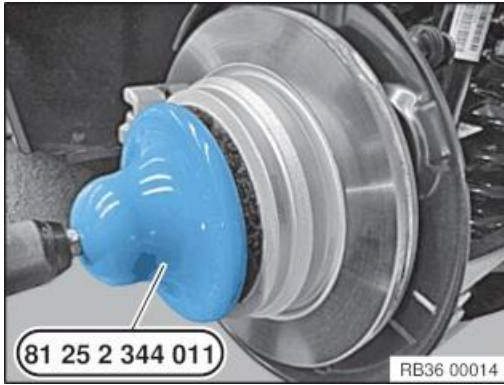
Plastic nut			2,5 Nm
-------------	--	--	--------

POSTPROCESSES

4 – Install rear left or right wheel

► Mounting the wheel

► Clean the contact surfaces between the brake disc and the wheel rim



TECHNICAL INFORMATION

The contact surface between the brake disc and the wheel rim must be clean and free from oil and grease. There is otherwise a risk of the wheel becoming loose at a later time.

- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool **2 344 011**.

Do not operate special tool **2 344 011** with an impact screwdriver.

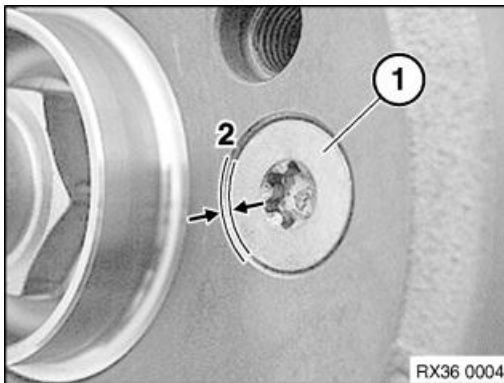
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue around the wheel bolt holes: remove and clean the brake disc.



- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool **2 344 011**.

Do not operate special tool **2 344 011** with an impact screwdriver.

- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).



- Renew mounting bolt (1).

Parts: Mounting bolt

- Check that the mounting bolt (1) for the brake disc is securely seated.

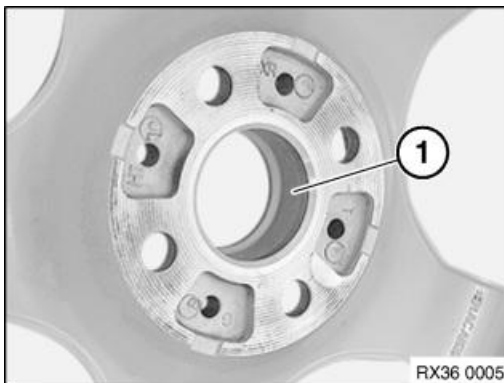
The mounting bolt (1) for the brake disc may not protrude under any circumstances on the contact surface (2) between the brake disc and the wheel rim.

Brake disc to front wheel hub

M8	Renew screw.		16 Nm
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Brake disc to rear wheel hub

M8	Renew screw.		16 Nm
----	--------------	--	-------



- Lightly grease the wheel centring (1) in the wheel rim; refer to additional information for grease for the wheel centring.



TECHNICAL INFORMATION

Never use impact screwdrivers or electric screwdrivers to screw in and tighten the wheel bolts.

The wheel rim must rest uniformly against the brake disc.

In the case of non-original BMW wheel bolts/wheel rims, it may be necessary to retighten the wheel bolts on account of setting properties (refer to the documentation from the manufacturer).

Do not apply oil to new wheel bolts.

- Renew corroded wheel bolts.

Parts: Wheel bolts

- Clean the wheel bolts.
- Check the wheel bolts (arrows) and the thread for damage, if necessary renew the wheel bolts.
- Mount wheel bolts and tighten.

Wheel bolts

M12/AF 17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim.	Tightening torque	120 Nm
	Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence. Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.	Check	120 Nm

Additional Information

Overview of Tightening Torques

Wheel speed sensor to swivel bearing/wheel carrier

Used in step [3](#)

M6			8 Nm
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Wheel arch cover

Used in step [3](#)

Plastic nut			2,5 Nm
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Brake disc to front wheel hub

Used in step [4](#)

M8	Renew screw.		16 Nm
----	--------------	--	-------

Brake disc to rear wheel hub

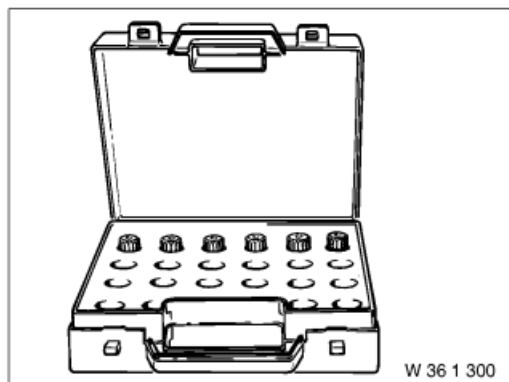
Used in step [4](#)

M8	Renew screw.		16 Nm
----	--------------	--	-------

M12/AF 17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim.	Tightening torque	120 Nm
	Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence. Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.	Check	120 Nm

Overview of Special Tools

0 492 518 (36 1 300) Adapter



Common

Used in step 1

Usage	(Wheel bolt adapter kit) For releasing and tightening wheel bolts. Individual parts are available via the EPC, see also comments texts for the individual adapters.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 27 04 (167)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
6	0 495 221 (36 1 323)		Wheel stud (Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259	
6	0 495 222 (36 1 324)		Wheel stud (Code 31) With centring bore available separately, (see EPC) under 36 13 6 765 544	
6	0 495 223 (36 1 325)		Wheel stud (Code 32) With centring bore available separately, (see EPC) under 36 13 6 765 545	
6	0 495 224 (36 1 326)		Wheel stud (Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546	
6	0 495 225 (36 1 327)		Wheel stud (Code 34) With centring bore available separately, (see EPC) under 36 13 6 765 547	

6	0 495 226 (36 1 328)	Wheel stud (Code 35) With centring bore available separately, (see EPC) under 36 13 6 762 340
6	0 495 227 (36 1 329)	Wheel stud (Code 36) With centring bore available separately (see EPC) under 36 13 6 762 341
6	0 495 228 (36 1 331)	Wheel stud (Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342
6	0 495 229 (36 1 332)	Wheel stud (Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343
6	0 495 230 (36 1 333)	Wheel stud (Code 40) With centring bore available separately (see EPC) under 36 13 6 762 344
6	0 495 231 (36 1 335)	Supplement Not available separately. Can only be ordered as part of the complete special tools (SWZ) set 83 30 0 492 518 (SWZ number 36 1 300) or via the Electronic Parts Catalogue (supplementary set for wheel bolt adapter kit 36 1 300). Consists of: 36 1 323 Code 30 36 1 324 Code 31 36 1 325 Code 32 36 1 326 Code 33 36 1 327 Code 34 36 1 328 Code 35 36 1 329 Code 36 36 1 331 Code 37 36 1 332 Code 38 36 1 333 Code 40 36 1 336 Connection diagram label
6	0 495 232 (36 1 336)	Labels (Label) Connection diagram not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.
6	0 495 233 (36 1 339)	Case s (Case) incl. connection diagram label. Not available individually.

2	0 492 519 (36 1 301)		Wheel stud (Code 11) Can be ordered separately via EPC under part number 36 13 1 181 241.	
2	0 492 520 (36 1 302)		Wheel stud (Code 12) available separately (see EPC) under 36 13 1 181 242	
2	0 492 521 (36 1 303)		Wheel stud (Code 13) available separately (see EPC) under 36 13 1 181 243	
2	0 492 522 (36 1 304)		Wheel stud (Code 14) available separately, (see EPC) under 36 13 1 181 244	
2	0 492 523 (36 1 306)		Wheel stud (Code 16) available separately (see EPC) under 36 13 1 181 246	
2	0 492 524 (36 1 307)		Wheel stud (Code 17) available separately (see EPC) under 36 13 1 181 247	
2	0 492 525 (36 1 308)		Wheel stud (Code 18) available separately (see EPC) under 36 13 1 181 248	
2	0 492 526 (36 1 309)		Wheel stud (Code 19) available separately (see EPC) under 36 13 1 181 249	
2	0 492 527 (36 1 311)		Wheel stud (Code 20) available separately (see EPC) under 36 13 1 181 250	
2	0 492 528 (36 1 312)		Wheel stud (Code 31) 12/2004 available separately, (see EPC) under 36 13 6 765 544	
2	0 492 529 (36 1 313)		Wheel stud (Code 32), 12/2004 available separately (see EPC) under 36 13 6 765 545	
2	0 492 530 (36 1 314)	0 495 224	Wheel stud (Code 33) 12/2004 Replaced by 36 1 326.(0 495 224) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	

2	0 492 531 (36 1 315)	0 495 225	Wheel stud (Code 34) 12/2004 Replaced by 36 1 327.(0 495 225) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.
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2	0 492 532 (36 1 316)	0 495 226	Wheel stud (Code 35) 12/2004 Replaced by 36 1 328.(0 495 226) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.
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2	0 492 533 (36 1 317)	0 495 227	Wheel stud (Code 36) 12/2004 Replaced by 36 1 329.(0 495 227) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.
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2	0 492 534 (36 1 318)	0 495 228	Wheel stud (Code 37) 12/2004 Replaced by 36 1 331.(0 495 228) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.
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2	0 492 535 (36 1 319)	0 495 229	Wheel stud (Code 38) 12/2004 Replaced by 36 1 332.(0 495 229) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.
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2	0 492 536 (36 1 321)	0 495 221	Wheel stud (Code 39) Code 30, 12/2004 Replaced by 36 1 323.(0 495 221) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.
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2	0 492 537 (36 1 322)	0 495 230	Wheel stud (Code 40) 12/2004 Replaced by 36 1 333.(0 495 230) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.
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10	0 493 534 (36 1 305)		Wheel stud (Code 15) available separately (see EPC) under 36 13 1 181 245
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2 344 011 Tool



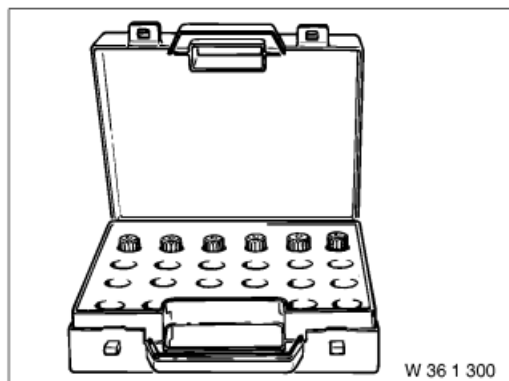
Common

Used in step 4

Usage	Tool (wheel hub grinder) for cleaning the connection of the wheel rim (wheel contact face) to the wheel hub.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	08 08 12 (872)

Replacement tools:

0 495 221 (36 1 323) Wheel stud

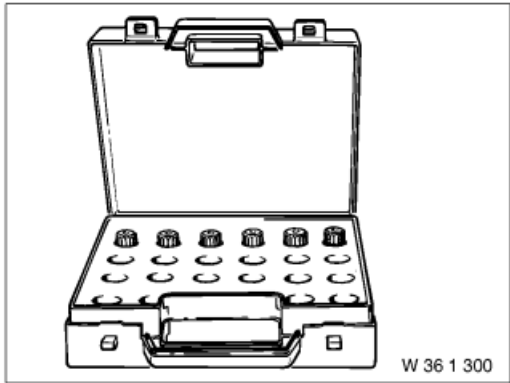


Common

Used in step 1

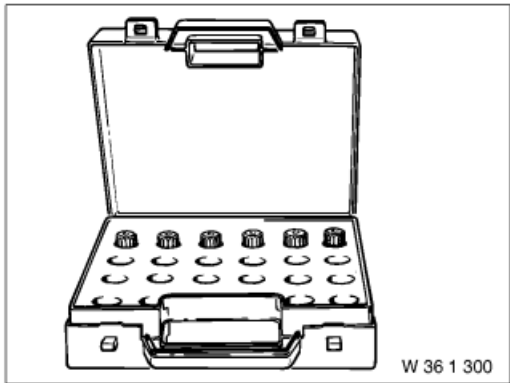
Usage	(Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 224 (36 1 326) Wheel stud



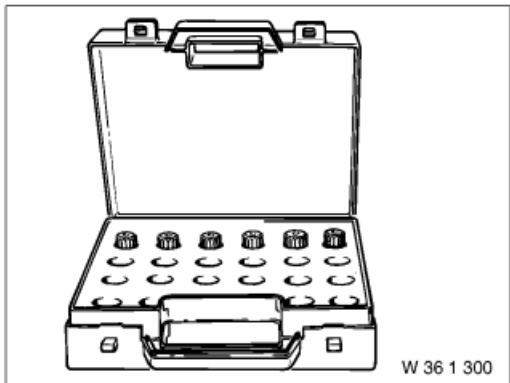
Common		Used in step	1
Usage	(Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546		
Included in the tool or work	0 492 518		
Storage location			
Replaced by			
In connection with			
SI-Number			

0 495 225 (36 1 327) Wheel stud



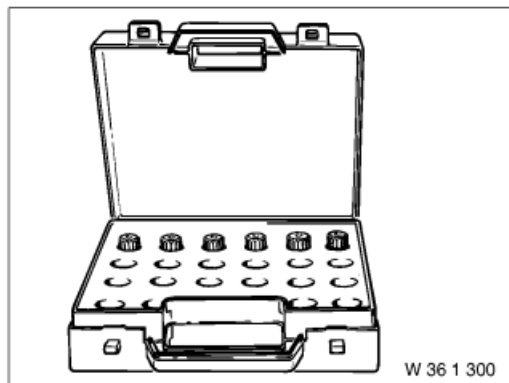
Common		Used in step	1
Usage	(Code 34) With centring bore available separately (see EPC) under 36 13 6 765 547		
Included in the tool or work	0 492 518		
Storage location			
Replaced by			
In connection with			
SI-Number			

0 495 226 (36 1 328) Wheel stud



Common		Used in step	1
Usage	(Code 35) With centring bore available separately, (see EPC) under 36 13 6 762 340		
Included in the tool or work	0 492 518		
Storage location			
Replaced by			
In connection with			
SI-Number			

0 495 227 (36 1 329) Wheel stud



Common

Used in step 1

Usage (Code 36) With centring bore available separately (see EPC) under 36 13 6 762 341

Included in the tool or work 0 492 518

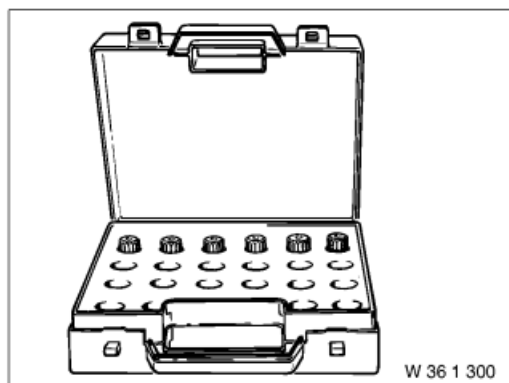
Storage location

Replaced by

In connection with

SI-Number

0 495 228 (36 1 331) Wheel stud



Common

Used in step 1

Usage (Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342

Included in the tool or work 0 492 518

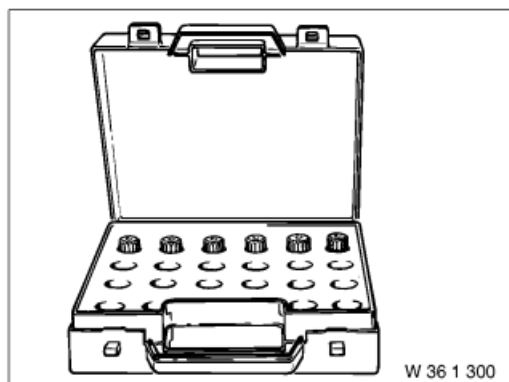
Storage location

Replaced by

In connection with

SI-Number

0 495 229 (36 1 332) Wheel stud



Common

Used in step 1

Usage (Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343

Included in the tool or work 0 492 518

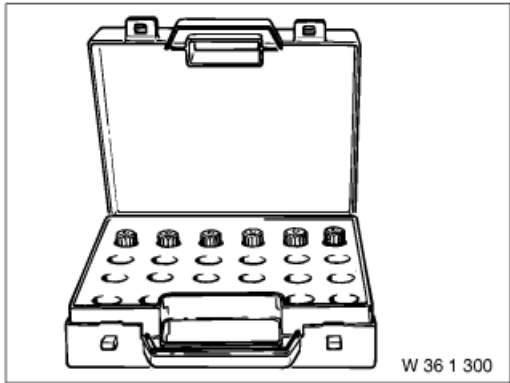
Storage location

Replaced by

In connection with

SI-Number

0 495 230 (36 1 333) Wheel stud



Common		Used in step	1
Usage	(Code 40) With centring bore available separately (see EPC) under 36 13 6 762 344		
Included in the tool or work	0 492 518		
Storage location			
Replaced by			
In connection with			
SI-Number			

Links

General repair instructions	Used in step
34 00 ... General notes	2
Operating materials	Used in step
2.0 Grease for wheel centring	4

Parts

Parts required

Designation	Used in step
Universal cleaner	4

**Important!**

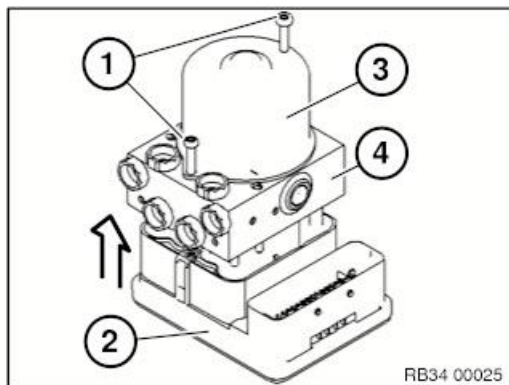
Read and comply with notes on [protection against electrostatic discharge \(ESD protection\)](#).

**Necessary preliminary tasks:**

- Remove [hydraulic unit](#).
- Immediately close off all hydraulic connections with protective caps!
- Clean the DSC control unit on the outside.

**Important!**

- The hydraulic unit must not be more than 7 years old.
- May only be replaced once. Check repair history!
- No longer install hydraulic unit if subjected to mechanical stress (dropped, impact).
- Then use lint-free cloths and cleaning agent free of mineral oil.
- Do not touch any contact surfaces on the connector, pressure sensor and control unit with the hand or objects.

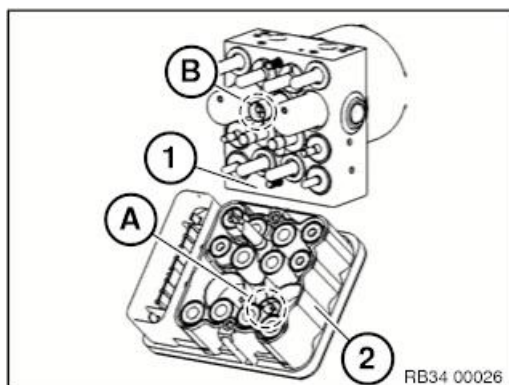
**Important!**

- Control unit (2) must not come into contact with dirt or moisture.
- Contacts must not be bent!

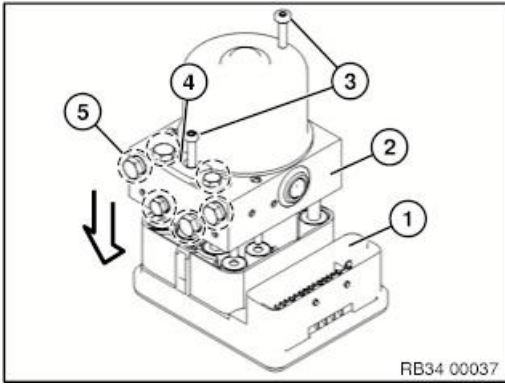
Release screws (1).

Firmly hold pump motor (3) together with valve block (4).

Carefully detach DSC control unit (2).

**Important!**

- The white moulding compound at the base of the DSC control unit (2) serves as a seal and must not be removed.
- Do not touch the contacts of pressure sensors (A) and (B) at DSC hydraulic control unit (1) and DSC control unit (2); otherwise, they could corrode.



Take DSC hydraulic control unit (2) out of the original packaging (part number 67 97 896).

Place the DSC hydraulic unit (2) straight on control unit (1) without twisting.

Installation note:

Replace screws (3).

Tightening torque [34 51 1AZ](#)

Important!

- The hydraulic unit is completely sealed in the area of the pressure sensor connection only after complete assembly.

Installation note:

- When installing the hydraulic unit, only remove retaining tab (4) and screw plug (5) directly before connecting the brake lines.



- Brake line mix-up test:
- Bleed [braking system](#)

64 00 ... Information on using cleaning agent/paints (personal protection equipment)



Warning!

Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!



Important!

Observe following instructions:

- Store cleaning agents/paints only in a secure cabinet.
- Keep cleaning agents/paints away from naked flames and other sources of ignition.
- Protect cleaning agents/paints from high temperatures and direct sunlight.
- Always keep an eye douche on hand, change the water regularly (once a month).



Important!

Observe following instructions before use:

- Manufacturer's instructions (on container/packaging)
- Hazard warnings (on container/packaging)
- Manufacturer's instructions on package insert
- Material safety data sheet of manufacturer
- Product information in EPC
- National market regulations



Important!

Observe following instructions during use:

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with skin and eyes.
- Wear personal protective clothing/equipment.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Immediately change working clothes soiled with cleaning agent/paint.
- After finishing work, wash your hands and apply protective skin cream.



Important!

Follow hazard warnings and wear personal protection equipment!

**First Aid:**

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

**Recycling:**

Dispose of cleaning agents/paints in a professional manner!
Observe national/country-specific disposal regulations.



Screw securing adhesive is a means of preventing a screwed connection from being loosened by external influences.

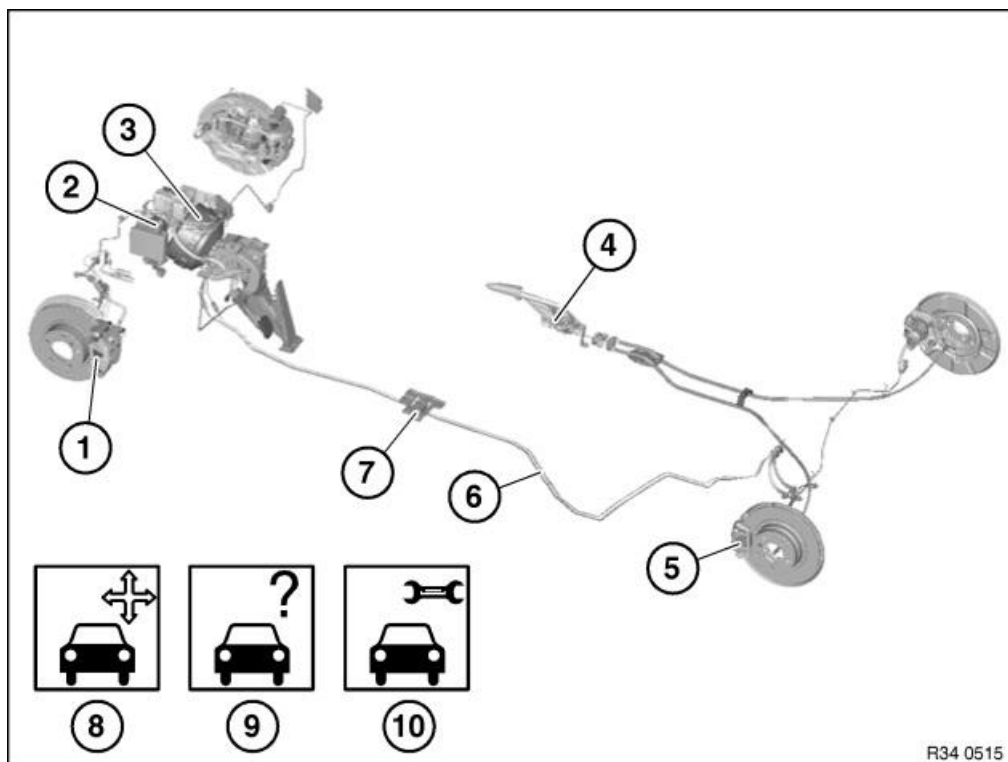
Once the screw has been coated with adhesive, the adhesive remains inactive until such time that it is activated by the encapsulation breaking when the screw is inserted and then cures (hardens) at room temperature.



Installation note:

- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must not be retightened
- Thread of nut must be cleaned beforehand in event of repeated use

34 Overview of brakes



0 [General Information](#)

- | | |
|---|---|
| 1 Front brake | 6 Brake lines |
| 2 Hydraulic unit | 7 Electronic components |
| 3 Brake master cylinder / brake servo | 8 Adjustment work |
| 4 Parking brake | 9 Troubleshooting |
| 5 Rear brake | 10 Testing |