WELCOME TO *PORSCHE OF ANNAPOLIS*

Tech Session

With:

Alexis Rodriguez,

Stephen Ryan

and

Dave McDowell

TIRES

TIRES ARE THE ONLY SAFETY ITEM ON YOUR CAR THAT ACTUALLY TOUCH THE ROAD. THE WRONG TIRES IN THE WRONG TEMPS CAN BE VERY DANGEROUS.

PORSCHE

Advanced Technical Information

All
1601 4440 **4**

Binder – Advanced Technical Information

Cold Temperature Related Damages and Handling Characteristics of Michelin Pilot Sport Cup 2 Tires

Vehicle Type: **All**

Model Year: **2014-2016**

Information: Michelin Pilot Sport Cup 2 Tires are designed for summer-only use and provide reduced traction at temperatures at or below 40°F (5°C). Therefore, use of vehicles equipped with these tires is not recommended at ambient temperatures at or below 40°F (5°C).

⚠ **WARNING! Do not attempt to move any vehicle equipped with these tires that is parked in temperatures 20°F (-7°C) or colder. The tires will develop deep cracks in the sidewall and tread areas. Any tires found to have these cracks are permanently damaged and must be replaced before the vehicle can be operated safely.**

These tires must not be used, dropped or even rolled at temperatures at or below 20°F (-7°C). Tire damage due to use, dropping or rolling at temperatures at or below 20°F (-7°C) is **not warrantable**. Michelin recommends that the tires be warmed to at least 40°F (5°C) before use or handling.

At time of publishing, Michelin Pilot Sport Cup 2 Tires are factory installed on the 918 Spyder, 911 GT3/GT3 RS (991) and Cayman GT4 (981) vehicles.

PORSCHE RECOMMENDS REPLACING TIRES EVERY 6 YEARS REGARDLESS OF MILEAGE

-BOTH TIRES ON THE SAME AXLE SHOULD BE REPLACED AT THE SAME TIME. IF A TIRE IS DAMAGED AND THE MATCHING TIRE IS LESS THAN 30% WORN, REPLACE ONLY THE DAMAGED TIRE. THIS RULE APPLIES TO ALL FOUR TIRES ON ALL-WHEEL DRIVE VEHICLES. HANDLING INCONSISTENCIES MAY RESULT IF THIS IS NOT DONE. (THE 30% RULE IS NOW THE 2MM RULE ON NEWER CARS)

-ONLY TIRES WITH THE SAME "***N***" NUMBER AND DESIGN MAY BE USED ON THE SAME VEHICLE. IF A MATCHING TIRE WITH THE SAME N NUMBER CANNOT BE SOURCED, REPLACE ALL FOUR TIRES.

Branded as N-Spec

Production tires that have passed all of the tests and received Porsche's engineering department's release can be branded with an N-specification. The N-specification brandings include: N-0 (N-zero), N-1, N-2, N-3, N-4, N-5, or N-6. These markings on a tire's sidewall clearly and permanently identify them as approved by Porsche for their vehicles. The N-0 marking is assigned to the first approved version of a tire design. As that design is refined externally or internally, the later significant evolutions will result in a new generation of the tire to be branded with N-1, N-2, N-3, etc., in succession. When a completely new tire design is approved, it receives the N-0 branding and the succession begins again.

Break-in of New Tires

Initially, new tires do not offer their full traction. Drivers should therefore drive at moderate speeds during the first 60–100 miles (100–200 km). If new tires are installed on only one axle, a noticeable change in handling occurs due to the different tread depth of the other tires. This happens especially if only rear tires are replaced. However, this condition disappears as new tires are broken in. Drivers should adjust their driving style accordingly.


Tire Manufacturer
Passenger Car Tire
Cross-Section Width (mm)
Ratio of Cross-Section Height to Width (%)
Speed Rating
Radial Construction
Rim Diameter (inches)
Speed Symbol & Load Index
N Number
DOT Identification
Maximum Load
Uniform Tire Quality Grading
MANUFACTURER TYPE
DOT XN V9 XKAU 0801
P 235 / 50 ZR 17 96W
TREADWEAR 360 TRACTION A TEMPERATURE A
MAX LOAD 710 kg (1565 LBS)
GT3

DOT Markings:

DOT markings signify that the tire meets or exceeds U.S. Department of Transportation Tire Safety Standards and that the tire is permitted for highway use.

Typical markings: DOT XB FU XJJX 479

The characters are defined as follows:
DOT Department of Transportation approval
XN Fourth and fifth characters – tire manufacturer and plant code
V9 Sixth and seventh characters – tire size code
XKAU Eighth–eleventh characters – manufacturer's optional symbols
0801 Date-of-manufacture code (8th week of calendar year 2001).

TIRE SCRUBBING

TIRE SCRUBBING IS A LATERAL MOVEMENT OF THE TIRE OVER THE SURFACE ON WHICH IT RESTS. IT MAY OCCUR AT HIGHER STEERING ANGLES AT LOW VEHICLE SPEED. THIS MAY RESULT IN A COMPLAINT OF TIRE AND FRONT END NOISE. MAY ALSO CAUSE A STEERING FEEDBACK. THERE ARE NUMEROUS FACTORS INVOLVED IN TIRE SCRUBBING, SEVERAL ARE DESCRIBED BELOW:

-STEERING GEOMETRY

-TEMPERATURE

-TIRE SIZE

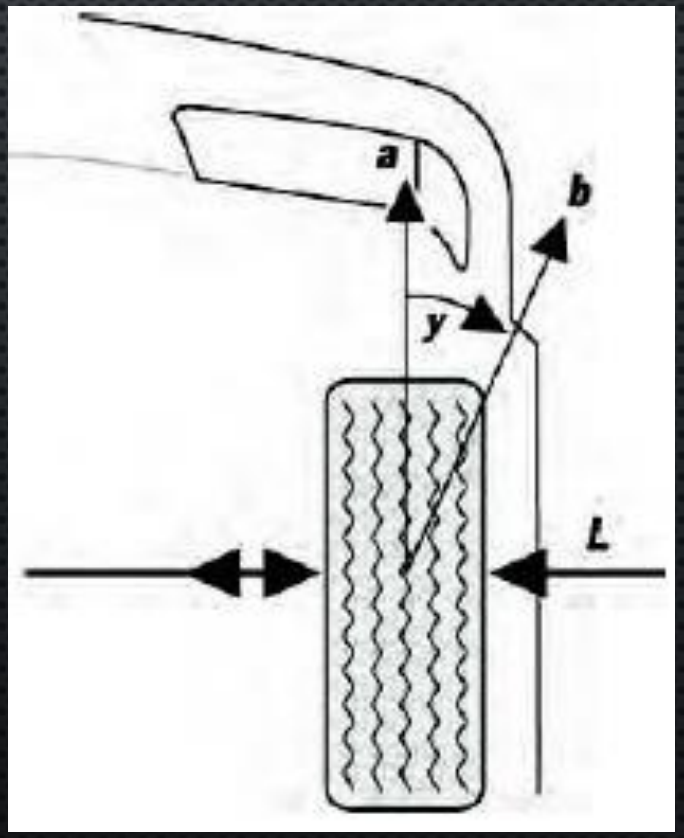
-TIRE COMPOUND

-SUSPENSION COMPONENTS

AND **SLIP ANGLE !**

Slip Angle

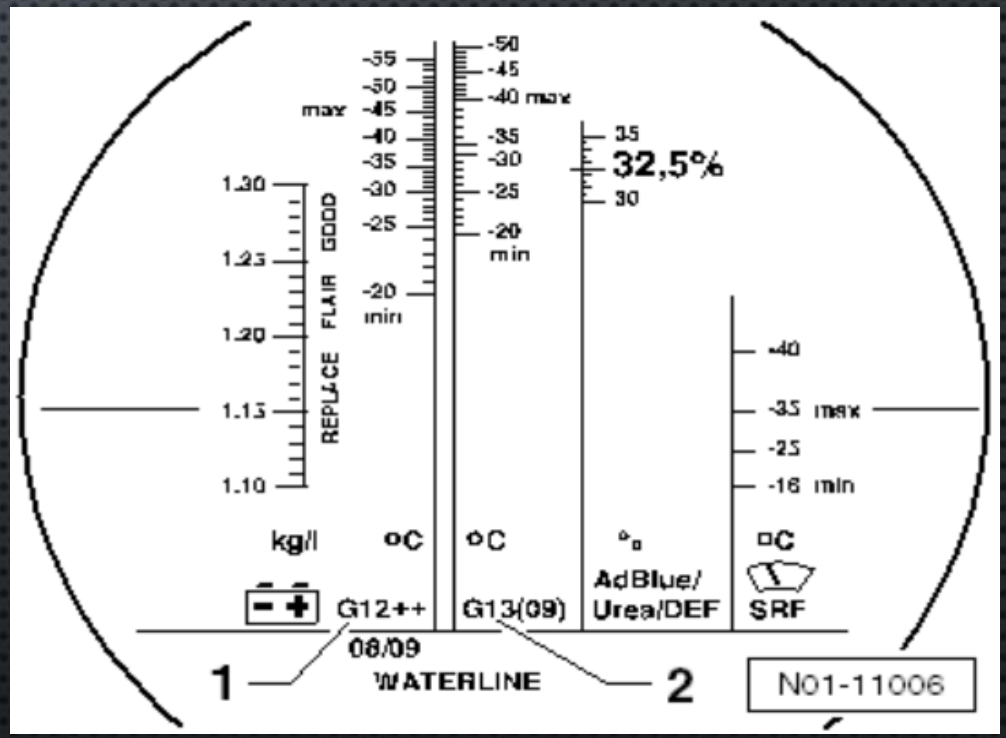
Slip angle (y) is the direction the tire is pointing, versus the direction the tire is traveling. Some level of slip angle is required for turning.



a - Wheel centerline
b - Direction of travel
y - Slip angle
L - Wheel contact forces/lateral

COOLANT

- THE COOLANT CONCENTRATION MUST NOT BE REDUCED BY ADDING WATER EVEN IN WARMER SEASONS.
- THE FROST PROTECTION MUST BE AT LEAST -25°C.
- ONLY REFRACTOMETER -T10007A- MAY BE USED FOR DETERMINING CURRENT ANTI-FREEZE VALUE.
- READ OFF ANTI-FREEZE FIGURES FOR RESPECTIVE REPLENISHED ANTI-FREEZE.
- THE TEMPERATURE READ OFF THE REFRACTOMETER -T10007A- EQUATES TO THE »ICE FLOCCULATION POINT«. ICE CRYSTALS CAN START FORMING IN THE COOLANT BELOW THIS TEMP.
- USE ONLY A WATER/ANTI-FREEZE MIXTURE AS A SLIP AGENT FOR COOLANT HOSES.
- DO NOT REUSE OLD COOLANT.
- G12 OR G13 COOLANT ONLY.



COOLANT MIXTURE RATIO

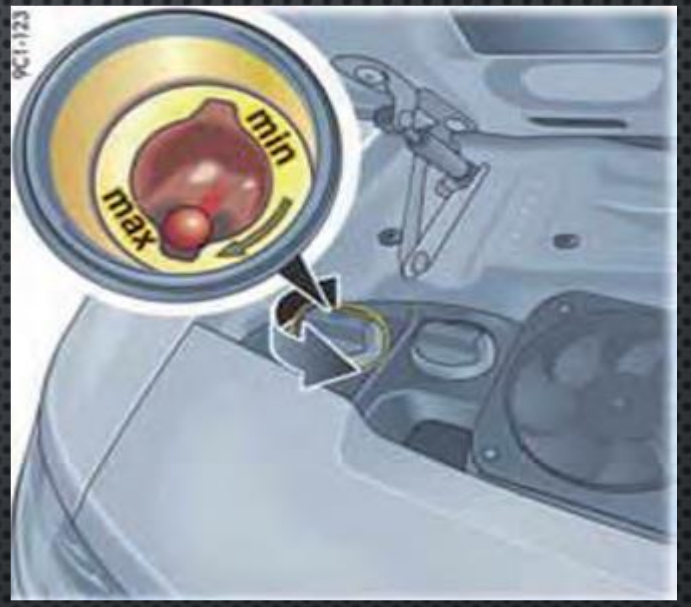
Frost protection to	Coolant additive concentration	Coolant additive	Distilled water
-25 °C -36 °C	40 % 50 %	3.2 l 4.0 l	4.8 l 4.0 l

CHECKING COOLANT LEVEL

LET THE FLUID COOL DOWN!

911

- THE RED BALL INDICATES THE CURRENT COOLANT LEVEL. THIS BALL MUST BE IN THE AREA BETWEEN THE MIN AND MAX MARKINGS WHEN THE ENGINE IS COLD AND THE VEHICLE IS LEVEL. THE COOLANT QUANTITY CAN VARY BETWEEN 30.3 AND 32 QTS (28.7 AND 30.3 LITERS) DEPENDING ON EQUIPMENT.



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- THE COOLANT LEVEL INDICATOR MUST BE BETWEEN THE "MIN" AND "MAX" MARKINGS WHEN THE ENGINE IS COLD AND THE VEHICLE IS HORIZONTAL.

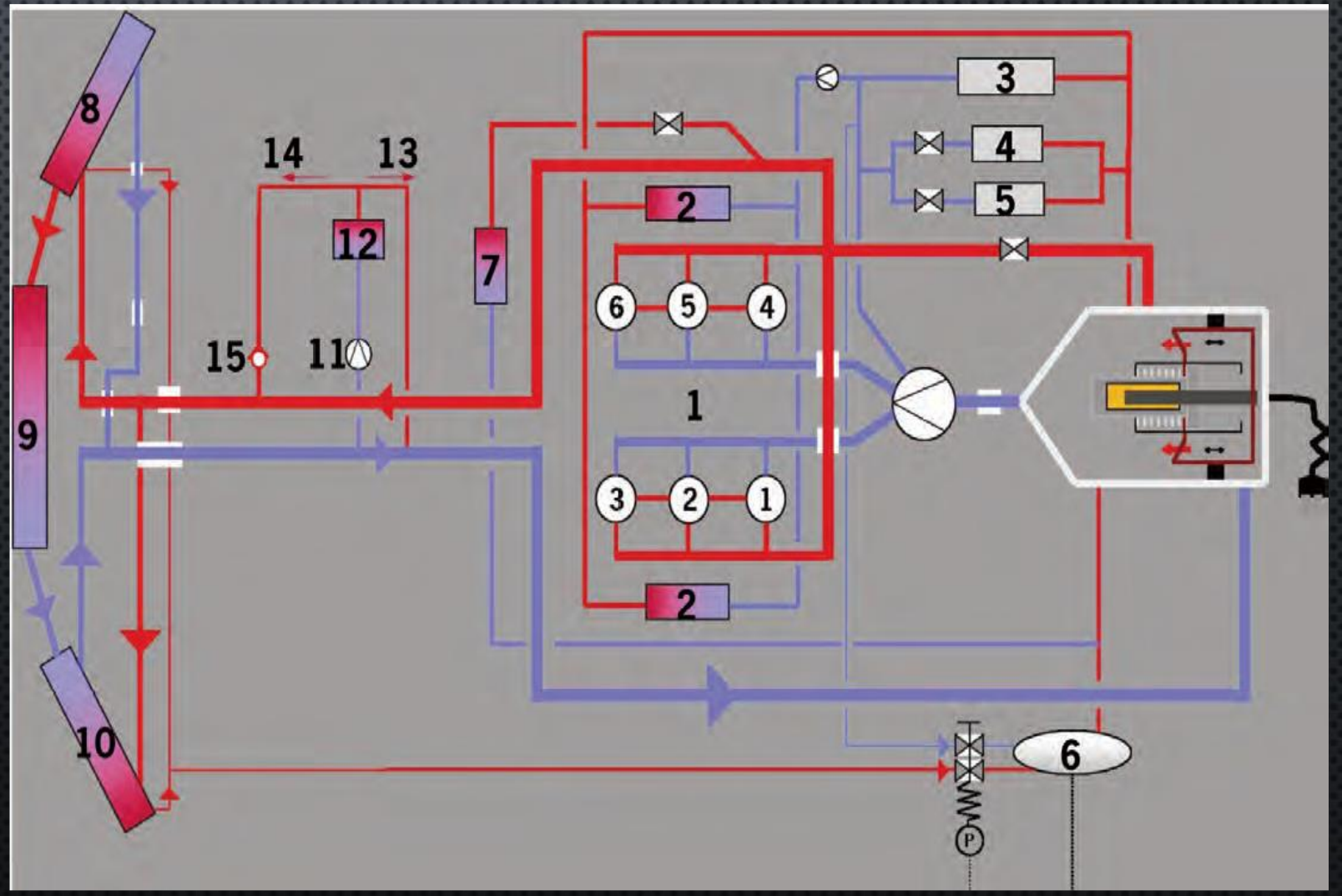
THE COOLANT QUANTITY CAN VARY BETWEEN 6.1 AND 6.6 GAL (23 AND 25 LITERS) DEPENDING ON EQUIPMENT.

FILLING AND BLEEDING COOLANT

- Unfortunately this is no longer something for the do it your selfer. It must be done at the dealer and the Porsche scan tool is needed along with Battery trickle charger, Filling device 9696 and VAS 6096/2 Vacuum pump. **This is why.**

911 Turbo (991) Cooling circuit

1. Cylinders 1 to 6
2. Turbocharger
3. Engine oil heat exchanger
4. Heat exchanger for PDK gear wheel set
5. Heat exchanger for PDK clutches
6. Coolant expansion tank
7. Heating heat exchanger
8. Right radiator
9. Center radiator
10. Left radiator
11. Pump for front-axle final drive
12. Heat exchanger for front-axle final drive
13. Cooling system with thermostat open
14. Cooling system with thermostat closed
15. Check valve

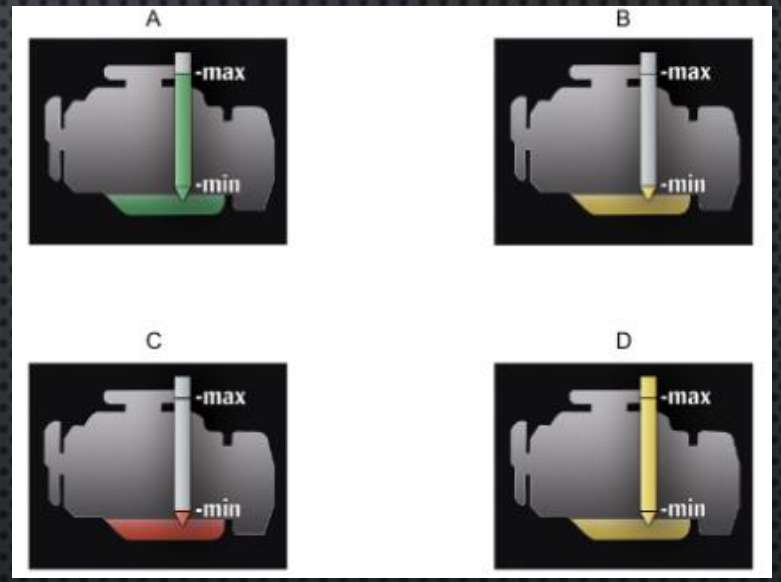


OIL SERVICE

- Drain oil when the engine is at operating temperature (oil temperature at least 90 °C).
- Let oil drain out for a minimum of 20 minutes.
- After draining the engine oil, fit oil drain plug with a new sealing ring.
- Check tightening torque for plug and oil filter.
- The difference between min and max is 1 liters (GT3 0.5 liters).
- Don't forget no more dipstick.
- Refer to the owners manual for checking oil level.
- The oil level is measured when the engine is at operating.
- Vehicle is parked on a level surface.
- Switch off the engine when it has reached operating temperature.
- The following message must appear in the display before measuring oil level in the cluster:

"No information on the oil level is available at present"

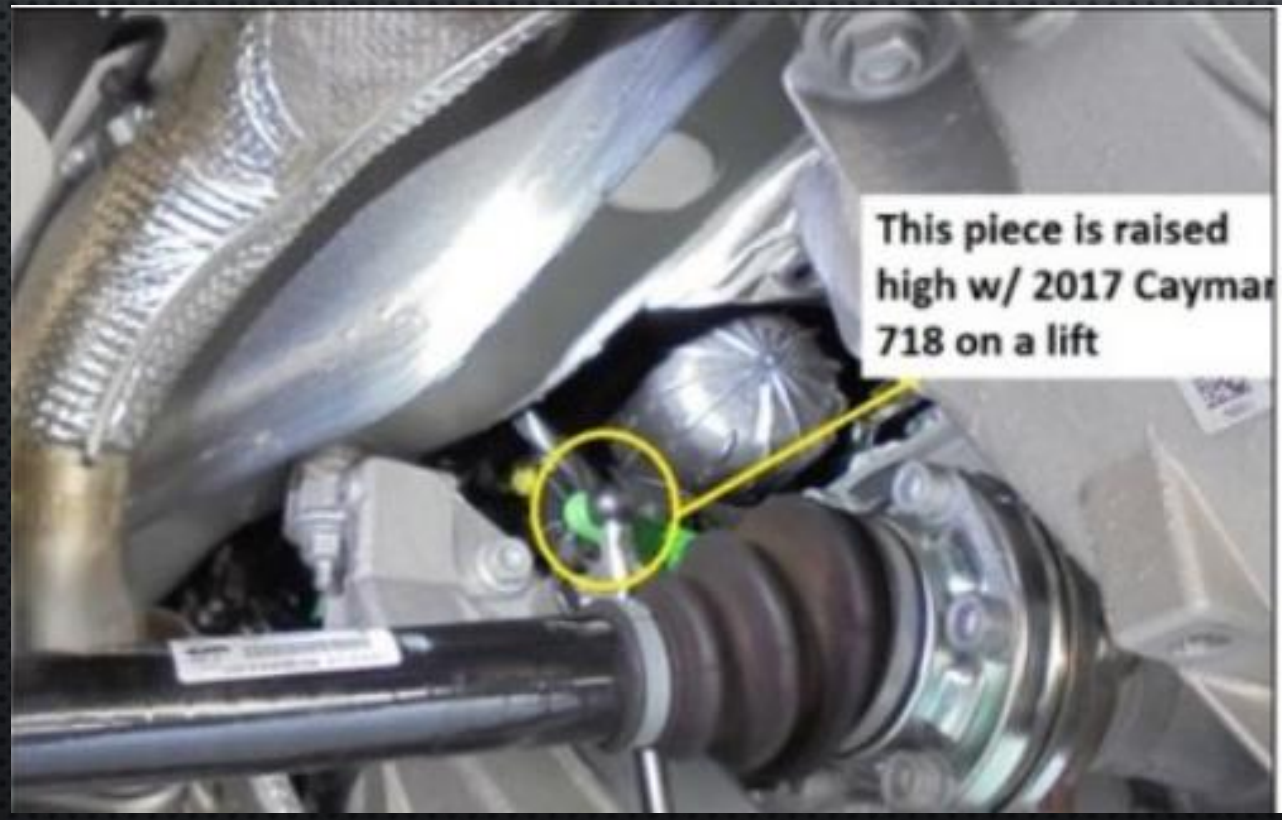
- Otherwise this is just a stored value in the cluster.
- try to set it just below max.



NOW DEPENDING ON MODEL THIS MAY GET MESSY.

718

ON THE 718 YOU NEED TO REMOVE REAR ANGLE SENSOR FOR HEADLIGHT BEAM ADJUSTMENT TO GET TO THE OIL FILTER. BE CARFUL THIS SENSOR WILL BREAK AND OIL FROM THE FILTER WILL GET ALL OVER THE AXEL, FRAME, AND ENGINE.

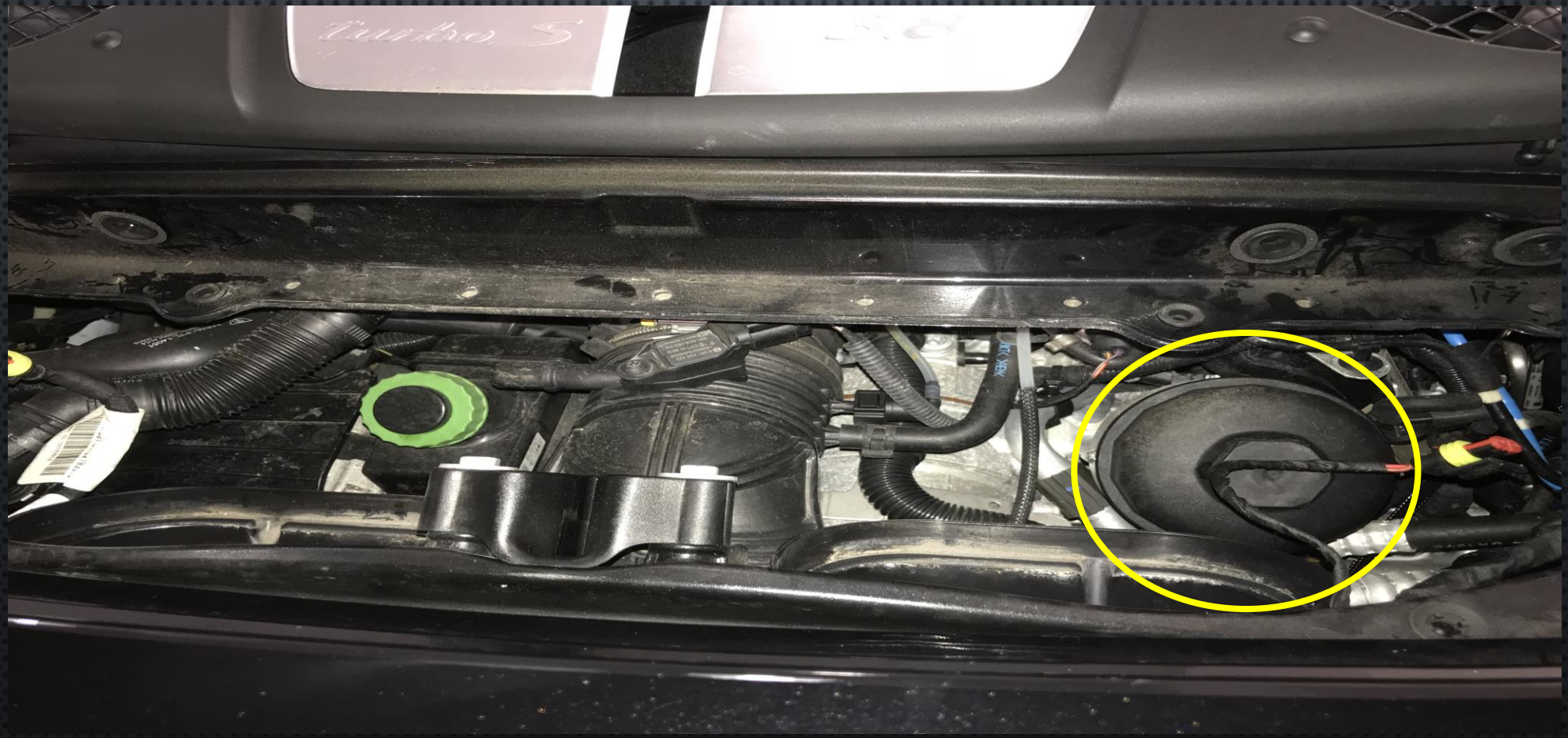


981

ON THE 981 THE OIL FILTER IS ABOVE THE FRAME AND WILL DRAIN IN TO THE FRAME RAILS.

991

On the 991 the oil filter is under the fan housing and will drip on the paint if not careful when removing. Don't leave rags in the engine compartment, they well catch fire. We use a special cover (9882) when removing the filter



Wheel Mounting

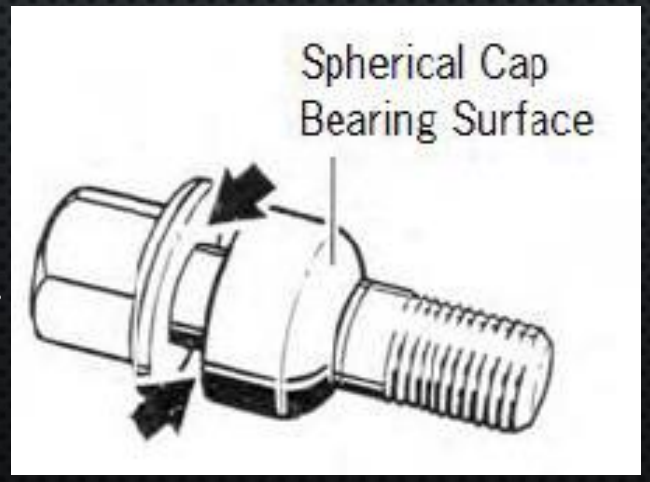
Silver Wheel Bolts (M.Y. 1997–2011)

- Always torque wheels with the vehicle off the ground.

- Always refer to the service information for proper torque specifications and lug bolt size before mounting wheels.

- Always apply a thin coat of Optimoly TA (aluminum paste) on the thread of the wheel bolts, on the shank between the bolt head bearing surface and spherical cap ring (arrows under the head).

-Do not grease the spherical cap bearing surface of the wheel bolts that face the wheel.

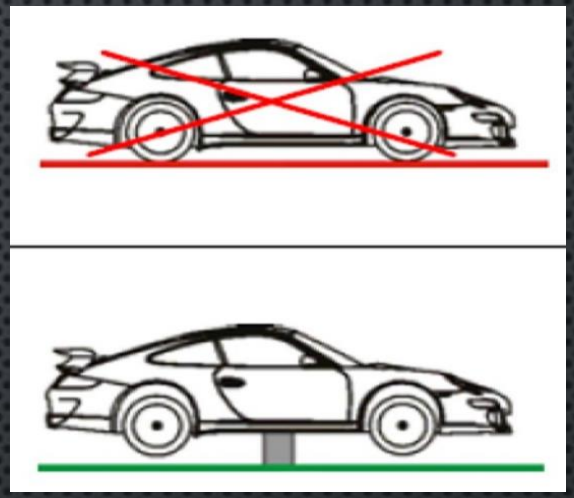


Black Wheel Bolts as of M.Y. 2012

- Dimensionally the same as Silver Wheel Bolts.

- DO NOT grease Black Wheel Bolts.

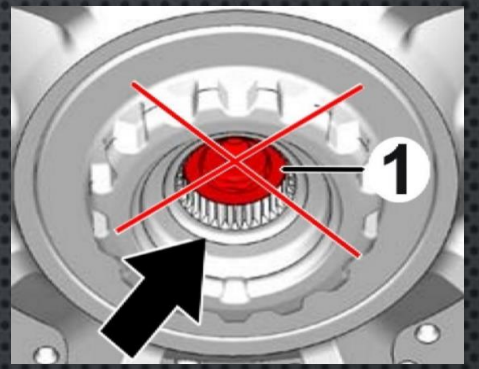
CENTER LOCK WHEELS



- Only use the permitted socket wrench on the 911 with centre-lock wheel!
- Never use the 9451 socket wrench from the Carrera GT.
- Under no circumstances use the 997 lockable wheel bolt on the 991!
- Five new wheel drivers (1 set) must be fitted when replacing the brake disc.
- Carefully lever the crested hub cap out using the special tool.
- Raise the vehicle so the wheels with the vehicle off the ground.
- When loosening the central bolt, Get a second person to press the brake pedal to prevent the wheel from turning (**DO NOT USE PARKING BRAKE!**) and make sure that the tool remains fully engaged and does not slide off even slightly.
- screw the (hub extension) into the wheel hub before taking off the wheel.
- Use a suitable torque wrench (together with socket wrench 9796) to tighten the central bolt **using the three-step tightening procedure**.
  1. 600 (444 ftlb.) Nm
  2. - 90 ° back off
  3. 600 (444 ftlb.) Nm

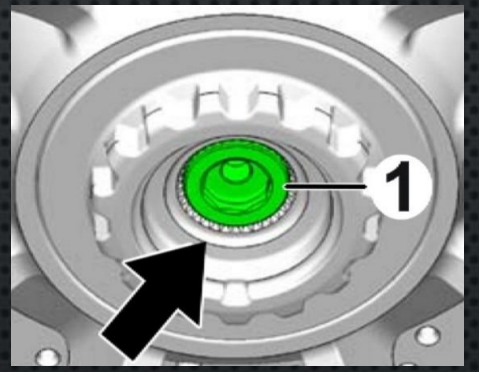
THE LOCKING PIN

- IF THE LOCKING PIN -1- IS STILL AT THE REAR POSITION *WHEEL BOLT NOT SECURED* AND HAS NOT YET ENGAGED IN THE INNER TOOTHING OF THE CENTRAL BOLT, THE CENTRAL BOLT IS STILL NOT SECURED AND MUST BE SECURED MANUALLY TO PREVENT IT FROM BECOMING LOOSE.



Wheel bolt not secured

- WHEN THE CENTRAL BOLT IS SECURED, THE END OF THE LOCKING PIN -1- WILL BE FLUSH WITH THE INNER TOOTHING OF THE CENTRAL BOLT.

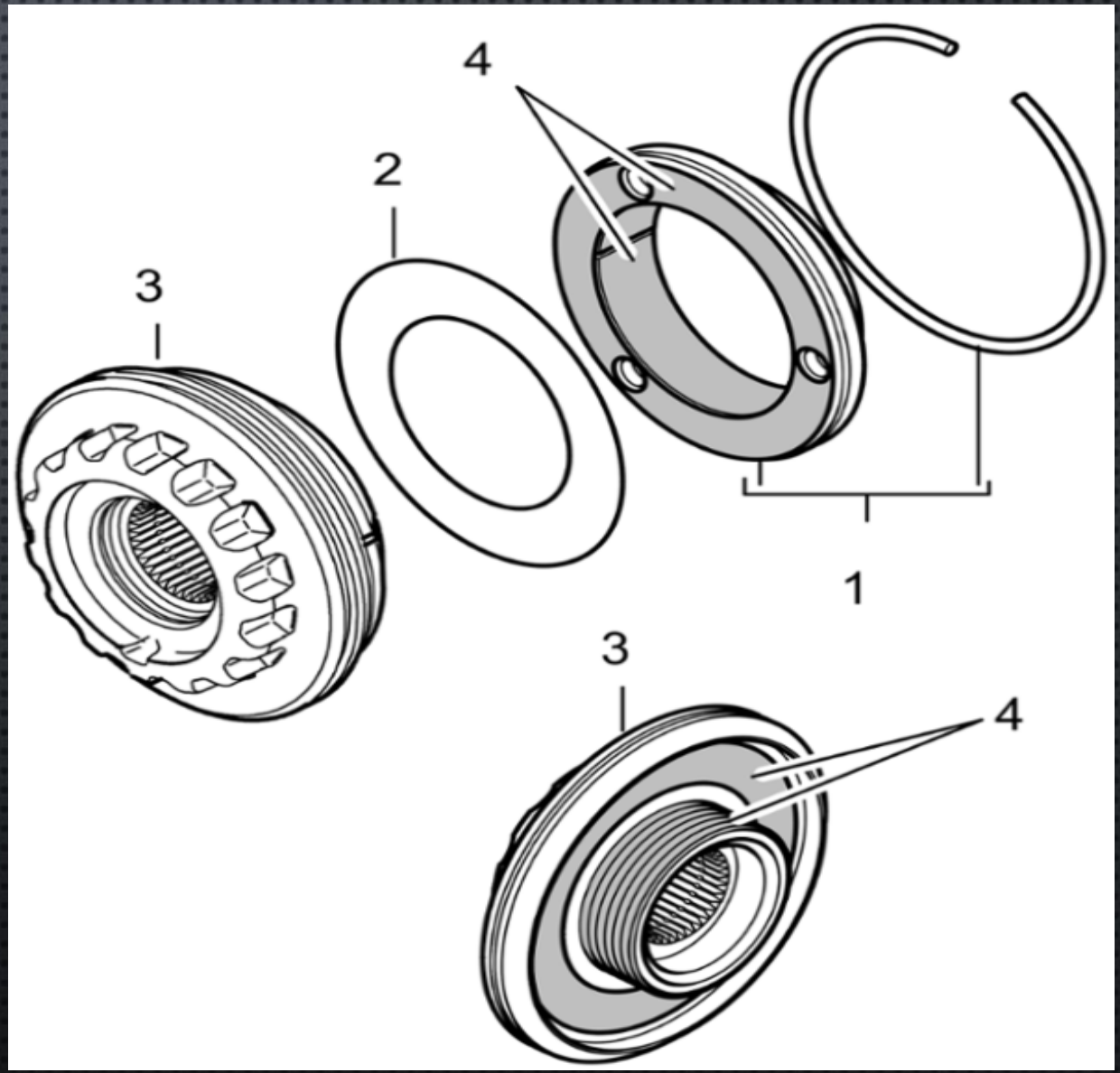


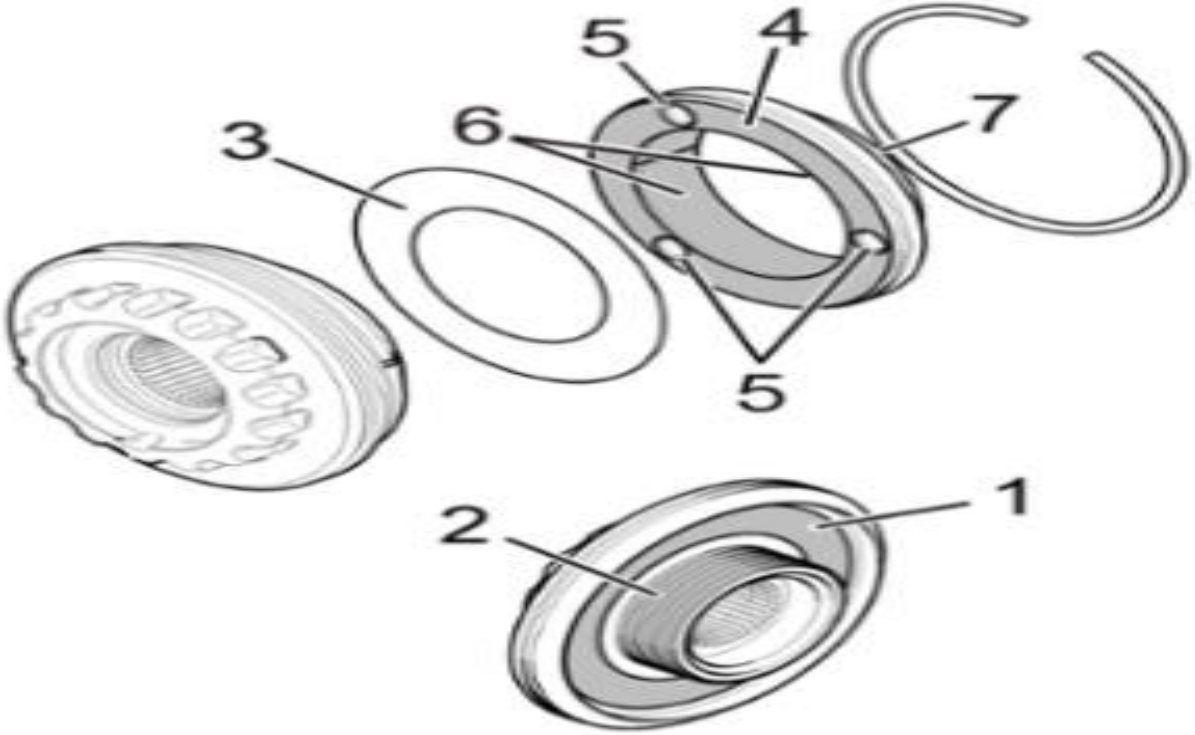
Wheel bolt secured

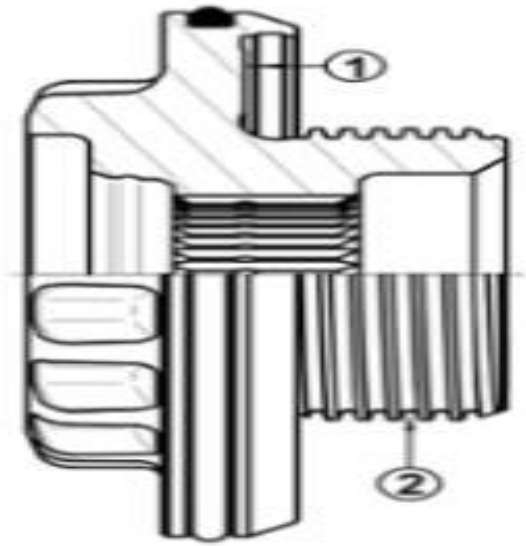
- IF REQUIRED, TURN THE LOCKING PIN -1- TO THE LEFT AND RIGHT USING AN AUXILIARY TOOL OR A 1/2-INCH SQUARE EXTENSION -DIRECTION ARROWS- UNTIL IT ENGAGES IN THE CENTRAL BOLT. THIS APPLIES TO BOTH ROAD AND RACE TRACK USE.

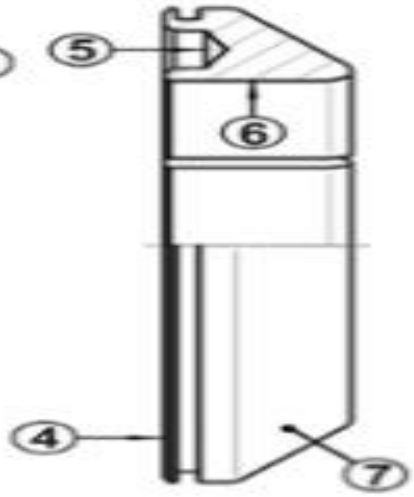
CENTRAL BOLT

- REMOVE CONE RING -1- FROM CENTRAL BOLT -3-. A CIRCLIP HOLDS THE CONE RING -1- IN THE WHEEL BOLT -3-.
- TO REMOVE THE CONE RING -1-, DETACH IT FROM THE WHEEL BOLT -3- BY TAPPING SHARPLY ON A WOODEN BASE (THREADED SIDE FACING DOWN TO THE WOOD).
- RE-GREASE SURFACES OF THE DISASSEMBLED CENTRAL BOLT (AS DESCRIBED IN THE OVERVIEW).









	Designation	**Grease with Optimoly TA**Part No. 000.043.020.00
1	Circular area on central bolt	Apply a **light** coating of grease (approx. 0.2 – 0.5 mm thick).
2	Trapezoidal thread on central bolt	Apply a **generous** coating of grease (approx. 0.5 – 1.0 mm thick).
3	Washer	Do **not** grease the washer (applies to both sides).The washer will be re-greased automatically on both sides during assembly and when the components are subsequently screwed together.
4	Circular area of cone ring	Apply a **light** coating of grease (approx. 0.2 – 0.5 mm thick).
5	Reserve bores on cone ring	Fill bores with grease so that they are 1/3 to 2/3 filled with grease.
6	Inner circular area on cone ring	Apply a **light** coating of grease (approx. 0.2 – 0.5 mm thick).
7	Conical area on cone ring	Apply a **light** coating of grease (approx. 0.2 – 0.5 mm thick).

ALIGNING THE CREST

Brake fluid

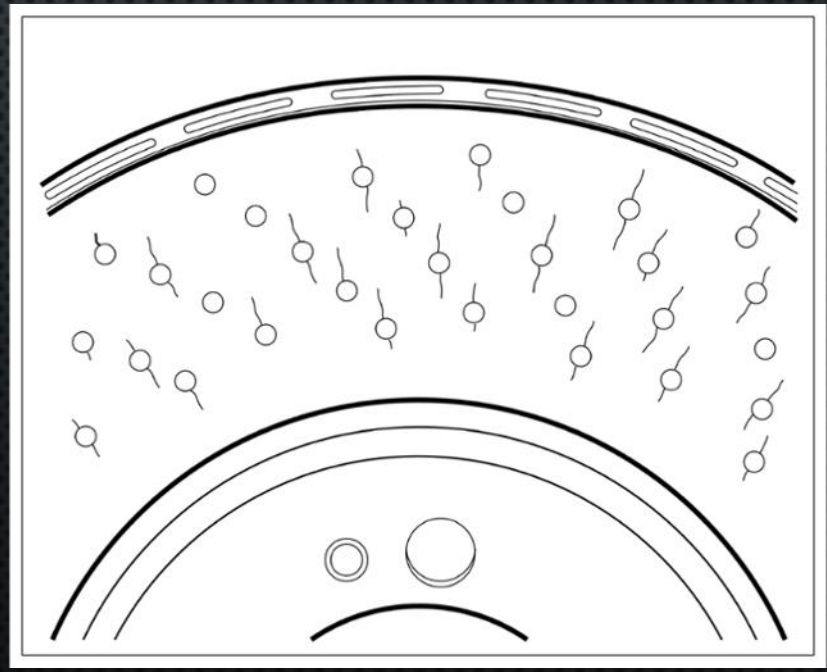
- Brake fluid serves as a hydraulic medium for force transmission in the braking systems. It must meet very high standards in order to ensure safe functioning of the brakes. These requirements are set down in various standards, Porsche specifies Super DOT 4 brake fluid. DOT 3 and DOT 4 brake fluids are both glycol-based fluids, but DOT 4 has a higher boiling point. DOT 5 brake fluid is silicone-based and is not compatible and not recommended.
- Recommended every 2 years.

BLEEDING THE BRAKES

- Suck out the old and fill reservoir up to the edge with new brake fluid.
- When bleeding the brake fluid you should use a bleeding device. Connect bleeding device to the reservoir with a Bleeding pressure of 2.0 bar.
- Continue changing the brake fluid at the brake callipers. Do this in the following sequence: rear right/rear left/front right/front left.
- Use a transparent hose and a collecting bottle to check that the escaping brake fluid is clean and free of air bubbles and to determine the amount of brake fluid used.
- Drain brake fluid from every brake caliper at both bleeder valves. Outside valve and then the inside valve.
- Tighten the bleeder valves to 8 – 12 Nm(6 – 9 ftlb.)
- the reservoir must be between the MIN and MAX markings once the vehicle has been filled and bled.

INSPECTING BRAKES

- Visually inspect the brake pads for wear. There is no need to remove the wheels unless the brake fluid needs to be changed at the same time. A mirror can also be used to inspect the inside pad.
- There are also tools out there to measure the brakes with the wheels on.
- Note that the brake pad wear indicated will set off the warning light between 3-4mm.
- Normally, brake disc replacement is necessary after the thickness falls below the minimum. In rare, isolated cases (of very high loads for long periods) replacement may be necessary due to crack formation.
- To a certain extent, these cracks may be rated as not important. The maximum permitted perforation crack length is 5 mm.
- The minimum thickness is stamped on the rotor hat.
- If you do happen to have the wheel off I would advise to inspect the brake lines for damage, kinks, twisting, and proper routing.



REPLACING BRAKES

- When replacing brakes be sure to use the factory parts. There is a common misconception that all brakes should exhibit the same characteristics. In the North American Market (U.S. & Canada), one brake friction material is used more than any other is. It is called Non Asbestos Organic (NAO). The dominance of this friction material in the market has aided this misconception. Porsche uses a Low Met friction material to meet our high performance standards.

The characteristics of NAO material are:

- Excellent Noise, Vibration, & Harshness (NVH) characteristics
- Excellent lining wear
- Produces low amounts of wheel dust
- Friction level fades at high temperature

Characteristics of Low Met material are:

- High coefficient of friction
- Excellent fade characteristics (friction level does not fade at high temperature)
- Very effective at stopping the vehicle
- Noise can be more than other friction materials
- Wheel dust is a normal by product
- Lining life is low (compared to NAO for example)

- Before removing the brake pads, a small amount of brake fluid must generally be removed by suction (from the reservoir) to prevent an overflow when pressing the brake pads back.

- Replace both pads and rotors at the same time.

- Use new mounting parts and always check tightening torque.

PORSCHE CERAMIC COMPOSITE BRAKE (PCCB)

- Advantages:
- 50% reduction in rotating and unsprung masses compared to conventional brake discs of the same diameter
- High life expectancy for brake components (brake discs should last up to approximately 200,000 miles)
- Quick response, whether brakes are hot or cold
- Constant friction coefficients, resulting in the highest fading stability
- Excellent responsiveness in wet conditions
- High resistance to corrosion
- Safety reserves during extreme stresses

Warranty Information

All
0517

Binder - Camp., Lit., Train., Warr.

Porsche Policy re: Aftermarket Parts on Porsche Vehicles

Attention: **Warranty Administrator /Service Manager / Parts Manager**

Information: **To All Porsche Cars North America Dealers**

The installation of aftermarket equipment on Porsche vehicles may adversely affect the vehicles performance and/or safety and potentially pose a risk to occupants and third parties. As a reminder:

All Porsche vehicles are tested and certified to meet or exceed all applicable safety and emissions standards. Changing or replacing original equipment on a Porsche with after-market items may compromise or alter the vehicle's safety, performance, integrity, reliability and/or emissions. Such modifications may also affect the warranty coverage to which the vehicle is entitled.

The installation of aftermarket parts and accessories constitutes an unauthorized modification that is not covered by PCNA's new vehicle limited warranty or the certified pre-owned warranty. Items damaged or impaired by, or as a result of, an aftermarket part or accessory are also not covered by the Porsche warranties. This topic is fully addressed in the Warranty and Customer Information booklet provided with each new Porsche vehicle and the Porsche Approved Pre-Owned Warranty booklet provided with each pre-owned vehicle; we urge you to review the terms. Voiding all or part of a Porsche warranty is a matter with significant implications for customer satisfaction.

We would also like to remind you that if you elect to install any part or accessory on a Porsche automobile that is not a Genuine Porsche Part or **Accessory you must disclose such fact to the owner of the vehicle and must, before such installation, advise the owner that the part or accessory is not authorized by, or covered by a warranty from, Porsche Cars North America**. You must also, in all cases, avoid the installation of any after-market item that might affect the vehicle's safety, performance, reliability, emissions or structural integrity.

Porsche Cars North America views this matter with the utmost seriousness. We are sure that you are as eager as we are to avoid any injury to our customers or damage to their property. We are also sure that you understand that a customer of an authorized Porsche dealer will naturally tend to rely on the authenticity and safety of products offered for sale in connection with the Porsche trademark. We request that you fully advise the customer of the concerns expressed by this letter and obtain the customer's informed (and written) consent before selling or installing such products on his or her vehicle.

Thank you for your anticipated cooperation.

Don't Forget

Here are a few items that are often overlooked:

- Body, top, and sunroof drains
- Replace air intake pre-filter
- Radiators and air intakes:

visual inspection for external contamination and blockage

- Service and maintain convertible top
- Check charge-air cooler for dirt
- Change brake fluid every 2 years at both inner and outer bleeder screws