



PRECISION PERFORMANCE
SINCE 2008

FUELS AND LUBRICANTS
CURRENT AND FUTURE TRENDS

Fuels and Lubricants

Current and Future Trends



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Disclaimer

- The recommendations contained herein are provided at your own risk.



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Driving

Your Porsche was meant to be driven.

Short drives are bad for your engine.

Extended storage is bad for your Porsche.

Drive your Porsche.





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Ethanol PROS

- Corn ethanol is used as an oxygenate and octane booster in the US to conform to ASTM D5798 ethanol fuel standards.
- Ethanol enriched fuels show a reduction of CO and HC emissions.
- Ethanol has a higher specific heat energy and higher resistance to detonation.



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Ethanol CONS

- Ethanol is hygroscopic.
- Ethanol increases the water solubility of fuels, which can lead to corrosion of internal engine components.
- Water is the carrier for the corrosive chlorides and other ions that lead to significant corrosion.
- Oxidation occurs through the formation of aggressive chemicals like aldehydes and acids.



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Ethanol CONS

- Ethanol is a solvent and will cause deterioration of rubber and plastic fuel system components that are not ethanol rated with up to a 70% loss in strength.
- The lubricity of ultra-low sulfur ethanol enriched fuels is significantly reduced compared to E0.
- Fuel economy is reduced up to 6.5%.
- Current sources are at best carbon neutral.



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Ethanol Fuels

- Unless labeled as non-ethanol or ethanol-free, most domestic unleaded fuel is E10.
- E10 – maximum ethanol content is 10%.
- E15 – 15% ethanol
- E85 – 85% ethanol





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Ethanol Fuels

- Models since MY1948 are not E10 compatible per Porsche (as of 5/7/12)
- Porsche models starting with the Boxster in 1997 are E10 compatible.
- E15 or E85 should never be used unless approved by the manufacturer.

PORSCHE

Manufacturer's Certificate

Freigabe/Approval
02/12 EN 2001 **2**

Compatibility of E10 fuels (02/12)

Vehicle Type: All Porsche standard-production vehicles

Model Year: As of 1984

Situation: Introduction of fuels with up to 10 % vol. bioethanol (so-called E10 fuels)

Compatibility: The following Porsche standard-production vehicles can be run on fuels with up to 10 % vol. bioethanol - E10 fuels:

Boxster	All vehicles since the introduction of the model range (from model year 1997 onwards) incl. the Boxster S, Boxster Spyder, etc. 986, 987 and 981 models
Cayman	All vehicles since the introduction of the model range (from model year 2006 onwards) incl. the Cayman S, Cayman R, etc. 987 models
911	All vehicles with water-cooled flat engine incl. all 911 Carrera/911 Targa/911 Turbo and 911 GT2/911 GT3 vehicles, etc. 996, 997 and 991 models
Cayenne	All vehicles since the introduction of the Cayenne model range (from model year 2003 onwards) incl. the Cayenne S, Cayenne S Hybrid, Cayenne Turbo, etc. with the exception of the Cayenne Diesel 9PA and 92A models
Panamera	All vehicles since the introduction of the Panamera model range incl. the Panamera S, Panamera S Hybrid, Panamera Turbo, etc. (from model year 2010 onwards) with the exception of Panamera Diesel vehicles 970 models

All vehicles listed in the table shown above are E10-compatible. No modifications, conversions or software changes are required on the vehicles for this purpose.

The minimum octane ratings, which are specified in the Driver's Manual and on the fuel tank cap, must be observed as well as the maintenance interval specifications in the "Warranty and Maintenance" booklet.



Information

All Porsche standard-production vehicles since model year 1948, which are not listed in this table, are not E10-compatible and must only be run on the fuels specified in the respective Driver's Manuals which contain max. 5 % vol. bioethanol. These fuels are labelled "Premium Unleaded in accordance with E DIN 51626-1" and "Premium Plus Unleaded in accordance with E DIN 51626-1" at filling stations. Different names can be used in the various countries.



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Fuel

- Only use Top Tier fuels like Shell V-Power if non-ethanol fuels are not available.
- Vehicles not E10 compatible should use non-ethanol fuels or require a fuel additive for protection.





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Top Tier Fuels

- Top Tier Fuels have higher standards for corrosion inhibitors, lubrication enhancers, detergents, and limits for moisture content.





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Non-Ethanol Fuels

- Always obey the minimum octane required for your vehicle.
- <https://www.pure-gas.org/>
- Pure-Gas.Org also offers an iOS and Android app to help you locate ethanol-free fuels.





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Fuel Additives

- Porsche offers a classic fuel additive for models not compatible with E10 fuels. PN 00004420602
- Driven offers Injector Defender and Carb Defender





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Storage

- Modern ethanol fuels start going bad within weeks – always add a fuel additive if the car sits.
- Products like Driven Storage Defender protect fuel system and oil while your car is in storage.
- Add any additives before fueling and run the engine to ensure all fuel system components are treated.
- Change your oil BEFORE the car goes into storage.



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Fuel Lines

- Older vehicles need modern fuel lines
- Do not use German braided fabric covered or any fuel hose unless approved for use with ethanol enriched fuels.





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Fuel Lines

- Griffiths offers SAE J30R9 ethanol compatible fuel hose for their line kits.
- Goodyear or similar E85 compatible ***fuel injection*** hose is a safe option for replacing old fuel lines on carbureted engines.





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New Oil Standards

- GF-6A, GF-6B and API SP coming May 1, 2020 including 0W-16 oils
- Euro 6c standard applied to all new cars as of September 2018 for particulate emissions (soot) in DFI/GDI engines.
- Gasoline Particulate Filters & C20,C30,C40 oils
- SN PLUS introduced to address LSPI in DFI/GDI engines





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Sequence IVB Test

- Part of ILSAC GF-6A and GF-6B
- Evaluates performance of oil for low temperature engine wear (49C/120F)
- Test engine: Toyota 2NR-FE (1.2 to 1.5L)
- 200 hours / 24,000 30 second cycles
800-4300 rpm
- Wear limit of 400 ppm of iron
(~2.5 cubic millimeters of wear)!





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GPF

- Particulate filters required to capture soot caused by DFI/GDI gasoline direct injection engines to meet Euro standards.
- Low or no-SAPS oils required
- C20, C30, and C40 oils are approved for emissions system protection for models with GPF and are not backwards compatible with A40 oils.





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LSPI

- Caused oil droplets infiltrate the combustion chamber
- Oils formulated with sodium and calcium detergents trigger “mega-knock”
- Oil reformulated to eliminate sodium and reduce levels of calcium detergents





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Oil Formulations

- Most oils are formulated to maximize fuel economy by blending to the min permissible viscosity.
- An SAE 40 viscosity grade oil can range from 12.5 to 16.3 mm²/s at 100 °C
- Oil companies can use pre-approved base stock and additive packages to meet manufacturer standards without testing requirement.
- Most oil companies buy base stocks and additives from the same sources regardless of brand.



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Porsche Classic Oils

- A40 oils are now only recommended 987, 997, 987.2, 997.2, 981, and 991 models
- Porsche Classic oils are recommended for 986, 996, and earlier models.
- Full SAPS oils with increased ZDDP are recommended for these older vehicles.



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Cylinder Scoring

- Wide-spread use of hypereutectic engine blocks by European manufacturers
- Use of an engine oil with moly has shown to support and extend the UMW regime of these engines
- Most A40 oils do not have Moly
- Target 300-600 ppm Moly





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Oil Analysis

- TBN/TAN tests no longer accepted by manufacturers.
- FTIR for Oxidation
- Inductively Coupled Plasma vs Rotating Disc Electrode
- Gas Chromatography





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Service Intervals

- Daily driven cars in temperate climates on paved roads fall under normal service intervals.
- Cars driven in hotter climates, short distances, stored extended periods, or tracked should be considered severe service
- For most cars, time in service, not mileage, is the critical consideration for replacement.
- Severe service reduces intervals by at least half.



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Track

If you take your street car to the track, remember, you must maintain it like a race car.

This includes using a proper race oil and shorter oil change intervals.





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Review

- This document covers many areas on your car that may need servicing as part of normal maintenance and ownership.
- Please refer to the vehicle manufacturer or technician that services your vehicle for further recommendations.



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Thank you!

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