



PRODUCT INFORMATION & DATA SHEET

PRINCE® FS1 SAE 5W-30

The Flagship P-9 Ester Based Fully Synthetic Motor Oil.

A low volatility P-9 Ester based fully synthetic motor oil engineered with high polarity ester technology and lowered HTHS viscosity (≤ 3.5 cP) value, meeting the ACEA A5/B5 and API SP performance standards for use in a wide range of recent energy-conserving passenger car and light-duty gasoline engines requiring a motor oil of this specification. The improvement made comply with the ACEA A5/B5 over ACEA A3/B4 on overall performance aspects including: higher levels of energy and fuel conserving, better low-temperature sludge control and thermal-related piston deposits control in the latest turbocharged gasoline direct injected engines (TGDI).

It even exceeds rigid performance demands of API SP:

- ✓ Effective protection against stochastic pre-ignition (LSPI) caused by very high-pressure direct injection activities.
- ✓ Effective timing chain stretch and wear protection of the camshaft and crankshaft in modern gasoline turbocharged direct injected engines (TGDI) from tiny soot particles.
- ✓ Enhanced anti-friction and anti-wear capacities over API SN motor oils that guarantee a higher degree of fuel efficiency and valvetrain wear protection effort.
- ✓ Exceptional protection against deposits, varnish and sludge protection in vital engine parts due to advanced detergency and dispersancy used.

This motor oil comply with the following industry specifications:

API SP, ACEA A5/B5, BMW LL-01 FE, Daimler MB 229.6, Fiat 9.55535-G1, Ford WSS-M2C913-D, Jaguar Land Rover STJLR.03.5003, Renault RN0700/ RN0710, Volvo VCC 95200377 (Service fill), VW 505.01

Advantageous of P-9 Ester Technology:

- P-9 Ester offers the highest compatibility with Group III synthetic base stock to enhance energy efficiency through better lubricity, reduce volatility and thermal-related breakdown, as well as solubilize additives.
- Great antioxidants performance to fight better against free radical and protect the oil from accelerated auto-oxidation, therefore a very minimal tendency of oil thickening and deterioration and prevent the formation of sludge and varnish for a long oil and engine life.
- Highest thermal and shear stability allow the oil to sustain exceptionally / viscosity to 'stay-in-grade' at extreme operating load and pressure and under high running temperature .
- High and stable viscosity index (VI) of P-9 Ester offers a formidable and dense lubrication film over a broader operating temperature range.
- Low volatility (burn-off) rate when the operating temperature rises, P-9 Ester is stable to the evaporation and thence a very low rate of evaporation loss, evidenced for higher flash and smoke point and lower oil consumption.
- Low pour point protects turbocharger against oil starvation in subzero temperatures and offers a quick return to appropriate oil pressure level after starting up.

- Features optimal winter pumpability and quicker low-temperature fluidity compared to the already outstanding ester base stock. P-9 Ester molecular particles spread and penetrate faster into narrow gaps of the engine at cold temperature (sub-zero) to build up oil pressure faster and prevent cold-start related corrosion and wear formation.

Our proprietary P-9 Ester achieved superiority among ester base technology.

13% higher film strength than commonly used Group V base*

Polarity refers to the ability of the oil molecules to attract and bond with other molecular structures. P-9 Ester is designed to establish unbreakable bond with polar structural and attach to metal robustly. Thence, FS1 motor oils demonstrate better lubrication performance when running at severely high temperatures and elevated wear protection under extreme load conditions.

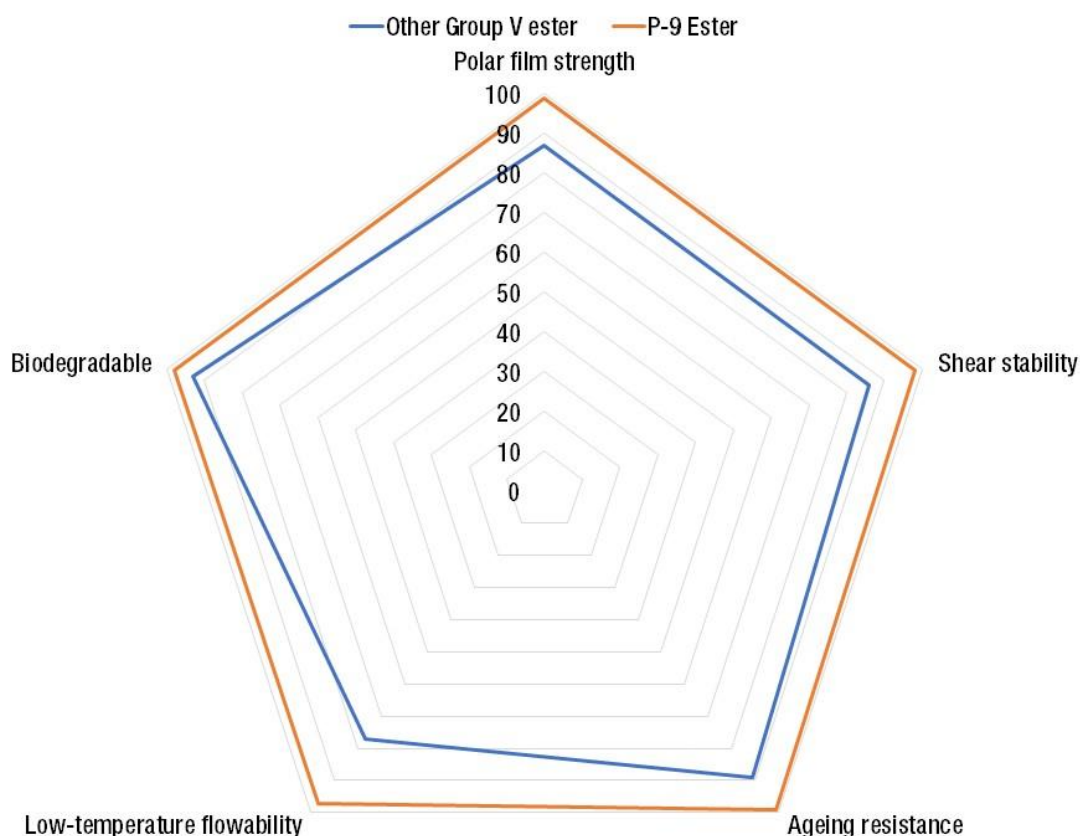
14% higher shear stability than commonly used Group V base*

Shear stability refers to the property of the oil to resist the action of shear forces and viscosity loss due to related mechanical stress and destruction. P-9 Ester is designed to help improve viscosity retention (without the use of additional VI improvers) and minimize the possibility of oil polymer dilution (thinning). Thence, FS1 motor oils deliver optimum viscosity-temperature behavior at high and low working temperatures.

11% higher ageing resistance than commonly used Group V base*

Ageing resistance refers to the ability to withstand external influences with minimal deterioration of oil and additive qualities. P-9 Ester is designed to enhance the stability of ageing to allow the most stable fluidity performance within the designated drain interval and therefore, FS1 motor oils support extended drain interval (note manufacturer's requirement).

The sets of performance data were collected in ASTM audited laboratory.



Areas of application

FS1 motor oil is developed for both common and high-displacement / high-performance gasoline engine applications. Can be used in naturally aspirated, turbocharged, supercharged, direct injection, multi-valve engines with and without catalytic converter and gasoline particulate filter (GPF). Highly recommended for the latest turbocharged direct injected gasoline engine (TGDI) require using an API SP motor oil.

The API SP is completely backward compatible with previous API specifications including SN Plus, SN, SM and SL.

Applicable in liquefied petroleum gas (LPG) and natural gas (CNG) engines requiring the viscosity grade and any of the specification of this motor oil.

Note: However, this motor oil is not designed for use in modern diesel engines with exhaust recirculation systems (EGR) and after-treatment devices such as DPF, DOC and SCR. Recommend only to be used if an oil meeting API CF and CF-4 performance is required.

Service recommendation

Follow the oil drain interval required by the respective manufacturers. Observe the owner's manual booklet. Recommend to flush before add in new oil. Change oil filter at time of oil change.

Commercially available product compatibility

Our fully synthetic motor oil is compatible with other fully synthetic, synthetic and/or conventional motor oils. Peak performance is guaranteed only upon using alone without mixing with other motor oils. Our motor oil products are designed and developed with appropriate additive package. Hence, aftermarket oil additive products are not recommended for used alongside.

Typical properties

<u>SAE Viscosity</u>		<u>5W-30</u>
Viscosity Index (VI)	ASTM D2270	172
Viscosity at 100 °C; mm ² /s	ASTM D445	11.3
Viscosity at 40 °C; mm ² /s	ASTM D445	65.7
Density at 15 °C; kg/m ³	ASTM D4052	849.0
HTHS Viscosity at 150 °C; cP	ASTM D4683	3.3
Flash Point; °C	ASTM D92	236
Pour Point; °C	ASTM D97	-45
Sulfated Ash; mass%	ASTM D874	1.2
Total Base Number; mgKOH/g	ASTM D2896	6.0 ≤

The information show herein is subject to change without noticed. The product indicated here have been developed by PRINCE LUBRICANTS for use in the areas of applications shown. We reserve all right to alter the characteristics and product properties to align with continually technical development.