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DATA BULLETIN

AMSOIL
The First in Synthetics®

Signature Series 100% Synthetic Motor Oil

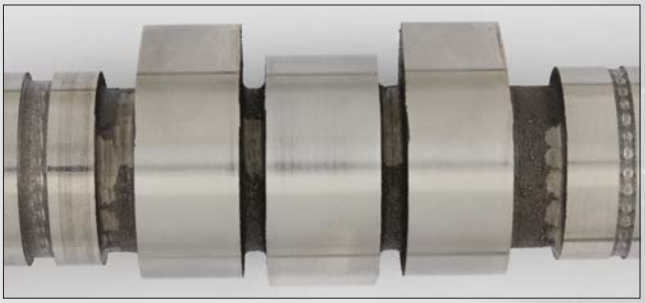
A New Level of Motor Oil Technology

AMSOIL was founded on innovation, beginning with our introduction of the world's first API-qualified synthetic motor oil. By ignoring conventionally accepted limitations and refusing to stop short of success, we set a new benchmark for lubricant performance. These same principles guide our product development today, resulting in Signature Series Synthetic Motor Oil. Signature Series is not only the best oil we have ever made, it's also better than any competitive oil we have tested. Some may claim that Signature Series is over-engineered. Perfect. It is not for everyone. It is for those who want the absolute best engine protection, and it delivers.

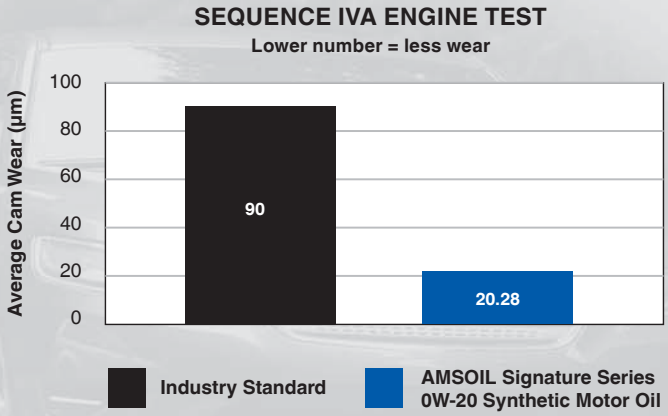


Protects Against Engine Wear

AMSOIL Signature Series Synthetic Motor Oil develops a strong fluid film that keeps metal surfaces separated while its robust anti-wear additives further reduce wear in metal-to-metal contact regions for maximum engine life. The Sequence IVA Engine Test, which must be passed to meet the industry-standard API SN specification, simulates extended periods of stop-and-go driving. For 100 hours, the test engine cycles between 50 minutes of idling and 10 minutes of elevated rpm – conditions that encourage engine wear. The camshaft is then measured for wear in 84 locations and an average score is determined. We used Signature Series 0W-20, the lightest viscosity in the line, to further increase the severity of the test. AMSOIL Signature Series Synthetic Motor Oil provided **75 percent more engine protection against horsepower loss and wear**[1] than required by the industry standard, extending the life of vital components like pistons and cams.



After rigorous third-party testing, the cam lobes show little-to-no wear.



[1]Based on independent testing of AMSOIL Signature Series 0W-20, in ASTM D6891 as required by the API SN specification.

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Protects Pistons from Low-Speed Pre-Ignition

We armed Signature Series with an advanced detergent system that protects against harmful deposits and low-speed pre-ignition (LSPI). Most new engines feature gasoline direct injection (GDI), often combined with a turbocharger to boost power and improve fuel economy. These new technologies, when combined with a poorly formulated motor oil, promote LSPI and threaten engine operation. LSPI is the spontaneous ignition of the fuel/air mixture prior to spark-triggered ignition. It occurs in today's advanced engines and is much more destructive than typical pre-ignition. A properly formulated motor oil is critical for protecting your engine.

Original equipment manufacturers (OEMs) like GM* have addressed the issue by designing tests to determine a motor oil's ability to prevent LSPI. Signature Series Synthetic Motor Oil achieved **100 percent protection against LSPI**[1] in the engine test required by the GM dexos1 Gen 2 specification – zero occurrences were recorded throughout five consecutive tests.

Protects Turbochargers

Our unique synthetic formulation is inherently stable to resist oxidation and neutralize acids. Signature Series Motor Oil provides outstanding protection against deposits common to high-temperature engine environments. The tremendous heat and stress turbos create can cause some oils to break down and form harmful bearing deposits through a process known as turbo coking. Over time, turbos can suffer reduced performance or fail altogether.

We challenged Signature Series to the GM Turbo Coking Test, which consists of 2000 cycles of extreme heat soaks. An oil must limit the temperature change within the turbocharger to 13 percent or less to pass the test. Signature Series limited the temperature increase to only 3.6 percent, **protecting the turbocharger 72 percent better than required**[2] by the GM dexos1® Gen 2 specification.



Example of piston damage due to an LSPI event observed during the testing of a competitor's motor oil. The red arrows indicate sections of the ring land that have broken away from the piston.



Signature Series controlled heat and minimized performance-robbing deposits on the turbo-bearing and shaft surfaces.



Maximum Cleaning Power to Battle Sludge

AMSOIL Signature Series Synthetic Motor Oil has **50 percent more detergents**[3] to help keep oil passages clean and promote oil circulation. Engine failures due to sludge are often caused by a plugged oil pick-up tube screen – the motor is effectively starved of oil. The Sequence VG Engine Test measures an oil's ability to prevent sludge. During the test, a Ford 4.6L engine is subjected to sludge-inducing conditions for 216 hours. The industry standard allows for 10 percent blockage before the motor oil fails the test. Signature Series produced a screen virtually free from sludge (see image). Its detergent and dispersant additives are so effective, Signature Series provides **90 percent better protection against sludge**.[4]

Trusted by Professional Engine Builders

Dedicated engine builders and mechanics put in long hours honing their craft. These architects of powerful, high-performance engines turn to Signature Series to protect their passion.

"When we use AMSOIL, I don't worry about a film breakdown or an oil breakdown – and the oil pressure is always consistent. We've tested oils back-to-back on the dyno in our shop and we're always able to make more power with AMSOIL."

Brett Bowers, Engine Masters Competitor and Professional Engine Builder

Extends Drains: Protection Guaranteed

AMSOIL Signature Series Synthetic Motor Oil provides reserve protection, allowing you to go longer between oil changes if you choose – up to 25,000 miles, 700 hours of operation or one year, whichever comes first*. Our unique synthetic formulation and long-drain additive system are inherently stable to resist oxidation and neutralize acids over longer periods. Signature Series is designed to deliver outstanding engine protection, cleanliness and performance over extended drain intervals – guaranteed. It provides peace of mind so you can fit oil changes into your schedule.

* refer to back page for details.

[1] Based on independent testing of AMSOIL Signature Series 5w-30 motor oil, in the LSPI engine test as required for the GM dexos 1® Gen 2 specification.
[2] Based on independent testing of AMSOIL Signature Series 5W-30 in the GM turbo coking test.
[3] vs. AMSOIL OE Motor Oil
[4] Based on independent testing of AMSOIL Signature Series 5W-30 in the ASTM D6593 engine test for oil screen plugging as required by the API SN specification.

* All trademarked names and images are the property of their respective owners and may be registered marks in some countries. No affiliation or endorsement claim, express or implied, is made by their use. All products advertised here are developed by AMSOIL for use in the applications shown.

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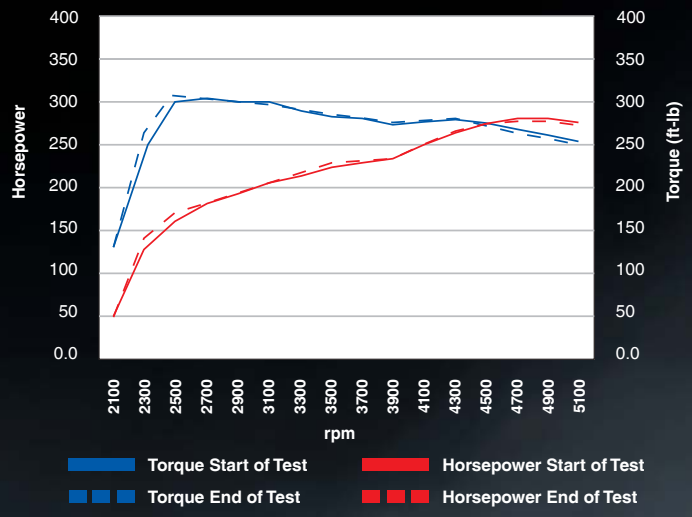
Preserves Horsepower

The extreme durability of Signature Series Motor Oil helps your engine run stronger, for longer. We installed Signature Series 5W-30 Synthetic Motor Oil in a Ford F-150 with a new 3.5L Ecoboost* engine to test its ability to protect turbocharged direct-injection (TDGI) engines from torque and horsepower loss during extended drain intervals up to 25,000 miles. Power sweeps were done at the beginning and end of the test to evaluate horsepower and torque retention. As the graph shows, Signature Series helped maintain engine performance throughout the 100,000 mile test.

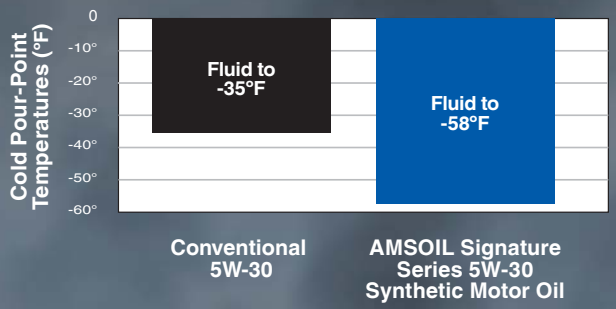


Easier Cold-Starts

Signature Series Synthetic Motor Oil does not contain paraffins (wax) and stays fluid in temperatures of -58°F and lower. Extreme cold causes other motor oils to thicken, starving vital moving parts of lubrication, accelerating wear and even preventing vehicles from starting. Signature Series **provides 66 percent better cold-temperature performance** for easier starting, better fuel economy, improved oil flow (as seen below) and reduced wear.

POUR POINT

Lower temperature = better cold flow





Conventional 5W-30 (-40°F)

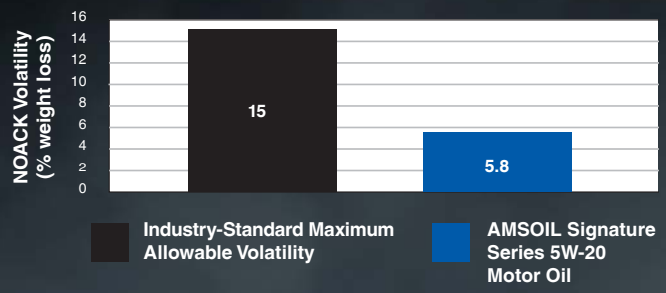
AMSOIL Signature Series 5W-30 Synthetic Motor Oil (-40°F)

Limits Oil Consumption

Signature Series has a uniform molecular structure that limits evaporation and keeps it where it's needed most – protecting your engine. Volatility (burn-off) occurs when oil gets hot, causing lighter molecules to burn off or evaporate. This leads to oil thickening, additive imbalance, higher emissions and oil consumption. The NOACK Volatility test is the industry standard for evaluating motor oil high-temperature evaporation. It measures the percentage of burn-off after a motor oil is placed under constant airflow at 482°F for 1 hour. A lower number indicates a better resistance to evaporation. Signature Series falls far below the API limit for volatility, reducing the need for frequent oil top-offs and limiting vehicle emissions.

NOACK VOLATILITY

Lower number = less volatility

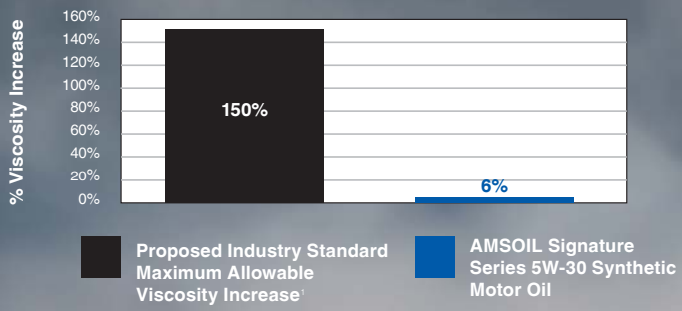


Maintains Protective Viscosity

We formulated Signature Series with superior thermal durability that resists breakdown better than conventional and synthetic motor oils. The Sequence IIIH Test uses the Chrysler 3.6L Pentastar engine to evaluate a motor oil's ability to resist the damaging effects of heat. The test is conducted with oil temperatures of 304°F, 100°F hotter than normal operation, to accelerate oil thickening and deposits. Despite the extreme conditions, Signature Series kept pistons clean and held thickening to only 6 percent, a minimal amount compared to the proposed specification limit of 150 percent.[1] This stay-in-grade performance helps maintain maximum power and fuel economy while also ensuring advanced technologies like variable valve timing (VVT) operate as designed throughout the entire drain interval.

SEQUENCE IIIH ENGINE TEST

Lower number = better viscosity control





Signature Series kept pistons 62 percent cleaner than required by the proposed industry standard.[1]

[1] Based on proposed ILSAC GF-5 Plus specification.

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TYPICAL TECHNICAL PROPERTIES

AMSOIL Signature Series Synthetic Motor Oil

	0W-20 (ASM)	5W-20 (ALM)	0W-30 (AZO)	5W-30 (ASL)	10W-30 (ATM)	0W-40 (AZF)	5W-50 (AMR)
Kinematic Viscosity @ 100°C, cSt (ASTM D445)	8.8	8.8	10.4	10.3	10.0	14.8	19.4
Kinematic Viscosity @ 40°C, cSt (ASTM D445)	47.1	50.6	57.1	59.7	62.3	84.6	119.5
Viscosity Index (ASTM D2270)	169	153	173	162	147	184	185
CCS Viscosity, cP @ (°C) (ASTM D5293)	5122 (-35)	4385 (-30)	5372 (-35)	3968 (-30)	4278 (-25)	6062 (-35)	5108 (-30)
Flash Point °C (°F) (ASTM D92)	220 (428)	220 (428)	220 (428)	220 (428)	230 (446)	222 (431)	224 (435)
Fire Point °C (°F) (ASTM D92)	244 (471)	244 (471)	238 (460)	244 (471)	256 (492)	238 (460)	244 (471)
Pour Point °C (°F) (ASTM D97)	-53 (-63)	-50 (-58)	-50 (-58)	-50 (-58)	-47 (-52)	-50 (-58)	-48 (-54)
NOACK Volatility, % weight loss (g/100g) (ASTM D5800)	8.5	5.8	8.8	6.7	4.1	7.7	6.1
High-Temperature/High-Shear Viscosity @ 150°C, 1.0 X 10^6 $s.^{-1}$, cP (ASTM D5481)	2.67	2.67	3.07	3.11	3.11	3.76	4.45
Total Base Number (ASTM D2896)	12.5	12.5	12.5	12.5	12.5	12.5	12.5

APPLICATIONS

Use AMSOIL Signature Series Synthetic Motor Oil in applications that require any of the following specifications:

0W-20 (ASM): API SN (Resource Conserving), SM…; GM dexos1 Gen 2 (supersedes 6094M); ACEA A1/B1; Ford WSS-M2C947-A; Chrysler MS-6395; ILSAC GF-5, GF-4… *Fortified with detergents that exceed the dexos1 Gen 2 sulfated ash specification.*

5W-20 (ALM): API SN (Resource Conserving), SM…; GM dexos1 Gen 2 (supersedes 6094M); ACEA A1/B1; Ford WSS-M2C945-A, WSS-M2C930-A; Chrysler MS-6395; ILSAC GF-5, GF-4… *Fortified with detergents that exceed the dexos1 Gen 2 sulfated ash specification.*

0W-30 (AZO): API SN (Resource Conserving), SM…; GM dexos1 Gen 2 (supersedes LL-A-025, 6094M and 4718M); ACEA A5/B5, A1/B1; Chrysler MS-6395; ILSAC GF-5, GF-4… *Fortified with detergents that exceed the dexos1 Gen 2 sulfated ash specification.*

5W-30 (ASL): API SN (Resource Conserving), SM…; GM dexos1 Gen 2 (supersedes LL-A-025, 6094M and 4718M); ACEA A5/B5, A1/B1; Honda HTO-06; Ford WSS-M2C946-A, WSS-M2C929-A; Chrysler MS-6395; ILSAC GF-5, GF-4… *Fortified with detergents that exceed the dexos1 Gen 2 sulfated ash specification.*

10W-30 (ATM): API SN (Resource Conserving), SM…; ACEA A5/B5, A1/B1; Ford WSS-M2C205-A; Chrysler MS-6395; GM LL-A-025, 6094M, 4718M; ILSAC GF-5, GF-4…

0W-40 (AZF): API SN, SM…; Chrysler MS-12633, MS-10725, MS-10850; Nissan GT-R

5W-50 (AMR): API SN, SM…; Ford WSS-M2C931-C (Mustang*)

COMPATIBILITY

AMSOIL Signature Series Synthetic Motor Oil is compatible with other conventional and synthetic motor oils. Mixing other oils with AMSOIL motor oils, however, will shorten the oil's life expectancy and reduce its performance benefits. AMSOIL does not support extended drain intervals where oils have been mixed.

Aftermarket oil additives are **not recommended** for use with AMSOIL synthetic motor oils.

TECHNICAL SERVICES

For immediate answers to your technical questions call (715) 399-TECH (8324) between 8 a.m. and 5 p.m. Central time or email tech@amsoil.com.

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SERVICE LIFE

Normal Service – Up to 25,000 miles, 700 hours of operation or one year, whichever comes first, in personal vehicles not operating under severe service.

Severe Service – Up to 15,000 miles, 700 hours of operation or one year, whichever comes first. Severe service conditions include commercial or fleet vehicles; excessive idling; or frequent towing, hauling, plowing or driving in dusty conditions.

- Modified engines (non-stock), racing vehicles and vehicles using alternative fuels (E85, CNG, propane, etc.) are excluded from extended drain interval recommendations.
- Change at the vehicle manufacturer's recommended drain interval outside U.S. and Canada.
- AMSOIL Ea® Full-Flow Oil Filters are designed for extended drain intervals. Do not exceed 12,000 miles or one year with other brand filters unless longer intervals are recommended by the vehicle manufacturer. Always change filter when changing oil.
- Check oil regularly to maintain proper fill levels.

AMSOIL Ea Full-Flow Oil Filters stop smaller particles, flow more oil and last longer than regular filters. For best performance, use AMSOIL Ea Full-Flow Oil Filters.

AMSOIL PRODUCT WARRANTY

Using AMSOIL synthetic lubricants or practicing extended drain intervals does not void your new vehicle or equipment manufacturer's warranty. All AMSOIL lubricants and filters are covered by the AMSOIL Limited Warranty. For complete information visit www.amsoil.com/warranty.aspx.

HEALTH & SAFETY

This product is not expected to cause health concerns when used for the intended application and according to the recommendations in the Safety Data Sheet (SDS). An SDS is available at www.amsoil.com or upon request at (715) 392-7101. **Keep Out of Reach of Children.** Don't pollute. Return used oil to collection centers.

AMSOIL The First in Synthetics®

AMSOIL products and Dealership information are available from your local full-service AMSOIL Dealer.

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