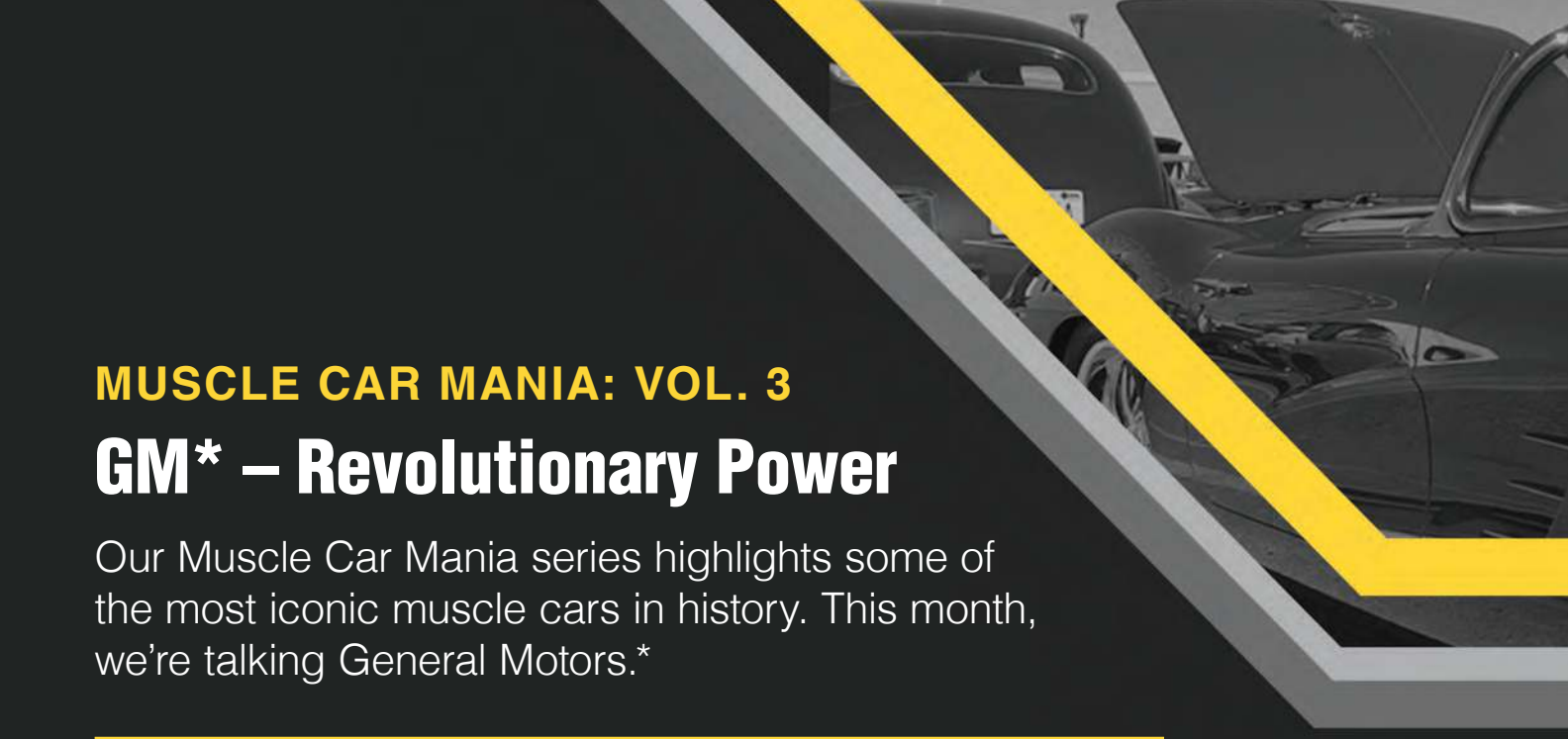

MUSCLE CAR MANIA: VOL. 3

GM* – Revolutionary Power

Our Muscle Car Mania series highlights some of the most iconic muscle cars in history. This month, we're talking General Motors.*

Back in 1954, Chevrolet* chief engineer Ed Cole was tasked with creating a new engine to power the 1955 model-year Corvette.* Little did Cole and his team know that the 265 cubic-inch V8 they'd build would become the most successful, widely used engine in history. Without it, we wouldn't have staples like the 283, the 327 and the 350 engines of the muscle-car era. The fundamental engine design of the 265 is still being used to this day in modern variants of the Corvette, Camaro* and other vehicle models.

Chevy receives credit for the small-block V8, but GM divisions Buick,* Oldsmobile* and Pontiac* also made their way well into muscle-car history. Buick had the Nailhead* engine, named after the relatively small heads on the valve stems. This style was used from the mid-'50s to the mid-'60s and went from 264 cubic inches all the way up to 425 by 1966. Some of those notable models were the Riviera,* the Wildcat* and the Electra.* Around this time, Buick also introduced a 350 cubic-inch small-block V8 that differed from the Chevy version and was typically found in Skylark GS* models. Then, in 1967, Buick rolled out its first big-block V8, which would eventually become the popular 455 by 1970.

Oldsmobile was also getting in on the action in 1964 by introducing the 4-4-2 package option on its Cutlass* models. The "4-4-2" name originates from the four-barrel carburetor, four-speed transmission and dual exhaust that the original car had in 1964. By 1970, the 4-4-2 would also have a 455 cubic-inch option.

Another contender in the race for more horsepower in 1964 was Pontiac and its offering of the GTO* package in the LeMans* model. With all the bells and whistles, this package could get you the highest-rated 389 cubic-inch V8 with "Tri-Power" (three two-barrel carburetors) that pumped out 348 hp. The GTO would become its own model in 1966 and, like Buick and Oldsmobile, would eventually receive the 455 cubic-inch engine treatment by 1970.

In the mid-'60s, GM's Chevrolet division made plans to develop a pony car to compete with the popular Ford* Mustang.* In 1966, the Chevy Camaro debuted. Its first-year V8 engine options would be 302, 327, 350 and 396 cubic inches. In addition, the SS (Super Sport),* RS (Rally Sport)* and Z/28* packages were available to offer further visual and mechanical varieties.

For people seeking performance in a mid-sized car, Chevrolet offered the Chevelle.* Introduced in 1964, it was one of the best-selling models GM produced. With options like the SS 396 and 454, the Chevelle held its own and then some in the muscle-car market. For those interested in top-of-the-line performance, Chevy made a step up with the Corvette. Its production began as a modest "sports car" for the 1953 model year, but the following years led it on the path for more serious power. By 1966, its 427 big-block engine was producing up to 435 hp. The popular 454 big block rolled out in 1970, but this would be the peak for power in the Chevy Corvette, as lower-leaded fuels and emissions regulations of the '70s required a drop in its engine output.

The Resurgence

After the 1970s, "true" muscle cars seemed to go extinct. The familiar models were still there (Chevelle, Camaro, Corvette, etc.), but the high-performance numbers and engine displacements of the original

muscle-car era decreased more every year. That began to change in 2005, when Ford brought back its "retro" Mustang with design cues from its original models of the '60s. A muscle-car resurgence started gaining traction. Dodge* soon followed suit with the revamped Challenger.* But while Chevrolet still had the Corvette model, the Camaro hadn't been produced since 2002. It was time for a GM muscle-car revival.

In 2006, Chevy unveiled its Camaro concept at the North American International Auto Show and received critical acclaim. The company announced production of its award-winning concept for the 2010 model year. The returning Camaro SS* would come equipped with a 6.2L LS-based small block producing 426 hp. Around the same time, the Corvette Z06* came out with the largest-displacement small block ever produced, a 7.0L V8 creating 505 hp and 470 lb.-ft. of torque. This would be known as the LS7.*

Just like the muscle-car era years ago, horsepower ratings have begun to climb. Modern Camaros and Corvettes are now pushing out more power than ever. A Camaro ZL1* package with a supercharged 6.2L LT4* boasts 650 hp and 650 lb.-ft. of pavement-peeling torque, and can go from 0-60 mph in 3.7 seconds. If that seems impressive, the all-new mid-engine Corvette can achieve the same feat in 2.9 seconds. Plus, it's got a top speed of 194 mph. It's no secret that extra horsepower puts additional stress and pressure on the lubricants needed to protect them. AMSOIL products are up for the challenge. Our motor oils are engineered to meet the increasing demands of these high-performance vehicles and ensure they keep producing power for years to come.

FOR EARLY MODEL GM MUSCLE CARS:

Z-ROD® Synthetic Motor Oil

- Specially engineered for classic and high-performance vehicles
- High-zinc formulation to prevent wear on flat-tappet camshafts and other critical engine components
- Proprietary blend of rust and corrosion inhibitors for added protection during long-term storage.

DOMINATOR® Octane Boost is an excellent lead substitute at the same treat rates in collector automobiles designed for leaded gasoline.

- Reduces engine knock
- Improves ignition and engine response
- Helps fuel burn cleaner
- Inhibits corrosion
- Recommended for racing use

FOR MODERN GM MUSCLE CARS:

Signature Series 5W-30 Synthetic Motor Oil
Signature Series 0W-40 Synthetic Motor Oil
(2019-present LT1, LT2 and LT4 engines)

- 75 percent more wear protection[1]
- 100 percent protection from LSPI[2]
- 50 percent more cleaning power[3]
- Ideal for turbos & direct injection
- Guaranteed protection for up to 25,000 miles (40,200 km) or 1 year, whichever comes first

[1]Based on independent testing in the ASTM D6891 test using 0W-20 as worst-case representation. [2]Based on independent testing in the LSPI engine test as required for the GM dexos1® Gen 2 specification. [3]vs. AMSOIL OE Motor Oil.

In industry-standard testing, AMSOIL Z-ROD® completely prevented rust formation while a leading competitor did not.[JJ]

[JJ]*Based upon in-house testing of AMSOIL Z-ROD 10W-40 and a leading competitor obtained on 7/25/2019 in ASTM D1748-10.*

Performs on the Street & Protects During Storage

New Z-ROD 10W-40 Synthetic Motor Oil (ZRD) provides the benefits of Z-ROD, including **rock-solid wear protection** for flat-tappet cams and proven **protection against rust** during storage, to applications that require a 10W-40 viscosity. It delivers modern technology for classic cars.

- **Engineered** for classic vehicles
- **High-zinc** formula
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AMSOIL MAGAZINE

▸ DEALER EDITION

JULY 2018

Signature Series Synthetic Motor Oil: The Best We've Made

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SOMETHING BIG IS COMING. BIG

SIGNATURE SERIES MOTOR OIL PROTECTS ENGINES FROM LOW-SPEED PRE-IGNITION

LSPI can destroy pistons and connecting rods, bringing an engine to a standstill in seconds. Original equipment manufacturers (OEMs) like General Motors (GM)* have addressed the issue by designing tests to gauge a motor oil's ability to prevent these destructive events. **Signature Series achieved 100 percent protection against LSPI[1]** in the industry-standard test.

OEMs have been aggressively downsizing engines to meet strict fuel-economy and emissions standards while improving power and torque. Most new engines today use some combination of turbochargers, direct-fuel injection and variable valve timing to make more power than their larger counterparts while delivering improved fuel economy.

This scenario seems like all upside for drivers. But today's smaller, hotter-running engines pose significant challenges to lubricants. The latest is a phenomenon called low-speed pre-ignition (LSPI), also known as "super knock," which can destroy pistons and connecting rods.

What Is LSPI?

LSPI is another version of engine knock, which has been around since engines were invented. In this case, it occurs under low-speed, high-torque conditions in turbocharged gasoline direct-injected engines – like when you're taking off from a stoplight. LSPI is the spontaneous ignition of the fuel/air mixture prior to spark-triggered ignition. This form of pre-ignition is more destructive than typical engine knock.

No Magic Bullet

Just as your engine relies on a balanced network of components to function, the motor oil needed to protect it requires additives with the right qualities at the right quantities. While adding more of one ingredient or reducing another seems simple enough, small composition changes can have big impacts. We were determined to find a solution to the LSPI problem without sacrificing the performance of Signature Series in any way.

[1]Based on zero LSPI events in five consecutive tests of AMSOIL Signature Series 5W-30 motor oil in the LSPI engine test required 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.

*Achieved **100%** Protection Against LSPI[1]*

TEST PARAMETERS	
Engine	GM 2.0L EcoTec, LHU
Duration	Five hours
Measures	Number of peak pressure pre-ignition events
Simulates	Turbocharged vehicle operating in high torque and at low speed
Requirement	At least three of the five total tests with zero peak pressure LSPI events and no tests with more than two peak pressure events

GM LSPI Test

OEMs like GM have addressed the issue by designing tests to determine a motor oil's ability to prevent LSPI. The GM LSPI Test records the number of peak pressure events during high-load operation in a turbocharged engine over a five-hour period. Passing the test is required to meet the GM dexos1® Gen 2 specification.

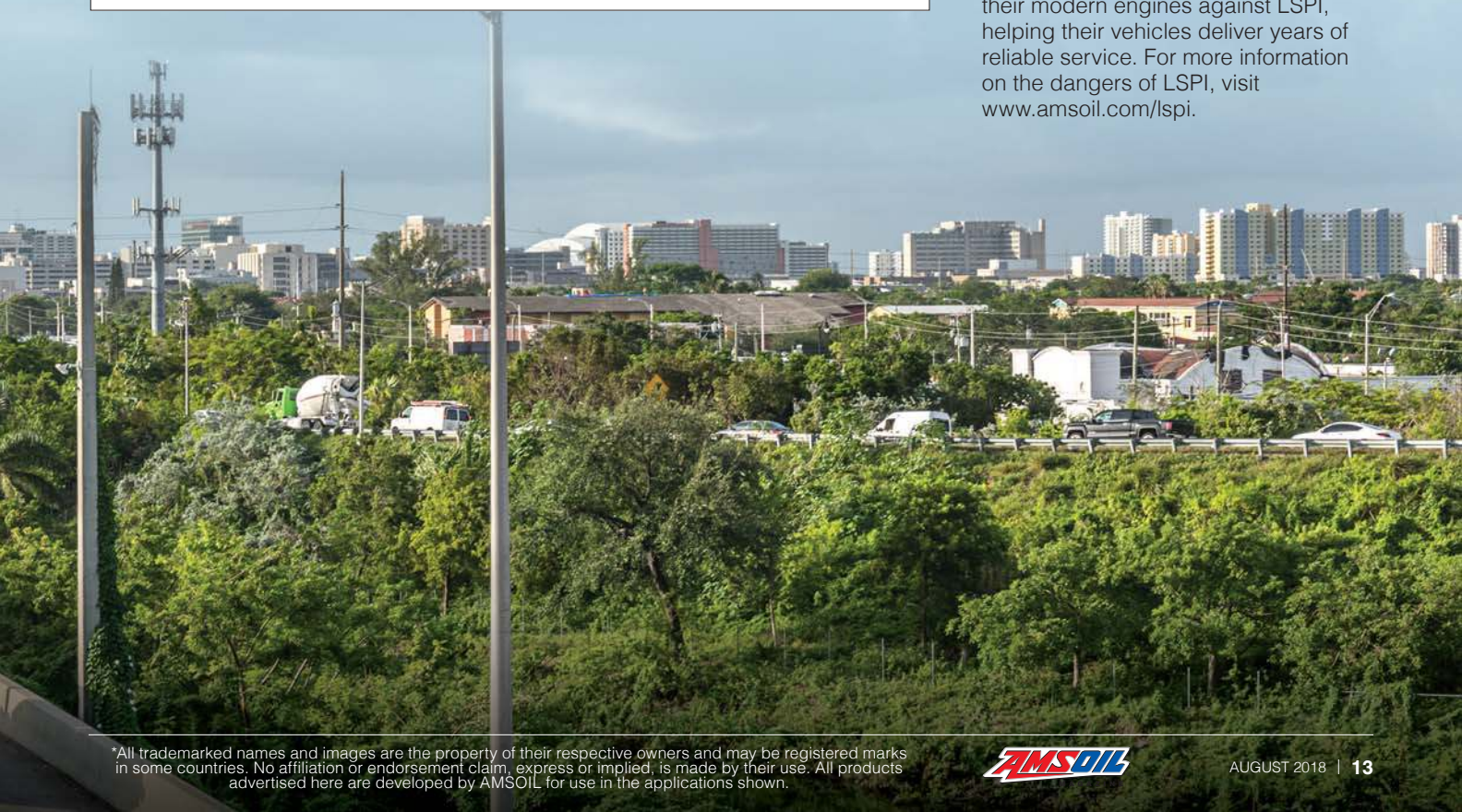
Perfect Score

We armed Signature Series with an advanced detergent system that protects against harmful deposits and LSPI. **Signature Series Motor Oil achieved 100 percent protection against LSPI** in the engine test required by the GM dexos1 Gen 2 specification – zero occurrences were recorded throughout five consecutive tests.

API SN PLUS Specification

API SN PLUS is a recently released specification that was requested by the automobile industry to protect passenger vehicles from LSPI. AMSOIL anticipated this change, and the current formulations of Signature Series, XL and OE synthetic motor oil all meet or exceed the specification. Look for updated product labels featuring the new API "donut" in the near future.

Your customers can be confident that AMSOIL synthetic motor oils protect their modern engines against LSPI, helping their vehicles deliver years of reliable service. For more information on the dangers of LSPI, visit www.amsoil.com/lspi.



SIGNATURE SERIES OIL PROTECTS TURBOCHARGERS 72% BETTER THAN REQUIRED BY GM DEXOS1® GEN 2[1]

The General Motors (GM)* Turbo Coking Test subjects motor oil to approximately three weeks of extreme heat soaks in the intense environment of a turbocharged engine. Signature Series Motor Oil provided outstanding protection against the harmful deposits common to turbos.

The turbocharger/direct fuel injection combo has emerged as automakers' favored choice for producing powerful engines and meeting government fuel-economy requirements. The increased airflow turbos generate enables an engine to burn more fuel and produce more power, but this power comes at a cost. The tremendous heat and stress turbos create 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.

The GM Turbo Coking Test

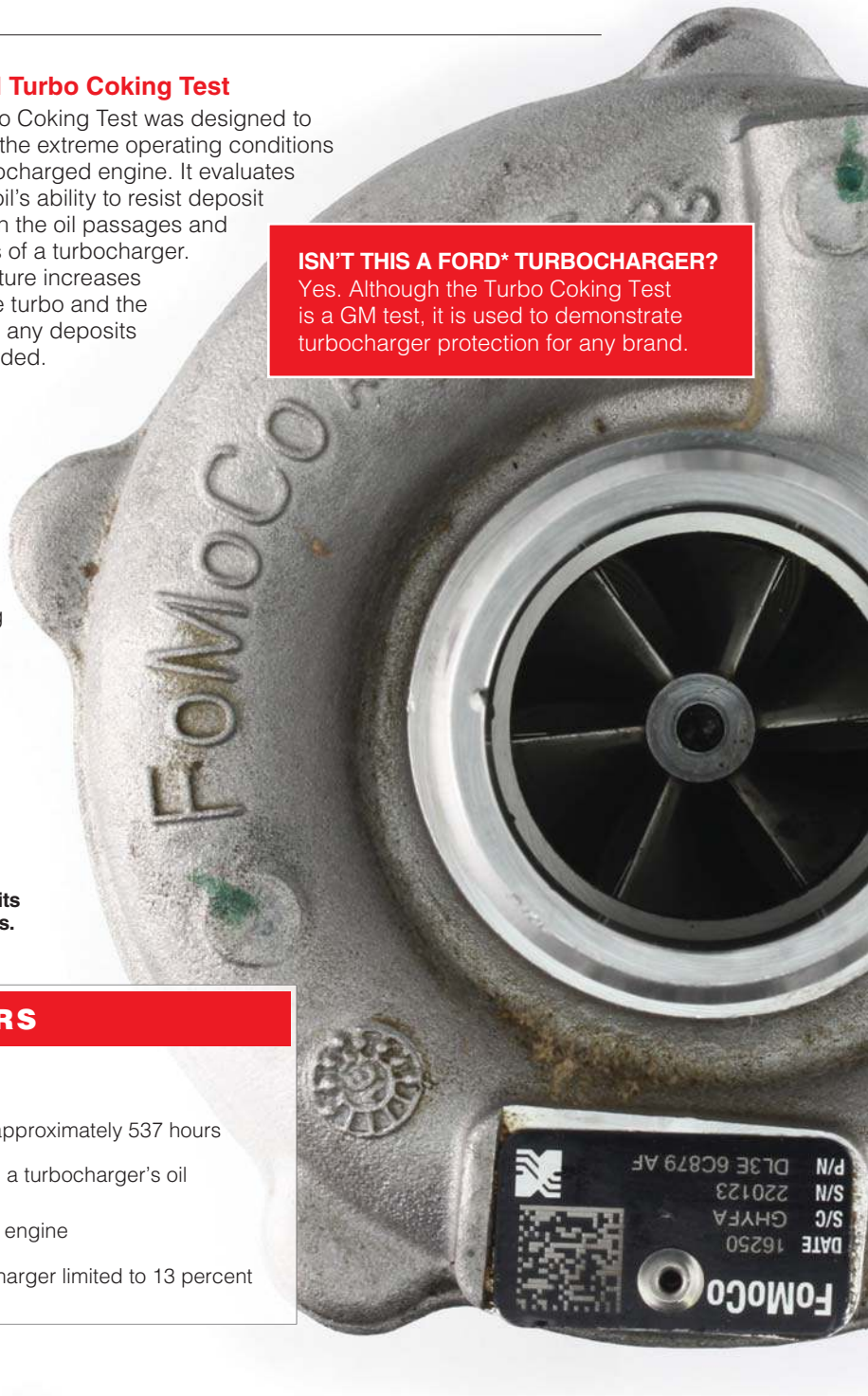
The Turbo Coking Test was designed to simulate the extreme operating conditions of a turbocharged engine. It evaluates a motor oil's ability to resist deposit buildup in the oil passages and bushings of a turbocharger. Temperature increases within the turbo and the weight of any deposits are recorded.

ISN'T THIS A FORD* TURBOCHARGER?
Yes. Although the Turbo Coking Test is a GM test, it is used to demonstrate turbocharger protection for any brand.

Signature Series Protects Turbochargers

The GM Turbo Coking Test requires an oil to 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, controlling heat and proving it protects against deposits common to high-temperature engine environments.

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



TEST PARAMETERS

Engine	2012 GM 1.4L
Duration	2,000 cycles of extreme heat soaks – approximately 537 hours
Measures	A motor oil's ability to resist deposits in a turbocharger's oil passages and bushings
Simulates	High-heat operation of a turbocharged engine
Requirement	Temperature change within the turbocharger limited to 13 percent

HOW TURBOS COULD SLOW YOU DOWN

The deposits common to turbochargers can lead to:

- Blocked oil passages, oil starvation and eventual failure
- Reduced turbine speed – resulting in lower boost pressures, reduced performance and poor efficiency
- Oil breakdown and oil burning
- Expensive turbo rebuild or replacement

Protects turbochargers 72% better than required by GM dexos1® Gen 2[1]

*Signature Series keeps temperatures and deposits in check and helps enthusiasts maintain their vehicle's **power and longevity**.*

TURBOCHARGER	
What it Does	Introduces more air into the combustion chamber, increasing efficiency and power
How it Challenges Motor Oil	Increases heat, which hastens chemical breakdown
Signature Series Advantage	Protects turbochargers **72% better** than required by the GM Turbo Coking Test[1]

[1]Based on independent testing of AMSOIL Signature Series 5W-30 in the GM Turbo Coking Test as required for the GM dexos1 Gen 2 specification.