

## Modern Motor Oil and the LT5 Engine

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Engine oil has evolved in many ways over the last 20 years. The oiling needs of the LT5 have remained fixed as they were in 1989, when the first ZR-1 was sold to the public. GM specified API standard SG<sup>i</sup> for the '90 to '93 engines. GM specified API "SG or SH"<sup>ii</sup> for the '94 and '95 engines.

As new engines have evolved, so have the requirements for oil performance. Today's modern oil has been changed to reduce friction, pumping losses, formation of deposits, more tolerance of high temperature, and for emissions system performance.<sup>iii</sup> The EPA is interested in extending the government mandated catalyst life requirement from the current five years or 50K miles to about 10 years or 100K miles. It is this requirement that runs contrary to the needs of the LT5. Catalysts are affected by metallic additives in motor oil. The metallics can lower the efficiency of a catalyst through a process known as deactivation<sup>iv</sup>. API SG oil uses zinc (ZnDDP) and phosphorus as EP (Extreme Pressure) anti-wear additives. Phosphorus is the more detrimental of the two, and is being progressively reduced to address the catalyst deactivation issue.

Maximum phosphorus per the API standard:	SG	.12%
	SH	.12%
	SJ	.10%
	SL	.10%
	SM	.08%

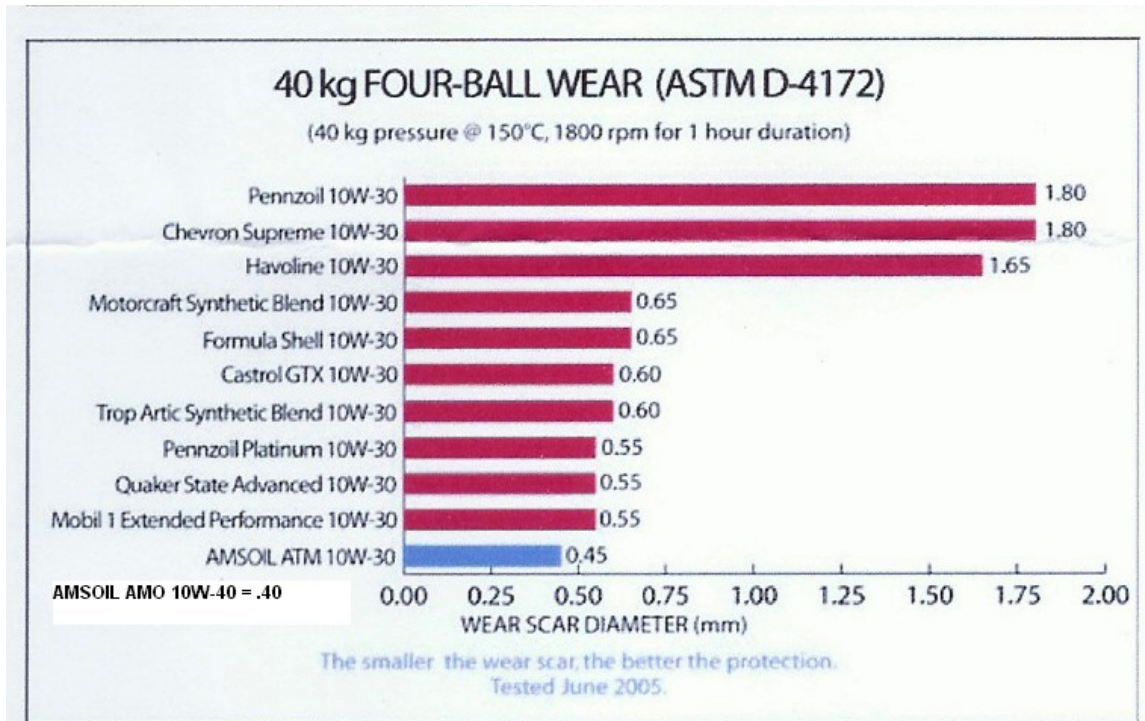
Most modern GM engines use roller valve lifters. They have short timing chains to drive a single camshaft or dry belts to drive multiple camshafts. The need for EP protection for these engines is decreasing. Japanese carmakers that like to use long metal timing chains are evaluating the effects of the future oil standard on their designs.

My concern is for the flat valve lifters, the camshafts, the timing chains and the sprockets in the LT5. I believe that the SM oil is not appropriate for the LT5. The Mobil 1 Oil Company has also recognized the needs of flat lifter engines with respect to their products. They recommend their reformulated 15W-50 product<sup>v</sup> for engines with high-tension valve springs. I think that 15W-50 oil is too high in viscosity for the LT5.

The Amsoil Company has addressed this issue with a product that is specifically designed for engines with flat valve lifters. It is formulated with high phosphorus and zinc levels. It meets the API SG specification that was used when the LT5 was designed. The product is named AMO 10W-40 Synthetic Premium Protection. It takes a two-pronged approach, higher EP additives and superior film strength contributed by the higher viscosity.

EP related performance specifications for AMO:	Phosphorus	1265 ppm
	Zinc	1378 ppm

EP performance can be measured with the Shell Four-Ball Wear test, ASTM D-4172. This test uses a machine to rotate a steel ball against three other steel balls. The test is run at a specific pressure, speed and temperature and for a specific amount of time. The width of the wear scar on the rotated ball is measured to reflect the effectiveness of the oil to protect the material.



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Note that the Mobil 1 Extended Performance (gold cap on the container) product is a higher performing and more expensive oil than the regular Mobil 1 (silver cap on the container) product.

The Amsoil AMO 10W-40 product offers additional protection beyond the Amsoil ATM 10W-30 product because of the contribution from the additional film strength.

For the LT5, I recommend Amsoil AMO, or another oil that can demonstrate similar EP performance in comparative product testing.

Amsoil is available from Amsoil dealers and directly from Amsoil at [www.amsoil.com](http://www.amsoil.com).

<sup>i</sup> GM Service Manual

<sup>ii</sup> GM Service Manual

<sup>iii</sup> Larry Carley, Underhood Service, January 2007

<sup>iv</sup> Critical Topics in Exhaust Gas After-Treatment, Chapter 6. Peter Eastwood, UK. SAE publication.

<sup>v</sup> [http://mobil1.com/USA-English/MotorOil/Oils/Mobil\\_1\\_15W-50\\_.aspx](http://mobil1.com/USA-English/MotorOil/Oils/Mobil_1_15W-50_.aspx)

<sup>vi</sup> Amsoil test data