



# Technical Service Bulletin

Date: 8/3/2007

Product Description: AMSOIL Synthetic Motor Oils

Subject: Flat Tappet and Camshaft Lobe Lubrication

## OBJECTIVE:

Provide facts outlining lubrication requirements of flat tappet and camshaft style engines and the effect of motor oil additives containing higher levels of zinc/phosphorus.

## ISSUES:

Engine oils contain anti-wear additives and the most common anti-wear chemistry is zinc dialkyldithiophosphate (ZnDDP), which contains a combination of zinc and phosphorus. In 2005, in an effort to guarantee catalytic converter performance in new vehicles, the American Petroleum Institute (API) and International Lubricants Standards Approval Committee (ILSAC) instituted API SM and ILSAC GF-4 quality standards which reduced the maximum limit for phosphorus to 0.085% and 0.080% respectively. Both API SM and ILSAC GF-4 specifications also contain a minimum phosphorus content of .065% and .060%.

Previously, API SL/ILSAC GF-3 oils were restricted to 0.10% phosphorus level, so a concern arose that oils containing lower levels of zinc/phosphorus could provide insufficient protection in high pressure areas of flat tappets and camshaft lobes found in many older cars and high-performance engines.

## TECHNICAL DISCUSSION:

Proper assembly lubes and oil additives should be used during the break-in phase for all new or rebuilt engines with flat tappets. These additives provide the extra protection required at the point of contact during break-in to help the flat tappet face to properly mate with the cam lobe. Once the break-in phase is completed, these additives should not be used because of other engine life issues created by long term use of these materials. AMSOIL does not provide break-in assembly lubricants, but one of the common products is GM E.O.S., which is an assembly lubricant and is not, as stated by GM, an engine oil additive. AMSOIL does not recommend using any engine oil additives with AMSOIL engine lubricants.

High-performance modified engines benefit from oils with superior film strength and anti-wear properties. The flat tappet/camshaft lobe interface is the one area in an engine that has extreme contact load. This load increases significantly where non-stock, high-pressure valve springs are employed so the use of properly formulated engine lubricants is extremely important to reduce wear and extend flat tappet/camshaft life. In these applications, AMSOIL recommends motor oils containing high levels of zinc/phosphorus for superior protection.

## RECOMMENDATION:

| AMSOIL Product Name                        | Phosphorus Level (ppm) | Zinc Level (ppm) |
|--------------------------------------------|------------------------|------------------|
| AMO 10W-40 Synthetic Premium Protection    | 1265                   | 1378             |
| ARO 20W-50 Synthetic Premium Protection    | 1266                   | 1379             |
| HDD Series 3000 Synthetic 5W-30 Diesel Oil | 1266                   | 1379             |
| TRO 20W-50 Synthetic Racing Oil            | 1235                   | 1370             |
| AHR SAE 60 Synthetic Racing Oil            | 1265                   | 1375             |

AMSOIL AMO, ARO, HDD, TRO, and AHR all contain high levels of zinc/phosphorus maximizing flat tappet/camshaft life in stock and modified applications.

AMSOIL 10W-40 (AMO) and 20W-50 (ARO) are premium synthetic formulations which are recommended for API SL (gasoline)/CI-4 Plus (heavy-duty, on-road diesel) specified applications. They are an outstanding choice where high zinc containing protection is required in late model hot rods requiring extra camshaft protection.

AMSOIL (HDD) is a 5W-30 weight combination diesel/gasoline oil with a higher starting TBN to handle the significant stresses from high soot loading and acid generation in modern diesel engines. HDD contains the high phosphorus and zinc required for long life.

Submitted By: DP

Reviewed By: DP

Approval By: AA Date: 08/08/07

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## Technical Service Bulletin

**Date:** 8/03/2007

**Product Description:** AMSOIL Synthetic Motor Oils

**Subject:** Flat Tappet and Camshaft Lubrication

AMSOIL 20W-50 (TRO) is a premium synthetic racing oil with superior film strength and anti-wear protection for gasoline engines. It is an excellent choice for street or race cars, hot rods, trucks or boats. TRO is the preferred choice for highly modified, high horsepower engines requiring the extra protection required by flat tappet camshaft engines.

AMSOIL (AHR) is a super heavy weight racing oil designed for alcohol and nitro burning race engines where viscosity loss associated with fuel dilution is a concern. AHR includes a high dose of zinc containing anti-wear chemistry that race engines require.

**Submitted By:** AA

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