

## Technical Service Bulletin

Date: 09/26/2005

Product Description: Tackifier Additives Used in Gear Lubes

Subject: Tackifier Performance Losses in Gear Lubes

### OBJECTIVE:

To provide information about the effectiveness of tacky/sticky gear oils and relay information that tacky additives, under high shear forces or heat conditions, are ineffective.

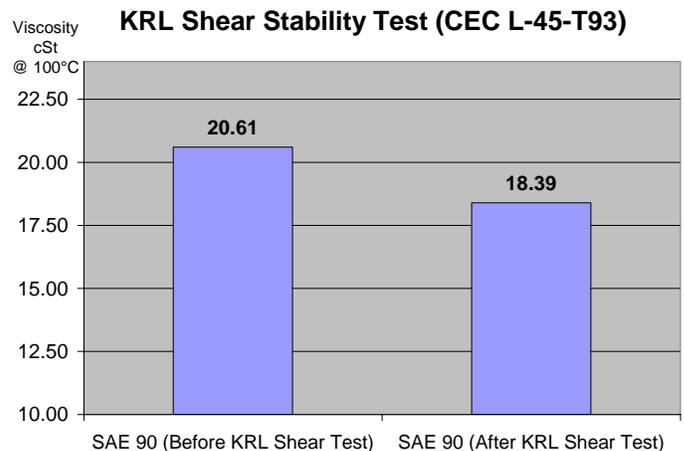
### ISSUES:

Some lubricant manufacturers add tackifier additives to gear lubes so they become “tacky” or “sticky”. Tacky gear oil provides a visual marketing benefit when used in clear, see-through plastic gear demonstration units or “egg beater” demonstrators. In these units tacky gear oils climb gears or cluster together around the egg beater demonstrator more than non-tacky gear oils. This property is sold as a benefit to prospective customers.

### TECHNICAL DISCUSSION:

Tackifier additives are large molecule components that are not shear stable. When subjected to high shear forces, they break down and lose their tackiness properties.

In order to demonstrate that tackifier additives become ineffective in service due to mechanical shearing forces, a commercially available SAE 90 tacky gear oil was subjected to a 20-hour KRL shear stability test. The 20-hour KRL shear stability test is a requirement for automotive gear oils according to the industry standard SAE J-306 (see KRL Graph).



After the test, the SAE 90 gear oil lost 10.77% of its viscosity due to mechanical shear. Upon visual inspection, the tacky properties of the gear oil were severely reduced.

Another factor that affects tackiness properties of a lubricant is temperature. Normal operating temperatures of (92°C, 197°F) are sufficient to cause the depolymerization of tackifier additives<sup>(1)</sup>. As operating temperatures increase, tackiness properties decrease to the point they are ineffective.

### CONCLUSION:

Effective gear lubrication only requires a thin film of lubricant. Excessive lubricant presents no benefits and, in some instances, can have negative effects. The perceived benefit of adding tackifier additives to gear oils is to show how the gear oil

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climbs or clusters around the gears. Under room temperature conditions, this is easy to show. Under normal operating temperatures, this does not occur.

Gear applications have some of the highest mechanical shear rates known. High molecular weight additives break down under these conditions. Tackifier additives lose their tack ability.

GM, Ford, & Chrysler gear oils were tested for tacky properties. None contained it. Based on this, it appears that OEM gear manufacturers do not use or recommend tackified gear oils.

### RECOMMENDATIONS:

AMSOIL Synthetic Gear Oils provide many benefits including longer oil life, longer gear life, reduced energy consumption, reduced friction and operating temperatures and better cold temperature performance. AMSOIL manufactures and sells premium quality gear oils such as:

- AMSOIL Long Life Synthetic Gear Oils 75W-90 (FGR) and 80W-140 (FGO) have a performance emphasis on over-the-road trucks with recommended drain intervals up to 500,000 miles where appropriate. FGR and FGO are also excellent for use in other heavy-duty and automotive applications.
- AMSOIL Severe Gear™ Synthetic Extreme Pressure Lubricants 75W-90 (SVG) and 75W-140 (SVO) have a performance emphasis on SUV, turbo diesel trucks, race cars, 4X4 off-road, extreme hot and cold

temperatures, and other severe service automotive applications. They are also excellent for use in heavy-duty applications.

- AMSOIL Synthetic Gear Lube 80W-90 (AGL) is a very high quality, cost effective synthetic replacement for petroleum 80W-90 gear oils. It is a multi-purpose product recommended for use in automotive and heavy-duty applications.

Reference:

- 1.) "Lubricant Additives chemistry and applications", 2003, Marcell Dekker, NY., Rudnick, Leslie R., Chapter 12, Page 358.

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