Viscosity Through Thick and Thin

Viscosity modifiers are an important part of modern lubricant technology. Products such as multi-viscosity engine oils, gear oils, power-steering fluids, hydraulic fluids, and automatic transmission fluids can all contain viscosity modifiers.

Viscosity Defined

Viscosity is a physical property of a fluid defined as its resistance to flow and is highly dependent upon temperature. Lubricant viscosity is closely related to its ability to reduce friction. Usually the lowest-viscosity lubricant that keeps two moving surfaces separated from one another is desired. If the lubricant is too thick and has a consistency like honey, it requires a large amount of energy to pump or move. If it is too thin, the surfaces will rub, friction will increase, and wear will result.

It is well known that the viscosity of oil increases (thickens) as temperatures decrease and decreases (thins) as temperatures increase. The most common way of measuring the viscosity of lubricants is called the kinematic method, which is performed by timing a known volume of oil as it flows through a calibrated capillary tube under gravity.

Viscosity Index

The viscosity index (VI) of a lubricant relates to the change in viscosity for a given change in temperature. VI is calculated using the viscosities at 40ºC and 100ºC. A high-VI lubricant will have a smaller change in viscosity with a given change in temperature than one with a low VI.

A viscosity index improver (VII) is a polymer that is used to decrease the temperature dependence of lubricant viscosity. VIIs allow for lighter base oils to be used as they make the oil act “thicker” at higher temperatures to prevent metal surfaces from rubbing together. Meanwhile, the oil remains thin at lower temperatures, allowing easier cranking and pumpability throughout the engine.

Multi-Viscosity Oils

Lubricants containing a VII are labeled as multi-grade or multi-viscosity oils. An example is an SAE 15W-40 where *15W* represents the winter grade performance, and *40* represents the high-temperature performance.

One differentiating characteristic of a quality engine lubricant is its ability to “stay in grade” during its useful life. Soot particles can conglomerate and thicken oil over time. High-quality lubricants contain advanced detergency and dispersancy chemistry to prevent soot particles from binding together. A lubricant can also thin (lose viscosity) and allow excessive wear if its VII fails. This is commonly referred to as “shearing,” referring to the shearing of long-chain molecules. Shearing results in both temporary and permanent viscosity loss.

Suprex Gold ESP Outperforms

With unique soot-dispersing technology that prevents oil thickening and the latest VII chemistry to prevent oil thinning, Suprex Gold ESP stays in grade at ideal viscosity levels long after lesser oils fall out of grade. See your local FS Energy Specialist for more information today.