



On the Horizon

A World of Lubrication Understanding®



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Savant Addresses the Need for Electric Driveline Fluid Testing - CEC-L-48 Oxidation Stability

Savant Author: Canika Owen-Robinson, New Business Integration Leader

Savant is happy to announce the addition of CEC L-48 *Oxidation Stability of Lubricating Oils Used in Automotive Transmissions by Artificial Aging*, an oxidation test to address future needs for electric driveline fluids. There is an upcoming SAE instruction document SAE J3200 Electric Drivetrain Fluids (DEF), under development in the ballot stage with a focus on thermal and electrical conductivity, oxidation, and copper corrosion which includes CEC-L-48¹. This lab-scale oxidation method ages oil in laboratory glassware. The method is used to evaluate key parameters that are related to longer oil service lifetime, better protection, fuel efficiency improvement and durability, reduced carbon emissions, and lower operating costs which have also led to higher operating temperatures for axle lubricants. These higher operating temperatures have placed more severe demands on the thermal and oxidative performance of axle lubricants.



CEC L-48 assesses resistance of lubricants to high temperature oxidation and the ability to resist oil degradation and sludging. A lubricant is heated and aerated under controlled conditions. The samples are tested for kinematic viscosity, Figure 1, and infra-red spectroscopy, Figure 2. The viscosity increase and the degree of oxidation are determined by comparing the fresh and aged oil. Lubricant performance is evaluated by measuring the change in kinematic viscosity at 40°C and

100°C. The degree of oxidation is measured by FTIR in accordance with ASTM D7214 which quantifies the Peak Area Increase (PAI) in the carbonyl region. Oxidation peak height is also measured in accordance with DIN 51453. In both cases, the smaller the increase the better. In addition, sludge rating is determined by visual examination of the aged oil. Typical conditions are temperature: 150°C to 170°C and 192 hrs duration.

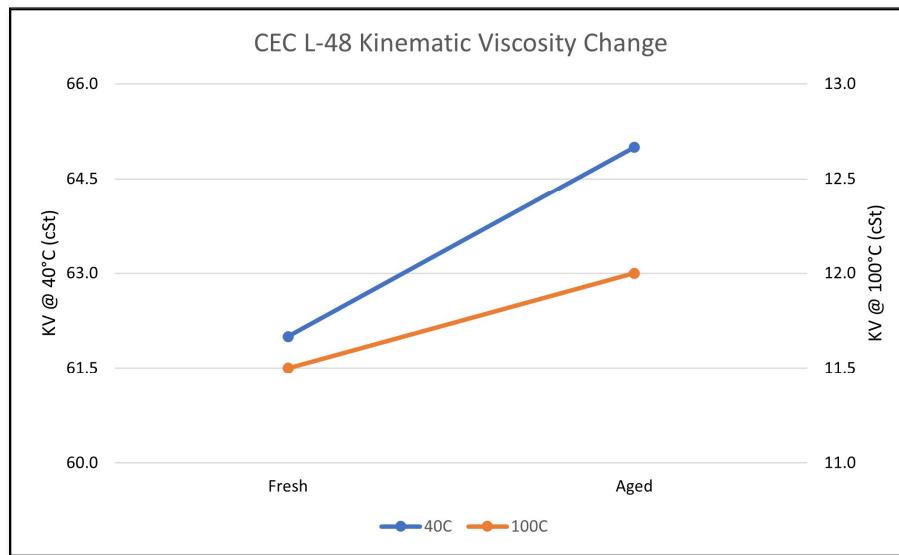


Figure 1.

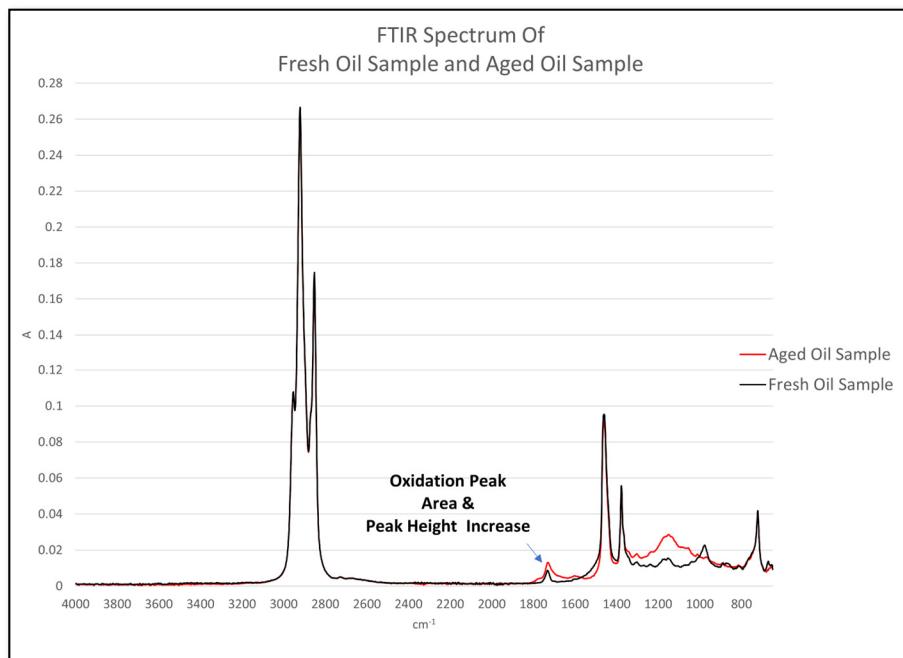
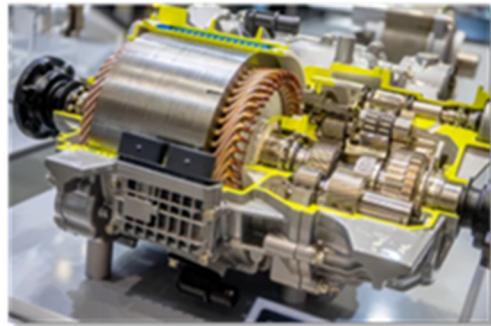


Figure 2.

Oxidation can lead to oil degradation, resulting in increases in viscosity, acid number, and/or sludge and deposit tendencies. An increase in KV can lead to increased friction and lower wear-prevention, which can reduce efficiency and increase wear. Increase in acid number will form undesirable gums and lacquers. Sludge enhances corrosion rates due to acidic compounds which can lead to malfunctioning of valves, confined space blocking, and orifice clogging. If a lubricant shows ability to resist degradation in these bench tests, it can indicate its ability to provide longer oil life and better protection.

As a reminder, our *On the Horizons Q4, 2021* issue focused on [Electric Vehicle Lubricant and Fluids Testing](#). In addition to characteristics common to all drivetrain lubricant performance, such as wide temperature range and anti-wear protection, Savant also offers the Conductive Deposit Test (CDT) which exists to determine to what extent conductive deposits will form on exposed copper in tight spaces exposed to lubricant or vapor and the Wire Corrosion Test (WCT) which identifies the rate of corrosion and depletion of copper on the test wire in both fluid and vapor states.



The advancements of electric vehicles and their specialized lubricants are creating opportunities for innovation in fluids and fluid testing. Savant Labs has been developing expertise in these new areas and is available to support our customers' testing needs.

Coming Soon... CEC L-105 and CEC L-109

Savant is also preparing to perform CEC L-105, which determines low-temperature pumpability and CEC L-109, which is the oxidation test for engine oils operating in the presence of biodiesel fuels. All newly formulated engine oils that wish to claim against the ACEA oil sequences must obtain the relevant pass criteria for CEC L-105 and CEC L-109.

The upcoming On the Horizons Q4 issue will highlight more information about the tests below:

- *CEC L-105 Low-Temperature Pumpability*
- *CEC L-109 Oil Oxidation with Biodiesel for Engine Oils Operating in the Presence of Biodiesel Fuel*

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¹This CECL-48 method is specifically prepared for fully formulated transmission lubricants (ATF and gear oils). It can be applied to other types of lubricants. But, in this case, this method has not been validated and its precision has not been evaluated.

Announcing Renovation and Expansion of Savant Labs

Over the next several months, Savant Labs will be increasing our footprint by renovating and expanding our laboratory facilities onsite. This additional laboratory space will allow Savant to conduct innovative research and to address additional testing needs for our growing customer base. We have seen significant growth of our business over the past couple of years and this additional lab will build upon our strategic plans for continued global growth. We are planning ahead to avoid any delays in our services. We will be in direct communication with our customers related to ongoing projects during this exciting time.



Savant Labs offers Custom Blending Services

At Savant Labs we welcome customers from across the lubricants value chain and recognize that those businesses need quality testing of their products. Sometimes customers may not have access to create a fully formulated lubricant but need to create those formulas for comparison against what is currently in the market. Here are some examples of situations where Savant has been able to provide custom blending support.



Have Additives, But Need Base Oil:

Supply challenges have made it difficult to source key additives, and that can open the door for Savant customers to provide their solutions. Or maybe the additive producer does not have US based blending assets and would prefer to minimize the shipping costs and just ship the additive package. Both those types of customers seek to compare their products vs. products in the market, but don't have the ability to blend samples. Savant has been able to provide a range of base oils and create the blends for these customers, saving time and cost.

Have Base Oil, But Need Additives:

Savant Labs have been able to help base oil producers who typically can create a wide range of synthetic chemistry by blending in some basic additive packages and running comparison testing vs. other base oil types. These services can help provide valuable information on molecule design and base oil product blends for certain applications.

Savant Labs can help your business save time and money with our blending solutions. Contact us to discuss your next project and how Savant Labs can help you.

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Michael Habitz, Promoted to Quality Assurance & Instrumentation Supervisor

Congratulations to [Michael Habitz](#) on his promotion as the Quality Assurance and Instrumentation Supervisor. Mike is a senior chemist and has worked for Savant Labs for over 20 years in many capacities. He has a solid reputation for technical precision, contributing to the successful implementation of testing protocols in the Labs.



Mike is also our lead chemist for custom testing projects pushing the limits to understanding lubricant performance for our customers. Please join us in congratulating him on this well-deserved promotion in recognition of his significant contributions to Savant Labs.

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