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SAVANT LABS

On the Horizon

A World of Lubrication Understanding®

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Today's Topics:

- **NLGI HPM Grease and GC-LB Specifications**
- **Lab Renovations Complete**
- **Join Us at Upcoming Events**

Grease Testing - HPM Grease and CG-LB Specifications

The NLGI HPM Grease specification published in 2020 is big news in the grease industry[1,2]. The High-Performance Multiuse (HPM) Grease specification is unique among specifications in several ways. First, there are simply not that many industry-wide specifications for grease[2]. Instead, according to grease experts Joe Kaperick and Chuck Coe, OEMs and others with specific lubrication needs have worked with grease manufacturers to identify or design the grease that meets those needs[3]. Historically this has made standardization difficult, though the GC-LB specification for automotive wheel-bearing and chassis applications has been popular since its release in the late 1980s. While the HPM Grease specification cannot meet every unique application, it indicates a grease that will excel in most situations and even has specific subcategories to indicate a grease's ability to handle particularly challenging environments such as water resistance (WR), saltwater corrosion resistance (CR), high load carrying capacity (HL), and low temperature performance (LT). Adding performance requirements to a core set of requirements is a new way in setting grease specifications. Savant Labs has stayed attuned while these developments were underway and has been ready to offer testing to these additional requirements since the specification was first launched. Because HPM is a high-performance specification for multiple uses, it is more directed at industrial applications than the particular needs of automotive applications. Grease manufacturers are interested in demonstrating their products meet the NLGI HPM Grease specification because it indicates a very good grease formulation for most applications, especially with the added enhanced performance requirements.

NLGI HPM vs. GC-LB Testing Requirements

The requirements for the HPM specification can most easily be classified in comparison to those for the previous automotive specification GC-LB. It's interesting to note that many of the testing requirements to obtain an HPM specification are similar to those for the historical GC-LB specification[1], and Savant Labs can offer testing for both. The worked-60 penetration test (ASTM D217), the bearing rust with DI water test (ASTM D1743), and the four-ball wear test (ASTM D2266) are implemented with the same limits. The four-ball extreme pressure test (ASTM D2596), the water washout test (ASTM D1264) and the oil separation test over 24 hours at 25 °C (ASTM D1742), are the same tests with stricter limits, while the acrylonitrile butadiene rubber (NBR) hardness and volume change test (ASTM D4289) uses harsher conditions with identical limits and a new elastomer material. The low temperature torque test at -40 °C (ASTM D4693) has been replaced by the low temperature torque ball bearing test at –20 °C (ASTM D1478) with limits for starting and running torque. There are also new tests required for the HPM core specification: the Emcor rust test with distilled water (ASTM D6138), oxidation stability (ASTM D942), copper corrosion (ASTM D4048), prolonged worked penetration (ASTM D217), high temperature bleed (ASTM D6184), and roll stability (ASTM D1831).

More stringent limits or additional tests are required for the enhanced performance requirements. To gain the water resistance tag, the water washout test (ASTM D1264) limits are more stringent. Additionally, the water spray off test (ASTM D4049) and wet roll stability test (ASTM D8022) are required. Corrosion resistance requires the bearing rust test with 10% simulated seawater (ASTM D5969) and the Emcor rust test with both simulated seawater and a 0.5 N NaCl solution (ASTM D6138). The high load tag requires increased limits for four-ball wear (ASTM D2266) and four-ball extreme pressure (ASTM D2596). It also requires the SRV step load test, Procedure B at 80 °C (ASTM D5706), fretting wear loss (ASTM D4170), and fretting wear scar by SRV (ASTM D7594). The low temperature tag requires the low temperature torque ball bearing test at –30 °C (ASTM D1478), the US Steel Mobility test at -20 °C, and a low temperature flow test at -30 °C (DIN 51805-2).

Table 1. Tests for HPM compared to GC-LB[3]. DXXXX represents an ASTM test method.

Tests with the same limits for GC-LB and HPM	Tests with stricter limits or conditions for HPM compared to GC-LB	Tests for HPM that replace similar tests for GC-LB	New tests for HPM that are not required for GC-LB
D217 D1743 (DI water) D2266	D2596 (weld) D1264 D4289 D2266 (HL) D1742	D1478 (Replaces D4693)	D6138 D942 D4048 D217 (prolonged) D6184 D1831 D4049 (WR) D8022 (WR) D969 (CR) D5706 (HL) D4170 (HL) D7594 (HL) US Steel Mobility (LT) DIN 51805-2 (LT)

For a complete comparision visit NLGI's HPM vs. GC-LB Comparsion chart.

Additional Applications for Grease Testing

The HPM specification is designed with industrial applications in mind. If a grease does not have the specification, it is a simple matter to complete testing to the standards to see how it compares to an HPM certified grease. However, there may be specific instances where even more testing is desirable.

Modified wear protection testing is another common extra for greases. While the HPM-HL specification provides assurance of the ability to carry a high load, wear can occur over a wide range of load, speed, and temperature conditions. SRV testing can be customized beyond the limits and conditions specified for HPM-HL to address any specific need for a particular application. Savant Labs has a great deal of experience doing custom testing for these situations. Other common applications include compatibility testing and in-service testing, both of which Savant Labs can provide.

By far the most common reasons for grease testing are to meet NLGI HPM or GC-LB specifications, to answer questions about suitability of a grease for a particular application, or to assess the health of the system with in-service testing. However, testing is also done to meet the handful of other specifications, such as railroad standards EN1208, AAR M-914, and M0949 or various OEM specifications[4].

Complete Grease Specification Testing Services

Whatever the grease testing need may be, Savant Labs can provide excellent service to address it. We offer a complete line of grease specification testing services, including a specific package to address HPM certification with or without tags. We also have extensive experience with compatibility testing using ASTM D6185 and custom tests. We provide standardized SRV wear testing to ASTM D5706 and D7594 as well and a wide range of customized temperatures, loads, and speeds.

For the full range of standardized grease tests Savant Labs offers please see the test list on our website. Because Savant Labs is most well-known for our ability to complete custom testing for special projects that address the fundamental concerns of our customers, we are confident we can also assist with any novel grease problem.

1. Sosa, Yulia. (2021, September). “New and in-service grease testing.” *Tribology & Lubrication Technology*, 77 (9), pp. 38-48. https://www.stle.org/files/TLTArchives/2021/09_September/Cover_Story.aspx
2. Mistry, Anuj. (2021, October). “NLGI specifications meet special needs.” *Efficient Plant*, 34 (8), p. 25. https://www.nxtbook.com/atp/MaintenanceTechnology/efficient-plant-october-2021/index.php#/p/24
3. NLGI Official.(2021, April 13). HPM Certification [Video]. YouTube. https://www.youtube.com/watch?v=O4VFbSjWHkA
4. Coe, Chuck. (2022, May/June). “The danger of cross reference charts.” Plant engineering, 76 (3), pp. 37 – 38 https://bt.e-ditionsbyfry.com/publication/?m=32190&i=750491&p=39&ver=html5

Lab Renovations Complete

Savant Labs recently completed renovations to its facility that began in October of last year. The renovations included not only aesthetic updates, such as new flooring and LED lighting, but also functional additions that will benefit the company's future growth with extension of two additional lab spaces for equipment. A dedicated area was added for elastomer testing, as well as improved ventilation and temperature/humidity control. Additionally, electrical power options were enhanced with backup power systems installed and additional space for blending and mixing oil formulations and greases.

The renovations at Savant Labs are expected to give the company a competitive advantage in the industry by providing a facility that ensures accuracy, consistency, and safety. As part of the renovations, new benchtop spaces have been added to provide flexibility for expansions of new test methods in the future.

These changes will help to increase the efficiency, productivity, and overall success of Savant Labs' operations and is an ideal platform to continue developing innovative solutions. As we continue to expand our services and offerings, these renovations will ensure that they are able to meet the needs of our customers while providing them with the best possible experience.

Join Savant Labs at Upcoming Events

Come and visit us and discuss the potential testing scenarios, understand existing testing practices, as well as stay up to date with the development and testing requirements of new electric vehicle fluid testing.

We look forward to meeting you there!

ILMA (Tucson, Arizona) – April 20-23
STLE (Long Beach, California) – May 21-25

NLGI Annual Meeting (San Diego, California) – June 4-7
ILMA (Palm Springs, California) – October 7-10
STLE E-Mobility Conference (Cleveland, Ohio) – November 12-15

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