Next-Generation NLGI Grease Specifications

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Abstract
This article outlines some of the current aspects and background of the NLGI GC-LB Certification Specification as well as the recent work to define new specifications for High Performance Multiuse greases to be certified by NLGI. NLGI is working with Center for Quality Assurance (CQA) to gather comments and suggestions for inclusion in these proposed specifications and would highly encourage all stakeholders to get additional information and provide their feedback to Mike Kunselman at Grease@CenterforQA.com.

NLGI certifies the quality of commercial grease formulations through their Certification Mark program using the GC-LB Performance Classification system. This certification program has provided an internationally-recognized grease specification for grease and bearing manufacturers, users and consumers since 1989. Although originally conceived as specification for greases used in automotive chasses and wheel bearings, GC-LB is today recognized as a mark of quality for grease specifiers in a variety of different applications. And due to advancements in materials, technologies and applications, NLGI has recognized that current applications may be better served by updated specifications.

NLGI has contracted with The Center for Quality Assurance (CQA) to interview and survey members of the grease industry to define these new specifications and ensure that they meet the needs of today's grease-lubricated applications. The initial focus will be on updated specifications for a High Performance Multiuse grease that could be used in a variety of bearings and applications which require similar lubricating properties. Additional specifications will also be defined for enhanced performance in the areas of high load, water resistance, corrosion resistance and long life applications.

GC-LB History
In order to better understand the current specification and the value of the Certification Mark to a formulator or and end-user, it may be useful to dig deeper into the tests that are incorporated into the GC-LB specification. NLGI originally designed the list of standard test methods and performance targets to meet the needs of automotive service greases, in cooperation with the American Society of Testing Materials (ASTM) and the Society of Automotive Engineers (SAE), and it was published in 1989 as ASTM D4950 "Standard Classification and Specification for Automotive Service Greases". [1] The highest performance standard that greases may be classified as are "GC" for wheel bearing lubricants, and "LB" for chassis lubricants leading to the oft-used shorthand "GC-LB". The current specifications limits of ASTM D4950 for the "G" and "L" categories are shown in Tables 1 and 2.

Table 1: Acceptance Limits for Wheel Bearing Grease Specifications [1]

Category	Test	Property	Acceptance Limit
GA	D217	Consistency, worked penetration, mm/10	220–340[A]
	D566 or D2265	Dropping point, °C, min	80
	D4693	Low temperature, performance, Torque at −20°C, N·m, max	15.5
GB	D217	Consistency, worked penetration, mm/10	220–340[A]
	D566 or D2265	Dropping point, °C, min	175
	D4693	Low temperature performance, Torque at −40°C, N·m, max	15.5
	D1264	Water resistance at 80°C, %, max	15
	D1742	Oil separation, mass %, max	10
	D1743	Rust protection, rating, max	Pass
	D2266	Wear protection, scar diameter, mm, max	0.9
	D3527	High temperature life, hours, min	40
	D4289	Elastomer SAE AMS 3217/2B compatibility:[B]	
		Volume change, %	−5 to + 30
		Hardness change, durometer-A points	−15 to + 2
	D4290	Leakage tendencies, g, max	24
GC	D217	Consistency, worked penetration, mm/10	220–340[A]
	D566 or D2265	Dropping point, °C, min	220
	D4693	Low temperature performance, Torque at −40°C, N·m, max	15.5
	D1264	Water resistance at 80°C, %, max	15
	D1742	Oil separation, mass %, max	6
	D1743	Rust protection, rating, max	Pass
	D2266	Wear protection, scar diameter, mm, max	0.9
	D3527	High temperature life, hours, min	80
	D4289	Elastomer SAE AMS 3217/2B compatibility:[B]	
		Volume change, %	−5 to + 30
		Hardness change, durometer-A points	−15 to + 2
	D4290	Leakage tendencies, g, max	10
	D2596	EP Performance:	
		Load wear index, N (kgf), min	295 (30)
		Weld point, N (kgf), min	1960 (200)

[A] Vehicle manufacturer's requirement may be more restrictive; grease containers should display NLGI Consistency Number as well as category designation.
[B] With respect to elastomer AMS 3217/2A, the elastomer specification has been superseded by AMS 3217/2B. Per SAE, the elastomers are identical, however the synthetic lubricant immersion fluid used to reference the elastomer has been exchanged from ARM-200 to AMS 3021. Reference fluid AMS 3021 better represents current market aviation fluids.

Table 2: Acceptance Limits for Chassis Grease Specifications [1]

Category	Test	Property	Acceptance Limit
LA	D217	Consistency, worked penetration, mm/10	220–340[A]
	D566 or D2265	Dropping point, °C, min	80
	D2266	Wear protection, scar diameter, mm, max	0.9
	D4289	Elastomer SAE AMS 3217/3B Compatibility:	
		Volume change, %	0 to 40
		Hardness change, Durometer-A points	−15 to 0
LB	D217	Consistency, worked penetration, mm/10	220–340[A]
	D566 or D2265	Dropping point, °C, min	150
	D2266	Wear protection, scar diameter, mm, max	0.6
	D4289	Elastomer SAE AMS 3217/3B compatibility:	
		Volume change, %	0 to 40
		Hardness change, Durometer-A points	−15 to 0
	D1742	Oil separation, mass %, max	10
	D1743	Rust protection, rating, max	Pass
	D2596	EP performance:	
		Load wear index, N (kgf), min	295 (30)
		Weld point, N (kgf), min	1960 (200)
	D4170	Fretting protection, mass loss, mg, max	10[B]
	D4693	Low-temperature performance, torque at −40°C, N·m, max	15.5

[A] Vehicle manufacturer's requirement may be more restrictive; grease containers should display NLGI Consistency Number as well as category designation.
[B] The fretting wear requirement is significant in passenger car and light-duty truck service, but it has not been shown to be significant in heavy-duty truck applications.

It is recognized that some of the methods incorporated in the ASTM D4950 specification have reproducibility issues as well as some questions about the appropriateness of some test methods for today's greases due to the evolutionary changes in equipment and applications. These issues are being discussed within NLGI and the ASTM sub-committee G with an overall goal of improving current tests by upgrading equipment, refining methodologies or developing new tests where necessary. This process may also lead to incorporating test methods or equipment used by other organizations such as the German Institute for Standardization (DIN) or the International Organization for Standardization (ISO).

Dropping Point

ASTM D2265 "Standard Test Method for Dropping Point of Lubricating Grease Over Wide Temperature Range" and ASTM D566 "Standard Test Method for Dropping Point of Lubricating Grease" are test methods specified within ASTM D4950 for measuring the dropping point of a grease.[2,3] The dropping point, the temperature at which a semi-solid grease begins to liquify and lose its consistency, has historically been used for assessing the ability of a grease to function at higher temperatures. With the evolution of equipment with increasing application temperatures, the development of grease formulations to protect at those higher temperatures and an overall better understanding of grease behavior, the dropping point is given less and less credibility in defining grease behavior at high temperature.

Additionally, the current apparatus calls for the use of glass thermometers containing mercury. Mercury is known to be a very hazardous substance. Due to this known fact, the Environmental Protection Agency is attempting to substitute the use of mercury-in-glass thermometers with safer alternatives in academia, government, and industry settings. However, it is difficult to replace mercury-in-glass thermometers with an alternative that is suitable for testing a wide temperature range of greases and still relatively affordable. David Turner, the senior technical services representative of CITGO Petroleum, predicts a cost of US$4,000 USD for potential electronic alternatives as opposed to the conventional mercury-in-glass thermometer which currently cost around US$75. Other potential alternatives include platinum resistance thermometers (PRTs) and Galinstan thermometers, which have non-toxic properties. However, there are additional costs involved with incorporating these alternative thermometers given that there is a difference in the rate of heat transfer and responsiveness which could introduce a bias into results determined by the ASTM dropping point methods.

There is also a possibility of ASTM D566 being dropped from the ASTM D4950 standard classification. ASTM D566 is currently obsolete and does not support the high temperature range of popular high temperature greases, such as complex soaps, polyurea, and calcium sulfonate grease. Instead, ASTM D2265, which supports a more expansive temperature range and includes higher temperatures, is heavily utilized.

High Temperature Bearing Life

Another test method that has been drawing a considerable amount of attention in the lubricant grease industry is ASTM D3527 "Standard Test Method for Life Performance of Automotive Wheel Bearing Grease".[4] This test method evaluates the long life performance of automotive wheel bearing greases. The result is used to rank the grease's performance and, in theory, is a much better indicator of high temperature performance than the dropping point.

The test requires a hub assembly, or wheel bearing, that is coated with the test grease and then subjected to a specific load through an external electric motor. The test operates in repeated cycles of 20 hours on and 4 hours off, which is an exaggerated imitation of long-term driving cycles as the bearing gets hot during operation and cools down when at rest. As the process goes on, the grease will begin to degrade and harden. At this stage the electric motor will require a higher amperage to overcome the thickened grease. The increase in amperage is an indication of resistance in rotational force (torque) and the test is ended when this resistance rises above a setpoint. The number of on-cycle hours is recorded as the service life of the grease sampled.

The lubricant industry has tried numerous times to improve this test method to yield more precise results, but the method remains relatively unchanged. Despite the shortcomings of ASTM D3527, this test is necessary for greases to meet the highest classifications of the "G" category. The major problem is the poor repeatability and reproducibility of the test results, as shown in Figure 1. The reproducibility statement in the standard states that results from the different labs may vary by as much as 1.2 times the average of the two results. This means that a result of 200 hours from one lab and a result of 800 hours from a second lab would be considered within "normal" scatter for the test.

Figure 1: ASTM D3527 Proficiency Test Results [5]

ASTM Proficiency Test Results for D3527

Report Period	# of Participants	Range of Results (Hours)
1H 2013	6	141-400
2H 2013	5	40-61
1H 2014	3	140-222
2H 2014	3	60-101
1H 2015	3	100-240
2H 2015	7	60-580
1H 2016	9	20-100
2H 2016	7	40-313
1H 2017	8	80-300
2H 2017	5	80-260

Source: ExxonMobil R&E

Carfolite and Chadwick [6] began to approach this issue from the perspective of the motor's functionality and found that there was a noticeable variance in the amperage linked to current fluctuations within the motors. The cause behind this occurrence was theorized to be the age of the hardware such that more current is needed to produce the same torque. A rise in amperage marks the end of the test and while it could mean that the grease has reached the end of its ability to perform, it could also be due to the age of the motor. Another theory is that variance in the results could be due to a voltage and torque constant difference.

Potential solutions, such as modernizing motor specifications and implementing the use of a torque meter to measure changes in power rather than current, are being investigated. However, there are financial constraints that arise from these modifications. While improvements are still being attempted, this method is less and less relevant as it was constructed based on an outdated wheel bearing hub design from the 1970s, and most modern wheel bearings cannot be re-lubricated as they are permanently sealed. There has been some discussion about replacing the test with alternative high temperature test methods such as DIN 51821 (FAG FE9), ASTM D3336 or SKF R0F+.

Grease Consistency

There has also been recent debate about the shortcomings of the current grease cone penetration tests and the possibility of replacing the standard penetration test with an alternative test or supplementing it with tests that give more information about the grease. The primary tests in use today are ASTM D217 "Standard Test Methods for Cone Penetration of Lubricating Grease" and ASTM D1403 "Standard Test Methods for Cone Penetration of Lubricating Grease Using One-Quarter and One-Half Scale Cone Equipment".[7,8] Most greases used in the industry are NLGI Grade #2. A grease product may have the same consistency grade, but still have noticeable differences in other physical properties as compared to different greases. This might include the ability for the grease to be pumped within a lubricated part and how it flows around the area to be lubricated. As shown in Table 3, the end users might have more specific requirements for the grease product concerning the consistency, which includes "pumpability, bearing speed (flow), operating temperature, grease bleed and environmental conditions," concerns which are not explicitly addressed by the current cone penetration test.

Table 3: Required Consistency for Different Applications [9]

High Consistency (Higher NLGI Numbers)
• Journal bearings, slow- speed, such as locomotive block grease • High-speed ball/roller bearings (with low-viscosity base oil) • To avoid water washout • To avoid bleed • To avoid excessive leakage • High ambient or operating temperatures • To seal out environmental dust (very dusty conditions)
Low Consistency (Lower NLGI Numbers)
• Low-speed rolling element bearings (with high viscosity) • Cold temperature operation • Pumpability requirements • Gearbox – lubed for life

Grease flow is important for the entry of the grease into the bearing from the grease gun and the movement of the grease in the lubricated area with moving surfaces. One measure is the shear force or stress required to get the grease to start flowing from rest. The ability of the grease to be pumped concerns its transportation from the gun or lubricator. A difficult hurdle can be the grease's pumpability, specifically with the distance at which the grease needs to travel to fully lubricate the bearing. The operating temperature can also affect the grease's consistency, so its dynamic viscosity may not correlate with the consistency of the system. Note that the grease cone penetration test occurs at 25 degrees Celsius, a temperature that may not reflect the actual temperatures encountered in industrial settings.

Grease bleed is also important and can occur in three scenarios:

- When the grease viscosity is low,
- Base fluid oil separates from the grease,
- Oil is released to aid in the lubrication of moving surfaces

Grease bleed could potentially affect the consistency of the grease and therefore it is important that its viscosity be evaluated.

Several authors have proposed a revised consistency chart shown in Table 4 that would include and would replace the old consistency chart shown in Table 5.

Table 4: Revised Consistency Specification [10]

Property	Tests	Comments
Dynamic Viscosity	Rheometer, ASTM Apparent Viscosity, U.S. Steel Mobility	Flow Characteristics
Yield Stress	Rheometer, Lincoln Ventmeter, Low-Temperature Torque	Pumpability
Bleed	Dropping Point, Pressure Screen Bleed, Conical Sieve Screen Bleed, Koppers Oil Separation	Release of Lubricating Fluid
Tackiness	Rheometer, Falex Tackiness Test, Functional Tackiness Test	Adhesive & Cohesive Properties

Table 5: NLGI Consistency Specification [11]

NLGI Grade	Range, 1/10 mm	Appearance	Description
000	445-475	Fluid	Cooking Oil
00	400-430	Semi-Fluid	Apple Sauce
0	355-385	Very Soft	Brown Mustard
1	310-340	Soft	Tomato Sauce
2	265-295	Normal Grease	Peanut Butter
3	220-250	Firm	Vegetable Shortening
4	175-205	Very Firm	Frozen Yogurt
5	130-160	Hard	Smooth Pate
6	85-115	Very Hard	Cheddar Cheese

Another recurring issues with the cone penetration test is the large required sample size. The test procedure includes a weighted cone being pushed into a volume of grease sample and the corresponding depth of penetration being used to evaluate its consistency. However, the volume of grease required ranges from as much as 290 mL to 3.8 mL depending on the density of the grease. The larger amount is an unrealistic quantity compared to what is required for in-service tests. Additionally, the grease is subjected to a pre-conditioning of 60 shear strokes prior to performing the penetration test. This is an issue since in-service greases usually don't undergo any pre-conditioning before usage.

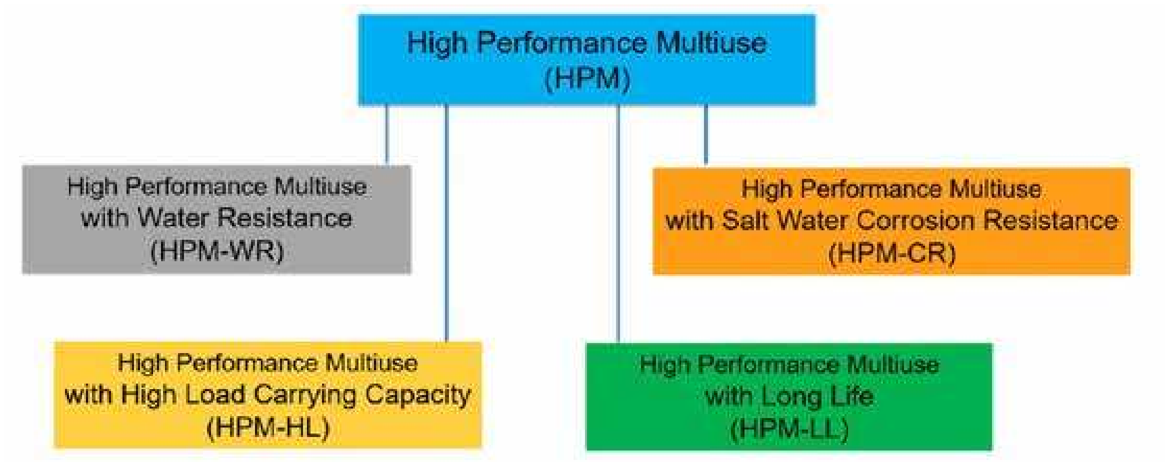
Some lubricant experts have suggested that the cone penetration test should be replaced with rheological testing. The rheometer requires a very small sample size on the order of 0.4 mL to 0.25 mL. It measures the physical properties (flow, yield stress, temperature limits) of a grease by placing the sample of interest under varied or controlled stress through oscillatory shear. Despite the comprehensiveness that the rheometer provides, it comes at a higher price in comparison to the relatively inexpensive penetrometer that has its limits. Most industries have adopted the conventional penetration method and chances are that most industries will stick with it until there is a more economically-viable alternative.

Beyond GC-LB – The Next Generation

The NLGI GC-LB specifications are still used widely despite the challenges of some of its test methods. As NLGI begins to supplement these old specifications with a new set of classifications for high performance, multiuse greases, the test methods and performance limits need to be closely scrutinized. The classifications will need to satisfy the demanding operating conditions of general machineries, not just automobiles. A high performance, multiuse grease can be defined through several different performance properties and can vary by thickener types, such as simple and complex soap greases and non-soap greases. The ability to formulate different base grease/oil combinations to meet different performance levels may also vary in degree of difficulty.

Multiuse greases are called for in a variety of different applications all of which may have different performance challenges. NLGI is focusing on specific sets of performance areas that may be common to many applications so that the appropriate performance subcategories can be chosen by end-users to match their particular needs. The performance sub-categories that have been discussed for the first set of specifications are: water resistance, load carrying capacity, salt water corrosion resistance and long life (see Figure 2). Test methods that will make up each portion of the specification and performance limits for each method are currently being discussed with input being solicited from all stakeholders.

Figure 2 – NLGI Proposed Future Grease Classifications



Water Resistance

Water Resistance is required by many industrial applications that undergo a large amount of exposure to water. Test methods being considered in this category are required for evaluating the adequacy of multipurpose greases with higher water resistance: ASTM D1264 "Standard Test Method for Determining the Water Washout Characteristics of Lubricating Greases", ASTM D4049 " Standard Test Method for Determining the Resistance of Lubricating Grease to Water Spray", ASTM D7342 " Standard Test Method for Prolonged Worked Stability of Lubricating Grease in Presence of Water (Water Stability Test)", and ASTM D8022 " Standard Test Method for Roll Stability of Lubricating Grease in Presence of Water (Wet Roll Stability Test)".[12-15]

ASTM D1264 measures the water resistance of a lubricating grease by determining the amount of grease, in weight percent, that gets washed out of a packed bearing during a specified time. The test method describes a lubricated ball bearing that gets rotated at a specific number of revolutions per minute (rpm) while water strikes the bearing at a constant rate. The current GC specification has a maximum limit for ASTM D1264 set at 15 wt%. Initial proposals for the Water Resistance specification line up the maximum limit of water washout in accordance with the corresponding consistency grade of the grease sample being tested: #1 = 8.0%, #2 = 5.0%, #3 = 3.0%.

ASTM D4049 Water Spray Off employs a metal surface, layered with a grease sample, that is subjected to water spray. This test method assesses the adhesive properties of lubricating greases by measuring the amount of grease that is removed from the metal surface when there is direct contact with water spray. Proposed limits ASTM D4049 Water Spray Off have been suggested to be similar in structure to ASTM D1264: #1 = 40%, #2 = 30%, #3 = 20%.

ASTM D7342 Wet Penetration Stability is another test method for evaluating the overall water resistance of a grease sample. This test method determines the effects of water on the shear stability of grease. This test specifies the introduction of a small amount of water into a grease sample which is then subjected to low shear. The change in consistency of the grease before and after this treatment is measured. Initial proposals for this test limit are a maximum of 50 decimillimeters (dmm) change in consistency.

The same requirement is suggested to apply to ASTM D8022 which uses a roll stability test apparatus to determine the wet roll stability of lubricating grease. This again looks at the change in consistency of a grease that has been exposed to water and then subjected to shear from a rotating roller.

Corrosion Resistance
Applications that involve outdoor-use or marine exposure may risk deterioration of bearings from corrosion caused by humidity or exposure to water. Lubricating greases that can have Salt Water Corrosion Resistance would be desirable in this situation. The test methods that are among those being considered for measuring the corrosion inhibiting properties of grease are: ASTM D5969 "Standard Test Method for Corrosion-Preventive Properties of Lubricating Greases in Presence of Dilute Synthetic Sea Water Environments" and ASTM D6138 "Standard Test Method for Determination of Corrosion-Preventive Properties of Lubricating Greases Under Dynamic Wet Conditions (Emcor Test)".[16,17] ASTM D5969 procedure exposes a bearing packed with the test grease to diluted synthetic seawater and then stores the bearing for a specified period of time. The bearing is then cleaned and evaluated for any indications of corrosion. The ability of the grease sample to prevent corrosion is evaluated using a pass or fail criteria through the presence of corrosion on the inside of the bearing races. Signs of corrosion are identified as red rust marks or black stains. Any corrosion marks that are 1.0 mm or larger in any dimension are considered a fail rating.

ASTM D6138 functions in a similar manner by partially submerging a clean bearing packed with the test grease in a diluted synthetic seawater, or sodium chloride solution. The bearing is then rotated at a specified rpm during specified cycles of running and resting. The bearings will be observed for signs of corrosion at the end of the test and evaluated using Table 6. A proposed maximum accepted rating for adequacy of the grease sample is 1/1 and 2/2 for synthetic seawater and sodium chloride, respectively.

Table 6: Rating System for Corrosion [18]

Rating	Designation	Description
0	no corrosion	no corrosion
1	trace	no more than three spots of corrosion, none of which has a diameter larger than 1 mm
2	light	small areas of corrosion covering up to 1 % of the surface
3	moderate	areas of corrosion covering between 1 and 5 % of the surface
4	heavy	areas of corrosion covering between 5 and 10 % of the surface
5	severe	areas of corrosion covering more than 10 % of the surface

High Load

High Load carrying capacity is another important property of lubricating greases for equipment reliability. Multipurpose greases often contain extreme pressure (EP) and anti-wear (AW) additives that promote a greater load capacity to minimize stress and wear in lubricated areas. Among the proposed test methods for High Load Carrying Capacity subcategory are ASTM D2266 "Standard Test Method for Wear Preventive Characteristics of Lubricating Grease (Four-Ball Method)" with tighter limits, ASTM D2596 "Standard Test Method for Measurement of Extreme-Pressure Properties of Lubricating Grease (Four-Ball Method)" with higher load limits, ASTM D5706 "Standard Test Method for Determining Extreme Pressure Properties of Lubricating Greases Using a High-Frequency, Linear-Oscillation (SRV) Test Machine", ASTM D4170 "Standard Test Method for Fretting Wear Protection by Lubricating Greases" with tighter limits and ASTM D7594 "Standard Test Method for Determining Fretting Wear Resistance of Lubricating Greases Under High Hertzian Contact Pressures Using a High-Frequency, Linear-Oscillation (SRV) Test Machine".[19-23]

The 4-Ball test method involves a single steel ball that gets rotated, at a specified rpm and applied load, on top of three stationary steel balls that are packed with the test grease. For ASTM D2266, the wear scar diameter imposed onto the three stationary, clamped balls is used to measure the wear preventive characteristics of a test grease on steel-to-steel sliding surfaces. A maximum limit for the wear scar diameter has been proposed to be 0.50 mm as opposed to the former 0.90 mm maximum limit for GC greases.

For ASTM D2596, one proposal is to set limits for not only Weld Point, but LWI and LNSL as well. The Weld Point is the lowest applied load at which welding occurs between steel-to-steel sliding contact. A minimum weld point of 400 kgf has been proposed. The Load Wear Index (LWI) is obtained from the 4-ball test method and assesses the performance of a lubricant in preventing wear when subjected to varying loads. A minimum LWI of 45 kilogram-force (kgf) has been proposed to be appropriate for this category. The Last Non-Seizure Load (LNSL) is the highest applied load where lubrication still exists between the 4 balls, at which any higher load would cause lubrication to diminish and steel-to-steel contact to begin. A LNSL limit has been proposed at 100 kgf or 126 kgf.

Bearings can be damaged by fretting wear which can happen under high applied loads in the presence of a vibratory, or oscillatory motion as metal-to-metal surfaces are sliding against each other. To evaluate the protective properties of lubricating greases against fretting wear, ASTM D4170 is designed to measure the mass loss of lubricated ball thrust bearings when subjected to an oscillatory motion through a specified arc under a specified frequency and applied load. The maximum mass loss, for the average two duplicate runs, is proposed at 5.0 mg for the grease to demonstrate acceptable fretting wear protection (which was lowered from 10 mg according to GC-LB specifications). The test is to be run in duplicates to reduce relatively wide precision limits present in ASTM D4170.

However, there has been a slow adoption of a more precise test method, ASTM D7594, which uses an SRV machine that employs high-frequency linear oscillatory motion with low strokes and high Hertzian contact pressures. The SRV test machine applies a steel test ball oscillating against a stationary steel test disk with lubricant in between which forms a wear scar on the disk. The machine will calculate and record the coefficient of friction (produced from the frictional force of the two surfaces) of a grease sample. The wear scar diameter on the disk is measured under a microscope and used to evaluate the fretting wear protection of a grease. Specific limits for the wear scar diameter of ASTM D7594 has not been proposed yet.

The SRV test machine can also be used to test for the extreme pressure properties of greases in ASTM 5706. This test method works in a similar manner as ASTM D7594 but uses increased loads in increments until seizure occurs. A load at which seizure occurs has been proposed to not be lower than 1200 Newtons (N) to meet the needs of a High Load grease.

Long Life

Another important characteristic of greases for many applications – especially those under higher temperature conditions – is its functional lifetime. Proposed test methods for evaluating the Long Life performance of multipurpose greases include ASTM D2266 4-Ball Wear, ASTM D4170 Fretting Wear, and ASTM D7594 Fretting Wear using SRV with tighter limits to reflect the need for grease to have lower wear to increase their useful life. These limits may be similar or identical to the High Load Capacity grease limits. ASTM D942 "Standard Test Method for Oxidation Stability of Lubricating Greases by the Oxygen Pressure Vessel Method" [24] could also be included to as another measure of extended life. NLGI is currently also working with ASTM and other stakeholders to develop a new test method to replace the outdated, problematic ASTM D3527 Life Performance test, as mentioned earlier. This will likely mean that the Long Life category will be delayed for several years pending the successful development of this new high temperature bearing test.

High Performance Multiuse

It is also proposed that a minimum level of performance be set for High Performance Multiuse greases which may or may not also meet some of the additional performance sub-categories outlined above. This would allow stakeholders to define a level of performance that will likely incorporate aspects of the current GC-LB specification with some additional measurements of performance such as roll stability, copper corrosion, and elastomer compatibility that aren't covered in that specification. Lower levels of performance from some of sub-categories may also be included in this High Performance Multiuse specification.

ASTM D4950 was first issued in 1989 to support GC-LB qualifications. It has been adopted by industries worldwide and many industries continue to follow this standard for specification purposes and direction with respect to lubrication needs. However, as technology advances in both the equipment and the lubrication industry, there is a growing desire for additional guidance to end-users on the most appropriate grease for specific applications. NLGI has undertaken the establishment of these new specifications to help all the stakeholders have a better conversation about addressing the more complex lubrication needs of today. NLGI's goal is to introduce these first set new specifications and begin certifying greases against them in January 2021 and are actively soliciting feedback from all stakeholders now to ensure that they reflect the needs of the industry today.

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