



161 Thorn Hill Road  
Warrendale, PA 15086-7527

## PROGRAM DOCUMENT

PD4000

Rev E

Issued 12-June-07  
Revised 11-Aug-11

### GEAR LUBRICANT REVIEW PROGRAM

#### 1. SCOPE:

These Review Procedures specify the mechanism to be followed by Presenters in submitting lubricant information, test reports, and test parts to the Review Committee for its evaluation. The Review Committee will follow these Procedures in its evaluation of the candidate lubricant against the requirements of the SAE J2360 Standard.

Information submitted to the Review Committee and Staff is submitted for the purpose of permitting the Committee to carry out its assigned function and is not for dissemination outside the Committee. Nothing in this section, however, precludes Committee members from using or discussing such information not designated proprietary under Section 3.6 in the normal course of their employment.

Any questions concerning interpretation of these Procedures should be addressed to the Chairman of the Review Committee.

At this time this document will only address multigrade gear lubricants.

PRI operating procedures provide that "This report is published by PRI to advance the state of technical, engineering, and quality sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

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Printed in U.S.A

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The laboratory performance tests comprise the following:

- a. ASTM D 5704 (L-60-1) – Standard Test Method for Evaluation of the Thermal and Oxidative Stability of Lubricating Oils Used for Manual Transmissions and Final Drive Axles.
- b. ASTM D 7038 (L-33-1) - Performance Test for Evaluating the Moisture Corrosion Tendencies of Automotive Gear Lubricants.
- c. ASTM D 6121 (L-37) – Standard Test Method for Evaluation of the Load Carrying Capacity of Automotive Gear Lubricants Under Conditions of Low Speed and High Torque Used for Final Hypoid Drive Axles.
- d. ASTM D 7452 (L-42) – Performance Test for Evaluating the Load Carrying Capacity of Automotive Gear Lubricants Under Conditions of High Speed Shock Loading.
- e. ASTM D 5579 (Cyclic Durability) – Standard Test Method for Evaluating the Thermal Stability of Manual Transmission Lubricants in a Cyclic Durability Test .
- f. ASTM D 5662 (Oil Seal Compatibility) – Standard Test Method for Determining Automotive Gear Oil Compatibility with Typical Oil Seal Elastomers.

These performance tests are under continuing development and refinement by ASTM Section D02.B0.03. Any questions concerning the test procedures to be followed should be addressed to the appropriate individual at the Performance Review Institute. Copies of pertinent SAE Standards are available from:

Customer Sales & Service  
SAE International  
400 Commonwealth Drive  
Warrendale, Pennsylvania 15096  
724/776-4841

The Storage Stability and Compatibility tests (SS &C) are included in the latest edition of Federal Test Method Standard No. 791, "Lubricants, Liquid Fuels and Related Products: Methods of Testing". This is available from:

General Services Administration  
Specifications Distribution Unit  
ROB, Room 6039 – WFSIA  
7<sup>th</sup> & D Streets, S.W.  
Washington, DC 20407  
Or  
Standardization Documents Order Desk

**1.1 Address of Qualifying Activity**

Secretary of the LRI  
Performance Review Institute  
161 Thorn Hill Road  
Warrendale, Pennsylvania 15086  
Phone: 724/772-1616  
Fax: 724/772-1699

**1.2 Point of Contact**

Inquiries, correspondence, and shipment of parts, tests reports, test data summaries, etc. are to be directed to the attention of the LRI Secretary at the above address.

**1.3 Shipping**

Shipping Information: If possible, bulk shipments of test parts should be packaged on pallets to facilitate unloading and handling. When shipping parts please contact SAE's Shipping and Receiving Department to ensure proper drop-off and pick-up arrangements are made.

SAE International  
Shipping and Receiving Department  
161 Thorn Hill Road  
Warrendale, Pennsylvania 15086-7527  
724/776-4841

**1.4. MEMBERSHIP**

**1.4.1 Becoming a Committee Member**

Individuals who have interests and expertise in the activities of the LRI Committee can request membership. Requests should be submitted to the Committee Chairperson, who determines the status of their membership.

**1.4.2 Review Committee Members**

LRI Review Committee Members shall be selected by the LRI based on the individual's qualifications to review the results of test data and experience in the performance of gear lubricants. The individual should have significant industry experience and technical expertise. They must be competent and authoritative in the field of automotive gear hardware and/or automotive gear lubricants. Individuals who wish to be considered for a position as a Review Committee member shall provide a written request (resume or letter of recommendation from their employer) to the LRI Chairman for discussion, a minimum of one week prior to the scheduled LRI Meeting. An Alternate Review Committee Member shall be appointed for each Review Station. However, no one shall be considered for Review Committee membership who is employed by, or affiliated with,

an organization that primarily refines petroleum products or produces or processes gear lubricants, or additives thereto; or any employee of an organization that primarily conducts gear lubricant tests.

Potential LRI Review Committee Members shall attend a minimum of two (2) LRI Committee Meetings and review submittals with an experienced Reviewer prior to a vote for selection and granting voting privileges.

The LRI shall obtain as broad a range of background experience as is possible within the limits of technical competence in gear lubricants.

#### 1.4.2.1 Responsibilities of the Review Committee Members:

1. Review test parts, test data, and test summaries for each program and recommend acceptance, non-acceptance, re-tests, or correction of information supplied.
2. Provide recommendations for field testing of lubricants as appropriate.
3. Provide recommendations for tests to be run for programs in support of requests for requalifications, of base stock interchanges, etc.
4. Make recommendations to LRI for improvements and changes (as necessary) in Review Procedures.
5. Make recommendations and vote on ballots for changes in gear lubrication specifications and associated test procedures as necessitated by changes in availability, technology of lubricants, and vehicle service requirements.
6. Assess validity of information generated in special gear lubricant standardization programs.

#### 1.4.3 Presenter Committee Members

Presenter Committee Members consist of Presenters and Test Laboratory Personnel. Potential Presenters shall attend a minimum of two (2) LRI Committee Meetings prior to a vote for selection and granting Supplier voting privileges, if applicable.

##### 1.4.3.1 Responsibilities of Presenter Committee Members

1. Attend LRI Committee Member Meetings as scheduled
2. Contribute to the work of the LRI Committee
3. Vote on ballots in a timely manner
4. Maintain active participation on the LRI Committee

#### 1.4.4 Maintaining LRI Committee Membership

The Chairperson shall review their Committee Roster at least once annually for the purpose of retaining only those who actively contribute to the effectiveness of the committee work. Voting members who are absent without alternate representation from four (4) consecutive committee meetings may be dropped from Voting Membership unless the Chairperson determines that other circumstances warrant retention.

The Chairperson should notify any Voting Member of a change in their participant classification.

#### 1.4.5 Committee Chairperson

The Chairperson is appointed by the LRI. Administratively, the Chairperson will be responsible to the LRI Secretary, who will administer compensation and insure that the Chairperson operates within the policy constraints of the Committee.

##### 1.4.5.1 Responsibilities of Chairperson of the Review Committee:

1. Schedule, organize and preside over meetings of the Review Committee.
2. Inform interested parties of changes or clarifications in test procedures, hardware, specifications and administrative matters.
3. Provide guidance and interpretation of qualification procedures and test requirements.
4. Determine merit of requests for reconsideration of Committee recommendations and initiate appropriate action.
5. Review, confirm and sign Committee Recommendations on each Program submitted.
6. Review and confirm minutes of each Review Committee Meeting.
7. Serve as spokesman for the Committee.
8. Report any problems to PRI.
9. Perform other duties as required by the LRI.

##### 1.4.6 Responsibilities of Secretary of the Review Committee:

Each Review Committee shall have a Secretary, assigned from PRI Staff. The duties of the Secretary of the LRI shall include:

1. Issue notices of Committee Meetings.
2. Arrange logistics of meetings including handling and rating of parts as well as arrangement of meeting and waiting room facilities.
3. Record Committee recommendations on each program submitted for review.
4. Prepare reports of each program review for signature by the Chairperson and transmit signed copies to the Presenter.
5. Maintain records of all Committee actions, correspondence, fee invoices, etc.
6. Prepare minutes of meetings for confirmation by the Chairperson. Distribute confirmed minutes to the Committee members.
7. Handle invoicing and collection of presentation and report fees.
8. Arrange for appropriate legal counsel and report findings and recommendations of legal counsel to the Committee.
9. Arrange for appropriate insurance for Committee members.
10. Assure compliance with all prescribed forms and procedures involving review activities.

## **1.5 Meetings**

1.5.1 Time: Meetings shall be called by the Chairperson and shall be held no less than once a year. Typically the LRI conducts a one-day meeting five times per year. At each meeting, the dates are set for the next meeting and tentative dates are set for one or more meetings thereafter.

1.5.2 Notice: Advance notice of the meetings will be distributed to all interested parties by the Secretary of the Committee.

1.5.3 Agenda: A detailed agenda will be issued prior to the meeting.

1.5.4 Minutes: The Secretary shall prepare and distribute minutes for each meeting no later than two weeks after the meeting. These minutes shall be subject to confirmation at the following meeting.

1.5.5 Quorum: Quorum for the review of submittals shall be >50% of the LRI Review Committee Members.

Quorum for the conduct of the Open Meeting shall be >50% of the LRI Committee Members.

1.5.6 Voting:

- Submittal Approval - One vote per Review Committee Member Company
- All committee decisions by simple majority
- Individual tests are reviewed by one person (or a group) and that person or group is the determining vote

Balloting

- One vote per LRI Committee Voting member
- Approval decisions shall require 2/3 majority approval of all voting members.
- All disapprovals require a verifiable technical explanation

## **1.6 Program Presentation Fees**

A fee structure has been established for the presentation of programs to the Review Committee. These fees will be invoiced to the Presenter by the Secretary of the Review Committee.

1.6.1 Fees will be charged for the following:

- a. Programs – complete, partial, or resubmissions – which involve evaluation of test parts or test reports by the Review Committee.

- b. Programs involving resubmission with additional information but without test parts or test reports.
- c. Programs requesting consultation (advice) from the Committee.
- d. Reference tests submitted for calibration purposes. A single fee will be charged for each reference test received.

1.6.2 No fees will be charged for the following:

- a. Presentations by a U.S. federal government agency.
- b. Presentation of supplemental information for the benefit of the qualifying agency and/or the Review Committee such as improvements in analytical methods, test procedures, field data, etc.

## **2.0 QUALIFICATION OF PRODUCTS TO SAE J2360**

In order to have a candidate gear lubricant evaluated by the Review Committee, the Presenter shall complete the specified tests and submit the required information on GL Forms 1, 2, 3, and 3a along with related test reports, prescribed test parts, and the results of any supporting field tests recommended by the Committee. If required, submit GL Form 2a and RGL Forms 1-5.

All tests on each candidate formulation must be conducted on samples from the same batch blend or approved reblends of the same formulation. As required by the qualifying agency, all laboratory tests must be conducted in a laboratory approved or designated for each particular test by the qualifying agency.

For those suppliers intending to sell lubricant products to the U.S. Military, note only the following lubricant grades have been adopted for their use:

- 75W-90
- 80W-90
- 85W-140

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2.1 Chemical and Physical Properties Requirements

2.1.1 Base Stock Requirements

All base stocks used must be identified on GL Form 2. Data for each base stock must include:

- a. Name of original base stock refiner or processor.
- b. Location of refinery or processing plant, by city and state (U.S.), province (Canada), or country.
- c. General base stock type shall be identified as follows:

DE	Diester
PAO	Polyalphaolefin
PE	Polyol Ester
RRE	Re-refined
MO – Group I	Mineral Oil – Group I*
MO – Group II	Mineral Oil – Group II*
MO – Group III	Mineral Oil – Group III*
Other	

\*API Definition

Note: For any base stock type not identified above, please identify as “Other” until the LRI Committee assigns a designator. There is a possibility the LRI may ask for additional information.

- d. Physical and chemical properties listed on GL Form 2. If two or more finished base stocks of different viscosities are subsequently blended to form one stock of an intermediate viscosity, data are to be reported separately for the base stocks, and for the subsequent blend.

2.1.2 Requirements for Base Stocks Produced from a New Feed Source or by a New or Changed Refining Process

- a. Refining Process – A detailed description of the refining method including a flow diagram of the process.
- b. Feed Stock Source – A description of the type of feed source and the typical concentration range of each in the feed stock. Also, for RRE stocks the geographical area from which they are collected must be identified.

2.1.2 continued

- c. Base Stock Consistency – A description of the quality controls used to monitor finished base stock consistency. This should include the tests conducted (list the test method) and the frequency of testing. In addition, finished base stock data, as indicated below, should be included for samples collected as part of the quality controls for a two-week period throughout a calendar year in each of the months of January, April, August and November.

Viscosity (cSt) 100°C  
Viscosity (cSt) 40°C  
Viscosity Index  
Gravity (API)  
Flash Point °C  
Cloud Point °C  
Pour Point °C  
Total Base Number  
Total Acid Number  
Demulsibility  
PCB  
Copper Corrosion

Carbon Residue, Mass %  
Sulfated Ash, Mass %  
  
Nitrogen, ppm  
Chlorine, ppm  
Sulfur, ppm  
Color  
Individual Metals, ppm  
  
Hydrocarbon Types –  
% Saturates  
% Aromatics  
% Polars  
% PNA

Boiling Range Distribution –  
1% @ °C  
5% @ °C  
10% @ °C  
50% @ °C  
90% @ °C

The original copy of the above information shall be forwarded to the qualifying activity, see 1.1. Twelve copies shall be provided to the Review Committee. This information need not be included with subsequent presentations utilizing these same constituents.

The physical and chemical properties listed on each GL Form 2 and GL Form 2a, when applicable, must be provided for each of the refined constituents.

2.1.3 Finished Oil Properties Requirements

The chemical and physical properties required by the SAE J2360 Standard and the test methods are identified in the Specification and in Table 1 of this document. Measured values of these properties on the candidate formulation shall be reported on GL Form 2, and GL Form 2a when applicable.

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Table 1

	ASTM Test Method	Viscosity Grade of Finished Lubricant			
		70W-xx	75W-xx	80W-xx	85W-xx
Kinematic Viscosity at 100°C, cSt	D 445	Per Requirements of SAE J306			
Brookfield Viscosity, cP	D 2983	Per Requirements of SAE J306			
Tapered Bearing Shear (KRL 20 hr)	CEC L-45-A-99	Per Requirements of SAE J306			
Channel Point, °C, max.	FTM 3456	-45**	-45	-35	-20
Flash Point, °C, min.	D 92	RI	150	165	180
API Gravity	D 287	R	R	R	R
Viscosity Index	D 2270	R	R	R	R
Pour Point, °C	D 97	R	R	R	R
Pentane Insolubles, % wt.	D 893	R	R	R	R
Sulfur, % wt.	D 1552*	R	R	R	R
Sulfur Contributed by Additive, % wt.	D 1552*	R	R	R	R
Phosphorus, % wt.	D 1091*	R	R	R	R
Chlorine, % wt.	D 808*	R	R	R	R
Nitrogen, % wt.	D 3228*	R	R	R	R
Zinc, % wt.	D 4951*	R	R	R	R
Boron, % wt.	D 4951*	R	R	R	R
Potassium, % wt.	D 4951*	R	R	R	R
Organo-metallic Components, % wt.	D 4951*	R	R	R	R

\* Preferred method shown. Other acceptable methods are listed in the SAE J2360 Standard.

R= Report

xx= 80, 85, 90, 110, 140, 190, 250

RI = Report for Information

\*\* Also report for information results at -50C

While SAE J306 does address monograde lubricants, the LRI will only evaluate the grades listed in the above table at this time.

## 2.2 Bench Test Requirements

The bench tests consist of tests for:

- corrosiveness of the lubricant to copper
- storage stability and compatibility (SS & C)
- foaming tendency characteristics

The results of the foam tests and copper corrosion test shall be summarized on GL Form 2. It should be indicated on the GL Form 2 that SS&C testing is scheduled, or if completed, the test lab and end-of-test date shall be shown. A copy of the SS&C test report should be provided to the Review Committee.

The criteria for acceptance are described below.

### 2.2.1 Copper Corrosion

Corrosiveness of the lubricant to copper shall be evaluated by the Standard Test method for detection of copper corrosion from petroleum products by the copper strip tarnish test, ASTM D 130. This test shall be conducted for 3 hours at 121 +/- 1°C; the test strip shall be rated by comparison with the ASTM Copper Strip Corrosion Standards. Discoloration shall not exceed that of ASTM No. 2a.

### 2.2.2 Storage Stability and Compatibility (SS & C)

The Storage Stability test is described in Method 3440, "Storage Solubility Characteristics of Universal Gear Lubricants," of Fed. Test Method Std. No. 791. The maximum permissible amount of separated solid material or of separated liquid material is 0.25 mass percent or 0.50 volume percent, respectively, of the additive material.

The Compatibility test is described in Method 3430, "Compatibility Characteristics of Universal Gear Lubricants," of Fed. Test Method Std. No. 791. The candidate lubricant must be compatible with six reference oils which shall be obtained from the Society of Automotive Engineers Customer Service.

### 2.2.3 Foaming Tendency Characteristics

The foaming tendency characteristics shall be determined by ASTM D 892. Option A of this procedure is not allowed for LRI testing. The maximum permissible volume of foam at the end of the 5-minute blowing period for Sequences I, II and III shall be:

Sequence	Max Vol. Of Foam at end of Blowing Time
I	20 ml
II	50 ml
III	20 ml

## 2.3 Laboratory Performance Test Requirements

Satisfactory performance must be demonstrated by the candidate gear lubricant in each of the following laboratory performance tests:

D 5704 (L-60-1)	D 6121 (L-37)
D 7038 (L-33-1)	D 7452 (L-42)
D 5579(Cyclic Durability)	D 5662 (Oil Seal Compatibility)

The ASTM Standard Test Methods are included in the most recent edition of the Parts 05.01, 05.02 and 05.03 of the Annual Book of ASTM Standards. Those laboratory performance tests which have not yet been published as ASTM Test Methods may be obtained from the ASTM Test Monitoring Center. ASTM publications are available from ASTM, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428-2959.

### 2.3.1 Laboratory Calibration Tests

The D 7038 (L-33-1), D 6121 (L-37), D 7452 (L-42), D 5704 (L-60-1), D 5662 (Oil Seal Compatibility) and D 5579 (Cyclic Durability) tests must be conducted in test facilities where satisfactory test stand calibration results have been demonstrated using reference lubricants. Reference lubricants and details regarding the procedures to be followed for calibrating test stands may be obtained from the ASTM Test Monitoring Center (TMC). Additionally, all testing must be conducted in a laboratory that meets the requirements of ISO/IEC 17025.

#### 2.3.1.1 Reference Lubricants

The ASTM Test Monitoring Center should be contacted for details regarding the process for calibrating test stands, the reference oils, etc. These oils may be obtained from the ASTM Test Monitoring Center, 6555 Penn Avenue, Pittsburgh, Pennsylvania 15206, website [www.astmtmc.cmu.edu](http://www.astmtmc.cmu.edu).

Test parts and laboratory test reports from each calibration test must be submitted to the Review Committee for evaluation.

#### 2.3.1.2 Frequency of Reference Testing

Calibration of test stands is under the jurisdiction of the ASTM Test Monitoring Center (TMC). The ASTM TMC should be contacted to determine current reference test frequency requirements. The Committee will not consider for review tests that have not been conducted on test stands that meet these reference requirements.

### 2.3.1.3 Criteria for Acceptance of Reference Tests

In order for a test stand to be considered acceptable for candidate testing (“referenced”), the results of the tests conducted on the reference oils(s) must be within the acceptance bands established for each reference oil, by the ASTM TMC.

The Review Committee reserves the right to accept or reject test results that fall outside of these acceptable bands when appropriate technical information is presented to support this decision. If this applies to all of industry, they will be notified via a PRI information letter issued from the Secretary of the Review Committee.

### 2.3.2 Tests Required on Candidate Lubricants

Each candidate lubricant must meet the acceptance criteria listed below for one D 5704 (L-60-1) test, one D 7038 (L-33-1) test, one D 6121 (L-37) test with uncoated gears, one D 6121 (L-37) test with phosphate-coated gears, two D 7452 (L-42) tests, one D 5579 (Cyclic Durability) test, and two D 5662 (Oil Seal Compatibility) tests (one using polyacrylate elastomer and one using fluoroelastomer elastomer). For SAE 70W-XX & SAE 75W-XX grade oils, you must use both the standard and Canadian versions of the D 6121 (L-37) and D 7452 (L-42) tests. However, certain tests are waived as follows:

- a. D 6121 (L-37) and D 7452 (L-42) tests are waived for SAE 85W-140 grade lubricants where the lubricant is formulated from base stocks and additives used in a qualified SAE 80W-90 grade lubricant.
- b. The D 6121 (L-37) test using uncoated gears and one D 7452 (L-42) test are waived where a given additive package has been qualified in seven or more programs using different base stocks. To obtain this waiver, the Presenter shall file a written request to the Committee as a separate program tabulating the meetings(s), Program number(s), and qualification number(s) (if assigned) of the seven programs using the new additive package. After the waiver has been granted for a given additive package, a reference to the meeting and program number of the written request shall be included on GL Form 3 for the D 6121 (L-37) test with uncoated gears and for the second D 7452 (L-42) test.

For 70W-XX & 75W-XX grade oils, you must use both the standard and Canadian versions of the D 6121 (L-37) and D 7452 (L-42) tests.

- c. For the ASTM D 5579 (Cyclic Durability) test finished oils having both SAE 80W-90 and SAE 85W-140 grades formulated from the same base stocks and additives, run the oil in the ASTM D 5579 (Cyclic Durability) test that has the poorer ASTM D 5704 (L-60-1) carbon/varnish rating. The test may be waived for the other viscosity grade oil. If the ASTM D 5704 (L-60-1) carbon/varnish rating is the same for the two viscosity grades, test the SAE 80W-90 grade oil.

- d. For the ASTM D 5579 (Cyclic Durability) test, testing will be waived where a given additive package and viscosity index improver (if used) has been qualified in five (5) or more programs using different base stocks. To have this test waived the candidate oil must have an additive package treat level equal to or greater than the lowest treat level of any approved lubricant in the test matrix. To obtain this waiver, the presenter shall file a written request to the Committee as a separate program tabulating the meetings(s), program(s), and qualification number(s) if assigned of the five (5) programs using the new additive system. Once the waiver has been granted, notification on the appropriate GL form shall be placed on all subsequent presentations.

#### 2.3.2 Acceptance Criteria for Candidate Lubricants

LRI Review Committee will utilize the limits established in SAE J2360 to evaluate submitted products except: as follows:

If a D 7038 (L-33) test (run in the proposed D 7038) (L33-1) test procedure) receives a passing result of 9.0 or better overall rating, it shall not have a rating of 5.0 or less on any individual rating area. Additionally, if the passing result is 9.0 or better overall, it shall not have more than three (3) areas rated as an 8.0 or less.

#### 2.3.3 Request for Test Waiver Based on “Read Across”

The LRI Review Committee, at its discretion, may allow certain test requirements to be waived based on “read-across” of data obtained from running similar formulations using the same test techniques. All “read-across” will be evaluated on a case by case basis and granted only when sound support data and engineering judgment exists. The Review Committee is in no way bound to grant a requested “read-across” when they deem the support is not technically sound.

#### 2.4 Supporting Field Test Performance Requirements

If information is provided to the Committee that a candidate gear lubricant formulation is composed entirely of base stock and of additive components which are currently used, or have previously been used, in gear lubricants which have demonstrated field performance satisfactory to the U.S. Army qualifying activity and to the Review Committee as indicated in 2.4.1 through 2.4.3 the candidate formulation will be considered for review without further field testing.

Field test information is required when the following are used:

- a. Any combination of unknown or new additive packages including viscosity index improvers.
- b. Any combination of base stocks that include one or more produced by a new process for recovery, reconstitution, and/or using a significantly different treatment or refining method (See 3.12)
- c. More than a combined total of 2 mass percent of low temperature flow improvers (“pour point depressants”).

When field tests are conducted, these tests must include heavy duty service and light/moderate duty service, as outlined in 2.4.1 through 2.4.3. Sample forms for reporting fleet testing information can be found in Appendix B.

Details of field tests or deviations from those described above or below proposed by a Presenter or ordered by the Committee are to be discussed with the Committee prior to the start of such tests.

#### 2.4.1 Field Tests – Heavy Duty Service

A minimum of three (3) Class 8 on-highway trucks equipped with new hypoid carrier assembly(ies), bearings and seals (including wheel end seals and bearings) are to be employed. All axle test components shall be new and from the Original Equipment Manufacturer (OEM). In order to accommodate the fact that new vehicles may accumulate “destination mileage” as they are moved from the manufacturer to the distributor and/or the field test site, field testing may be conducted using axles that have accumulated up to 500 miles (800 km) of operation in unloaded service.

The vehicles shall be equipped with standard transmissions and must be operated for at least 200,000 miles (320,000 km) each. These vehicles are to be loaded and operated in typical commercial, for profit service.

It is acceptable, prior to test: (1) To clean the housing and wheel hubs; and (2) to fill with candidate oil and run under no-load conditions for no more than 15 minutes or 10 miles (16 km) as a flushing operation. Following this operation, drain and refill with candidate oil and start the 200,000 mile test. There is to be no other drain during the test.

Small samples (maximum of 4 oz) of the gear lubricant shall be withdrawn at approximate intervals of 20,000 miles (32,000 km) for chemical analysis. These withdrawn samples are not to be replaced with new oil. These samples are to be analyzed by the latest revision of referenced test methods for:

- a. Viscosity at 40°C and 100°C, cSt (ASTM D 445)  
NOTE: LRI Committee Reviewers shall not consider shearing out of viscosity as the only justification to reject a field test.
- b. Additive and wear elements, ppm or wt% (Std ASTM Methods)
- c. TAN (ASTM D 664) and TBN (ASTM D 4739)
- d. Water, ppm or % (ASTM D 1744)
- e. Sulfur, wt %

At the completion of the 200,000 miles (320,000 km) of operation, a tear-down inspection shall be made on all units. A report of the analyses of the drained samples and the tear-down inspection shall be presented to the Committee. Also all axle components (including seals) from at least two axles (two drive axles – front only- from tandem axle vehicles or two axles from single drive axle vehicles) shall be presented to the Committee for inspection. Any seal leakage, seal replacement or other axle maintenance on any of the test vehicles during the test must be reported. Any replacement components shall be presented to the

Committee. Prior to disassembly, seal condition should be documented by photographs if a qualified rater has not done any inspection of these parts. When integral seals are used, the case should be cut to allow easy inspection of the seals by the Committee.

#### 2.4.2 Field Tests – Light/Moderate Duty Service

A minimum of five (5) light trucks and/or sedans equipped with new hypoid gear(s), differential case assembly, seals, and bearings are to be employed. All axle test components are to be new and from the original equipment manufacturer (OEM) and have accumulated not more than 25 miles (40 km) prior to being placed on test. If on-shaft bearings are used, axle shafts must also be new.

The vehicles must be operated in mixed city-suburban-expressway service for a minimum of 100,000 miles (160,000 km) each. Operation on a mileage accumulation dynamometer is not acceptable.

It is acceptable, prior to the test: (1) To clean the housing and wheel hubs; and (2) to fill with candidate oil and run under no-load conditions for no more than 15 minutes or 10 miles (16 km) as a flushing operation. At the end of this period drain and refill with the candidate oil and start the 100,000 mile test. There is to be no other drain during the test.

Five (5) small samples (maximum of 4 oz but preferably smaller) of the gear lubricant shall be withdrawn at approximate intervals of 25,000 miles (0, 25,000, 50,000, 75,000, 100,000) for chemical analysis. These withdrawn samples may be replaced with new oil. These samples are to be analyzed as in 2.4.1.

At the conclusion of the test, a tear-down inspection shall be performed on each rear axle. A report of the drain sample analyses and the tear-down inspection of units from five (5) vehicles are to be presented to the Committee. Also all axle components (including seals) from at least two (2) representative complete axles, and the worst case of the test fleet results, must be presented to the Committee for inspection. Any seal leakage, seal replacement, or other axle maintenance on any of the test vehicles during the test must be reported. Prior to disassembly, seal condition should be documented by photographs if a qualified rater has not done an inspection of these parts. Any replacement components of any test vehicle must be presented to the Committee. Also report the total amount of new oil added during the test, including the amount of samples drained for inspection and replaced with new oil.

#### 2.4.3 Field Test Responsibility

It shall be the responsibility of the person conducting the tests to comply with all applicable federal, state, and local regulations including procurement of proper exemption certificates where required.

### 3. SUBMISSIONS TO REVIEW COMMITTEE

#### 3.1 Advance Submittal of Information and Test Parts

In order to have reference oils and candidate oils considered for review, each Presenter shall be responsible for the following:

- a. A written notification (GL Form 0, for example) indicating an estimate of the number of programs to be submitted by the Presenter shall arrive at the office of the Secretary of the Committee (see 1.1) at least three working days prior to the start of the Review Committee Meeting.
- b. All parts shipped shall arrive at PRI Headquarters, Warrendale, Pennsylvania at least one-half day prior to the actual Review Committee presentation.

#### 3.2 Order of Presentations

The following priorities are established for presentations of programs to the Review Committee:

##### a. Reference Oil Presentations

All reference lubricant test results from the independent test laboratories received at least 24 hours prior to the start of the Review Committee Meeting will be reviewed first. This procedure will facilitate the review of candidate lubricant programs since the facilities and services of independent laboratories are available to, and may be used by, all Presenters.

Reference lubricant results obtained by dependent laboratories are to be presented by the respective dependent laboratory representative prior to the presentation of candidate products.

##### b. Candidate Gear Lubricant and Other Presentations

The order of appearance is determined by consensus by the Presenters. All Visitors must wear a Visitors badge while in the building at PRI.

If Presenters wish to exchange their order of appearance before the Committee with another Presenter, they may do so provided that all other Presenters, whose order and time of appearance may be affected, affirm to the Chairman their assent to the rearrangement.

Presenters who do not conform with the aforementioned requirements must obtain permission from the Chairman of the Review Committee prior to appearance before the committee.

3.3 Attendance at Committee Meetings

During the review of a candidate lubricant by the Committee, only the Presenter and any person authorized by the Presenter shall be permitted to attend or appear before the Committee. PRI Staff personnel, as needed, will be available to assist in handling of parts and paperwork during the presentations. Where question(s) arise about specific test results, a representative of the laboratory where the test was conducted may be called into the meeting for consultation.

No photographs, recordings, or transcripts may be made of any of the Committee meetings without the prior written permission of the Committee Chairman.

3.4 Presentations Extending Beyond a Single Meeting

Presentations of candidate lubricants to the Committee must be completed within three consecutive meetings, i.e., the first meeting for the initial presentation and two meetings for presentation of supplemental or retest data requested by the Committee. Additional time may be granted upon request to the Committee to permit completion of field tests and/or resolution of other problems such as shortages of test gears and reference oils. Requests for additional time are to be presented as a part of or attached to GL Form 1. Such requests may be made prior to, but must be no later than the third consecutive meeting.

3.5 Presentations to the Committee

At the time of appearance before the Review Committee, the Presenter shall place before each member of the Committee all the paperwork relevant to the presentation. This shall be prefaced by a completed GL Form 0 which indicates which performance test procedures will be presented with each program. The individual programs, both references and candidates, shall be pre-numbered and stacked in the order in which they will be presented. This pre-numbering shall include the meeting, a two letter prefix assigned by the Secretary of the Review Committee for identification, and the sequence number in which programs will be presented. For example, 50/AA-1, 50/AA-2, 50/AA-3, etc. would identify Meeting 50, Presenter AA, and programs 1, 2, 3 etc. of Presenter AA. Such pre-numbering identification shall appear on all sheets of each program including attachments, such as supporting data and/or previously presented programs relating to the presentation.

### 3.5.1 Test Summaries

Twelve copies of RGL Forms 1-5 (when applicable), twelve copies of GL Forms 1-3a, and twelve copies of field test results (when applicable) shall be distributed to the Committee.

GL Form 1 is required for every candidate program and for each program requesting advice or submitting analytical methods; this form should be submitted to explain the purpose of the presentation and to receive official recommendations of the Committee. GL Forms 1 and 2 are required for each field test. GL Forms 1, 2, 3 and 3a and GL Form 2a when applicable are required for each program presenting performance tests on candidate lubricants.

When a program extends beyond one meeting, copies of the GL Forms presented at previous meeting(s) and signed by the chairman, including Committee recommendations, must be resubmitted with each subsequent presentation.

Note: When copies of the GL Forms presented at previous meetings are resubmitted with each subsequent presentation, it is not necessary to include all attachments with each related program. For example, if program 60/AA-1 has related programs 58/AA-2, 57/AA-3 and 55/AA-4, and if program 58/AA-2 also has related programs 57/AA-3 and 55/AA-4, and if program 57/AA-3 has related program 55/AA-4, then only one copy of 57/AA-3 and one copy of 55/AA-4 should be attached. They should be attached in descending sequential order, but in order to minimize the paperwork DO NOT ATTACH EXTRA COPIES OF THE RELATED PROGRAMS.

### 3.5.2 Test Reports

Two copies of each test report of each laboratory performance test shall be submitted. One copy shall include the following glossy photographs:

- a. ASTM D 5704 (L-60-1) – one photo required
- b. ASTM D 7038 (L-33-1) – no photo required
- c. ASTM D 6121 (L-37) – no photo required
- d. ASTM D7452 (L- 42) – no photo required
- e. ASTM D 5579 (Cyclic Durability) – no photos required
- f. ASTM D 5662 (Oil Seal Compatibility) – no photos required

One copy of the test report submitted to the Committee must include the original or copy of the following:

- a. ASTM D 6121 (L-37) Lubricant Temperature Chart or Trace
- b. ASTM D 7452 (L-42) Load Torque Chart or Trace

3.5.2 continued

The following of each test shall be submitted to the Committee:

- a. ASTM D 5704 (L-60-1) – The two gears.
- b. ASTM D 7038 (L-33-1) – The drive pinion, the differential case assembly and drive gear with the drive gear bolts removed, the two pinion and the two differential bearing assemblies, thrust washers, and the axle housing cover.
- c. ASTM D 6121 (L-37) – The drive pinion and the drive gear.
- d. ASTM D 7452 (L-42) – The drive pinion and the drive gear
- e. ASTM D 5579 – The shift fork, friction plates, and reaction plates.

Note: If more than one D 6121(L-37) or D 7452 (L-42) test is required, then the same parts listed in c and d are required from the second test.

3.6 Restrictions on Disclosure of Information Designation as “Proprietary” Submitted to the Committee

Each Committee member by accepting his appointment to the Committee or such other person having access to such information by virtue of a Presenter’s submission to the Committee agrees to refrain from disclosing information designated as “Proprietary” by the Presenter outside the Committee.

This obligation of non-disclosure is binding on each Committee member and such other person having access except in the event that such information:

- a. Was available to the public at the time of presentation to the Committee.
- b. Becomes available to the public except as the result of unauthorized disclosure by the Committee member.
- c. Was known to the Committee member prior to its disclosure to the Committee
- d. Is required to be disclosed by enforceable legal process.
- e. Is obtained from other sources without knowingly violating the rights of the Presenter.

This obligation of non-disclosure of such information shall cease three years after its initial presentation to the Committee except that it may be extended by written request as set forth in 3.7b for successive one-year periods up to a maximum of three such one-year periods.

3.7 Procedure for Submitting and Handling of “Proprietary” Information

- a. As provided in 2.4, field test data on each lubricant is normally required. However, information on additive composition may be submitted to the Review Committee to assist in assessing anticipated performance of lubricants. In the event a Presenter deems any such compositional or test result information to be supplied to a Review Committee as proprietary, then all such material shall be marked “Proprietary” to come within the provisions of paragraph 3.6 and directed to the Chairman of the Review Committee at least 45 days prior to the meeting at which the information is sought to be presented with all supporting data. In the event that it is thought by the Chairman that the information marked

3.7 continued

“Proprietary” does not warrant the special obligation of paragraph 3.6 or is not proprietary, then the Chairman shall within 10 days, so notify the Presenter by registered or certified mail and the Presenter shall have 25 days to submit comments substantiating the use of this special procedure. Failure to respond to such notice shall be deemed to constitute a withdrawal of the presentation to which such information pertains. All information to which a substantiating response is received shall be submitted to the respective Review Committee in accordance with paragraph 3.6.

- b. As to any information which continues to be proprietary at the end of the three-year term provided in paragraph 3.6, a Presenter may request an additional one-year renewal term. No more than three such renewals shall be granted and no renewal shall be effective if the material is not proprietary as provided in paragraph 3.6. Each request shall be sent to the Chairman of the Review Committee identifying the information by meeting and program number. To be effective, such request must be received prior to the review meeting preceding the end of the term. The Chairman shall notify all members of the Committee having received such proprietary information that the term of confidentiality has been extended an additional year.
- c. If a Presenter presents a formulation for requalification, the Presenter may again avail himself of the above procedures so as to extend the time of protection for information on additive composition designated as “Proprietary” by the Presenter.

3.8 Committee Recommendations

Following the review Committee Meeting, the Committee recommendations will be entered on GL Form 1 and signed by the Secretary for official transmittal to the Performance Review Institute Qualifying Activity along with the remaining test summaries and test reports. One copy of the signed GL Form 1 together with copies of GL Forms 2, 3, 3a and 2a where applicable will also be forwarded to the Presenter. These completed GL Forms shall not be used for advertising purposes nor shall there be any implication that SAE and/or PRI has approved or endorses the candidate lubricant. Approval by PRI will only be verifiable once the lubricant formulation appearing on GL Form 1 appears on PRI's qualified products list.

If the Committee judges that additional information is necessary to decide the performance aspects of the product under consideration, the Committee will include with its recommendation a statement as to what additional information it deems necessary.

At the discretion of the Committee, the additional information required may be provided in a 40-day correction (paragraph 3.17) and reviewed by the designated Committee member(s) for acceptance. The acceptance will be documented in the submittal paperwork. If the additional information is not acceptable to the Reviewer, the Secretary will coordinate the communication between the Reviewer and the Presenter to achieve acceptance.

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Unless otherwise agreed by the Committee, test results which require a review of test parts, interpretation of the test results, or verification of the reference oil test results used to calibrate the test stand (or test bath) must be presented to the Committee at a regularly-scheduled meeting, and are not eligible for submission as a 40-day correction.

### 3.9 Reconsideration of Committee Recommendation (See GL Form 1)

Any Presenter who is dissatisfied with the report of the Review Committee, may within 30 days of receipt such report request in writing to the Chairman, reconsideration of the report setting forth each reason for consideration, except that data not previously considered shall not be submitted or reviewed. The Chairman shall review such request and if he finds that the request has merit, shall submit the request to the Review Committee for consideration at the next Review Committee Meeting.

### 3.10 Resubmission of a Program

Any Presenter submitting a lubricant for review who is dissatisfied with the recommendation of the Review Committee, may submit the program as a new program for consideration at the next Review Committee meeting if additional test results become available to support the request.

### 3.11 Requests for Requalification

Under the terms of section 3.1.3 and 3.1.4 of the SAE J2360 Standard PRI will qualify each gear lubricant for a period not to exceed five years from the date of its original qualification. To be eligible for qualification, the reapproval process must be initiated prior to the expiration of the original qualification. This requires either a formal presentation of the product to the Lubricants Review Institute (LRI) for recertification of tests or the submission of written notification of the intent to requalify the product to the Qualifying Activity. In addition, all required testing and submission of new affidavits must be completed within twelve (12) months of the expiration of the original approval. Requests for requalification which do not meet the above guidelines will not be considered.

All requests for requalification must be accompanied by twelve copies of all summary data (GL Forms 1, 2, 3 and 3a and GL Form 2a when applicable) submitted for the original qualification along with the recommendations of the Committee on those data.

In addition, the following tests must be conducted on the qualified formulation in support of the request and the required test reports, parts, and summaries submitted to the Committee for its review:

- a. All Lubricant Formulation and Inspection Data specified on GL Form 2.
- b. In cases where PRI has granted permission for a change in base stock/additive(s) after the original qualification was granted, then any laboratory performance test not conducted on the changed formulation must be run.

- c. Any laboratory performance test (e.g., ASTM D 7038 (L-33-1), ASTM D 6121 (L-37), ASTM (L-42), ASTM D 5704 (L-60-1), ASTM D 5579 (Cyclic Durability), or ASTM D 5662 (Oil Seal Compatibility) which has been revised substantially since the original qualification was granted.

The Committee may, at its discretion, require that information in addition to that specified above be presented before a request for requalification is approved. This may include one or more of the laboratory performance tests which were conducted in order to obtain the original approval on the lubricant.

If the Committee judges that additional information is necessary to decide the performance aspects of the product under consideration, the Committee will include with its recommendation a statement as to what additional information it deems necessary.

### 3.12 Request for Changes of Base Stock in a Qualified Product

If a supplier desires to change one or more of the base stocks used in a qualified product, a written request shall be presented to the Committee. This request should contain information that will aid the Committee in determining the extent of testing that will be required on the changed formulation.

This request must list, explain, and/or specify:

- a. The magnitude of the change
- b. The reason(s) for the change
- c. The qualified products affected
- d. A summary of the qualification tests results, in tabular form, for each product affected
- e. A comparison of the inspection data and limits on both the old and new base stocks
- f. The change(s) in refining treatment
- g. The change(s), if any, in crude oil source

When required tests are completed, the results obtained on the changed lubricant(s), along with any results required by the Committee on previously qualified lubricant(s), shall be presented to the Committee for review.

### 3.13 Requests for Interchangeability of Base Stocks

Suppliers who wish to interchange crudes in a refinery and/or to interchange base oil between two or more refineries, may do so under conditions imposed by an "interchange agreement" with the Qualifying Activity. To obtain such an agreement, LRI requires that a request be submitted as a program to the Review Committee. A comparison of the inspection data and production limits, description of differences in refining treatment, and a statement of change(s) in crude oil sources shall be submitted as part of this program. The Committee will recommend the performance testing to be completed as part of this program.

3.13 continued

In general, the following guidelines apply:

- a. Candidate products must be formulated with base stocks from manufacturing facilities and crude(s) to be covered by the interchange agreement. These base stocks must be from a manufacturing run, and NOT from a pilot plant run, made within two (2) years of the date of the candidate oil tests.
- b. Any candidate product containing more than 10% of a base stock covered by an interchange agreement, must be tested in accordance with the test-matrix recommendations of the Committee.
- c. Base stock manufacturers have the responsibility to assure that stocks meeting the requirements of the interchange agreement are made available for testing of candidate products, and that the requirements to use these stocks in candidate testing programs are disseminated to the appropriate using organizations such as additive suppliers, marketing companies, etc.

3.14 Requests for Manufacturing Facility Approval (Manufacturing Facilities Survey)

All commercially manufactured gear oils identified as being approved under SAE Standards must be blended in manufacturing facilities that have been approved for blending by the Qualifying Activity. To obtain such approval, the following are required:

- a. The manufacturer must blend a minimum of 2,000 gallons, or plant capacity (whichever is less) of an SAE 80W-90 oil qualified under SAE J2360 using his personnel and the facilities for which manufacturing facility approval is desired.
- b. Using the facilities of a laboratory that has been certified to ISO/IEC 17025 conduct the following tests:
  - Physical and chemical property analyses
  - Storage, Stability and Compatibility (SS & C)
  - Foaming
  - ASTM D 5704 (L-60-1)
  - ASTM D 7038 (L-33-1)
  - ASTM D 6121 (L-37)
- c. Submit the test data to the Committee with the appropriate parts, reports, and summaries required for the review of the tests. Each committee member must receive a copy of the letter submitted to the Qualifying Activity requesting manufacturing approval. The letter requesting approval (see Appendix A-7) should be executed by the manufacturing facility official and should state the following:
  1. Size of the facility and blend made according to a. above.
  2. Designation of the blend (product name, batch number, etc.)
  3. Location of the facility
  4. Description of the facilities including a diagram and storage capacity

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5. Description of the manufacturing process to include blending time, temperatures, metering, blending, equipment, etc.
  6. Quality assurance tests and procedure followed at the facility to ascertain that product integrity and quality are maintained. Calibration procedures must be described by providing a list of the equipment which needs calibration and schedule for calibration.
- d. In addition, a side-by-side columnar summary must be presented listing (1) the chemical and physical properties of the originally qualified product as listed in Appendix A-1 (2) the chemical and physical properties of the blend made in the facility for which manufacturing approval is sought, and (3) the tolerance values assigned to the properties of the originally qualified product by the PRI Qualifying Activity
  - e. Should the company be processing an original approval in conjunction with the manufacturing facility, then all the tests required under SAE J2360 must be performed using the 2,000 gallons or maximum facility capacity blend. The company must provide all the information described in this section (except for d. above) which is not provided as part of the qualification requirements.
  - f. If the manufacturer is qualified to ISO 9000 by an RaB approved registrar or ISO/TS 16949, they will be automatically granted a manufacturing facility approval and need not complete sections a,b,c,,d & e above.

The Committee will review the submission and make its recommendations to the Qualifying Activity.

**3.15 Submittal of Approved Programs for Listing on the PRI/LRI Qualified Product Listing (QPL)**

Following LRI committee approval of programs, suppliers are able to have the product listed on the PRI/LRI QPL by completing the following:

- a. Submit Affidavit Form 1 with completed and signed LRI Forms 1, 2, 2a and 3 as appropriate to the Qualifying Activity.
- b. Payment for QPL listing to be included in submittal and determined from pricing structure post on the [www.pri-network.org](http://www.pri-network.org) "Lubricant Qualification – QPL Listing Fees".
  - a. Gear Lubricant qualifications are valid for up to five (5) years.
  - b. Start date will be the date of the last committee action in the approval process. Suppliers will have 6 months from that date to request a QPL listing or the material will require re-submittal to the LRI.

NOTE: Paragraph 3.15(b) the 6 month timeframe applies to materials qualified after the issuance of this PD4000.

- i. Exceptions can be made if the LRI is notified in advance of some significant reason for the delay.

All affidavits shall be submitted directly to the Qualifying Activity, and are not reviewed by the Committee.

A QPL Approval Letter and Production Tolerances will be developed and distributed to the requesting company and the military by the Qualifying Activity. Approval is posted on the [www.pri-network.org](http://www.pri-network.org) / Lubricant Qualification / QPL Listing.

### 3.16 Reblending/Rebranding of Qualified Products

#### 3.16.1 REBLENDING

The Qualifying Activity will allow reblends of qualified products by a second manufacturer with either manufacturing facility approval or a documented ISO 9000 or ISO/TS 16949 certificate. All such reblend requests must be submitted with the following properly-executed affidavits:

If you wish to have a re-blend qualification of an original qualification, you will need to submit GL Forms 1, 2, 2a and 3a as appropriate from the original qualification holder as well as a completed Affidavit Form 2 and 3.

All affidavits shall be submitted directly to the Qualifying Activity, and are not reviewed by the Committee.

#### 3.16.2 REBRANDING

The Qualifying Activity will allow rebrands of qualified products. All such rebrand requests must be submitted with the following properly-executed affidavits:

Affidavit Forms 1 and 4 from the original qualification holder as well as a completed Affidavit Form 5.

All affidavits shall be submitted directly to the Qualifying Activity and are not reviewed by the Committee but are reviewed by PRI.

Reblends and rebrands QPL expiration date will be the same as the original approval on which they were based.

### 3.17 Errors in Submissions

Presenters are responsible for the accuracy of the reports and summaries; and therefore should review them prior to presentation to the Committee to assure they are free from typographical errors, errors in the data, discrepancies, and/or omissions.

As directed by the Committee, typographical errors in data, inadvertent omissions from reports and summaries, etc., in the information presented to the Committee must be corrected. In such cases, the corrected information must be received by the Secretary within 40 calendar days after the close of the meeting. If the corrected information is not submitted within this time period, the program must be resubmitted for review.

### 3.18 QPL Expiration Date Extensions

If a submission for requalification is initiated and the approval is pending, at the discretion of the LRI Reviewers (based on the type and amount of pending data) an extension may be granted to the applicable QPL lubricant(s) for a designated period. PRI will communicate the QPL extension period to the candidate submitter.

### 3.19 Production Tolerances

The properties of products that are delivered as qualified under this document must lie within certain production tolerances established by the qualifying activity at the time of qualification. These tolerances shown in Table 2 have been assigned on the basis of one of the following criteria:

- A minimum or maximum value set by the specification
- A +/- numerical value from reported value
- A +/- percentage of reported value

These production tolerances are not to be applied during qualification testing.

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Table 2  
Summary of Production Tolerances for SAE J2360 Gear Lubricants

	Viscosity Grade of Finished Lubricant						
	xxW-80	xxW-85	xxW-90	xxW-110	xxW-140	xxW-190	xxW-250
API Gravity	+/- 1 API °						
Flash Point	Per Requirements Shown in Table 1						
Kinematic Viscosity at 100°C, cSt	+/- 2.0 *						
Brookfield Viscosity	Per Requirements Shown in Table 1						
Pour Point, °C, max.	Value + 6						
Channel Point	Per Requirements Shown in Table 1						
Copper Strip	2a max.						
Pentane Insolubles, % wt. max.	Value + 0.1 units						
Sulfur (Additive, Interchange Only) % wt.	Sulfur – 0.10 (Additive Sulfur) to Sulfur + 0.15 (Additive Sulfur)						
Sulfur (Finished Oil With Interchange) % wt.	Lower Limit = Minimum Basestock Sulfur + Lower Additive Tolerance Upper Limit = Maximum Basestock Sulfur + Upper Additive Tolerance						
Sulfur (Finished Oil, No Interchange) % wt.	Record Actual Value Value – 0.10 (Value) to Value + 0.15 (Value)						
Boron % wt.	Record Actual Value Value - 0.10 (Value) to Value + 0.15 (Value)						
Chlorine % wt.	If ≤ 0.01% Report as <0.01%						
Potassium % wt.	If > 0.01% Value - 0.10 (Value) to Value + 0.15 (Value)						
Zinc % wt.							
Other % wt.							
Phosphorus % wt.	Record Actual Value Value - 0.10 (Value) to Value + 0.10 (Value)						
Nitrogen % wt.	Record Actual Value Value - 0.10 (Value) to Value + 0.15 (Value)						

Xx = 70, 75, 80, 85

Value = Value reported on GL Form 2

\* Note that oil must also be within grade as defined in SAE J306 and same formulation as qualified.

FORMS

GL Form 0 Summary of Reference and Candidate Lubricant Programs  
GL Form 1 Program Submission and Committee Recommendation  
GL Form 2 Gear Lubricant Formulation and Inspection Data  
GL Form 2a Supplementary Gear Lubricant Formulation and Inspection Data  
GL Form 3 Gear Lubricant Laboratory Performance Results  
GL Form 3a Gear Lubricant Laboratory Performance Results  
RGL Form 1 Summary of ASTM D 5704 (L-60-1) Calibration Test Results  
RGL Form 2 Summary of ASTM D 7038 (L-33-1) Calibration Test Results  
RGL Form 3 Summary of ASTM D 6121 (L-37) Calibration Test Results  
RGL Form 4 Summary of ASTM D 7452 (L-42) Calibration Test Results  
RGL Form 5 Summary of ASTM D 5579 Calibration Test Results

APPENDICES

A-1 Affidavit Form #1 for Original Qualification  
A-2 Affidavit Form #2 for Reblending (Original Qualification Holder)  
A-3 Affidavit Form #3 for Reblending (Blending Company)  
A-4 Affidavit Form #4 for Rebranding (Supplier)  
A-5 Affidavit Form #5 for Rebranding (Marketer)