L-42 Surveillance Panel Meeting Minutes

Teleconference

Jun. 25, 2015

**Attendees**: voting members in **bold**

| | | |
|---|---|---|
| **T. Gottwald (Afton/C)** | M. Keisler (Afton) | **M. Umerley (LZ)** |
| ***B. McGlone (Meritor)** | D. Schwenk (Afton) | **A. Goyal (BASF)** |
| **R. Warden (SwRI)** | **A. Trader (Intertek)** | **S. Parke (TMC)** |
| B. Kearney (Afton) | D. Bell (Afton) | |

**Purpose of the Call**

To vote on proposed changes to the L-42 referencing procedures.

**Meeting and Discussion**

Motion made by R. Warden, 2nd by M. Umerley, to make amendments to the L-42 referencing procedures that were originally distributed to the SP via email on 6/4 [file "L42_Reference Proposal 20150527.docx"], effective immediately [copy attached].

Discussion over section 9.2.3 was focused on intent/letter of verbiage but TMC and group agreed to leave the section as stated in the proposed verbiage.

Unanimous vote of approval. *B. McGlone was absent; however he cast his vote "in favor" electronically.

Motion made by R. Warden, 2nd by T. Gottwald, to approve e-ballot sent by TMC, concerning L-42 procedure section 9.2.2.9 [copy attached]

Unanimous vote of approval.

Respectfully submitted,

Thomas Gottwald

L-42 Surveillance Panel Chairman

# 9 | Calibration and Standardization

9.1 Reference Oils:

9.1.1 To correctly evaluate non-reference oil test performance, calibrate test stands first by completing tests using reference oils available from the ASTM Test Monitoring Center (TMC), see Annex A4. Laboratories wishing to calibrate test stands shall participate in the referencing and stand calibration program administered by the TMC. Reference oils are distributed by the TMC for calibration. Report all reference oil test data to the TMC.

9.1.2 Correction Factor—When using TMC Reference Oil 117 for stand calibration, add 6 % to the pinion scoring result and add 4 % to the ring scoring result. Report both the rated scoring and the corrected scoring in the space provided in the test report.

9.1.3 Do not submit reference oils to physical or chemical analyses for identification purposes. Identifying the oils by analyses could undermine the confidentiality required to operate an effective blind reference oil system. Therefore, reference oils are supplied with the explicit understanding that they will not be subjected to analyses other than those specified within this test method unless specifically authorized by the TMC. In such cases where analyses are authorized, supply written confirmation of the circumstances involved, the data obtained, and the name of the TMC person authorizing the analysis to the TMC.

9.2 Test Stand Calibration—Calibration is established upon satisfactory completion of a reference oil test sequence that meets established reference oil targets. Each calibration sequence consists of three operationally valid and statistically acceptable calibration tests. If a calibration is being performed on a previously referenced test stand after the twentieth non-reference oil test or after three months since the last acceptable reference oil test, a single operationally valid and statistically acceptable calibration test is to be performed. The calibration sequence will consist of the new test and the last two calibration tests performed. Each operationally valid test is considered statistically acceptable if the end of test pinion coast side scoring meets the Shewhart limits as published by the Test Monitoring Center. Specific Shewhart limits are defined for each gear batch and reference oil combination. Repeat any operationally valid calibration test in the calibration sequence with an end of test pinion coast side scoring value exceeding the Shewhart limits until acceptable pinion scoring results are achieved. Conduct a discrimination oil test on the test stand every six months from the completion of the last test in the calibration sequence or after four calibration sequences. The end of test pinion coast side scoring value of the discrimination oil test shall be a minimum of twice the average value of the three acceptable reference oil tests for the test to be considered acceptable. The discrimination oil test may be conducted at any time during the calibration sequence. If the discrimination oil test is conducted at the end of the calibration sequence and a second discrimination oil test is needed, this second discrimination oil test if acceptable, will count as 1 of the 20 non-reference oil tests. Repeat the calibration sequence, consisting of the three reference oil tests and the discrimination oil test, if both discrimination oil tests do not meet the above requirements. For all reference oil tests, the end of test coast side pinion scoring shall be equal to or greater than the end of test ring coast side scoring for the test to be acceptable.

9.2.1 New Test Stand Calibration—A new test stand is considered calibrated upon satisfactory completion of reference oil tests, as prescribed by the TMC, that meet established reference oil targets. TMC requires new test stand inspection for compliance with this test method.

9.2.2 In-Service Stand Calibration—Calibrate previously referenced test stands with a new three test calibration sequence:

~~9.2.2.1 After every twentieth non-reference oil test, or~~

~~9.2.2.2 After three months since the last acceptable reference oil test sequence, or~~

9.2.2.3 After a test stand is moved, or

9.2.2.4 After changing axle batches, or

9.2.2.5 After changing throttle settings, or

9.2.2.6 After changing torque settings, or

9.2.2.7 After major computer changes, or

9.2.2.8 After a test not conforming to this test method was run in the stand since the last acceptable reference test.

9.2.2.9 After 6 months since the last valid L42 calibration test.

9.2.2.10 After 2 attempts are made to calibrate resulting in the end of test pinion coast side scoring to not meet the Shewhart limits as published by the Test Monitoring Center or the tests are statistically unacceptable or operationally invalid.

9.2.3 If a new three test calibration sequence is being established, there shall not be more than 5 attempts between the first and last run numbers. If the discrimination oil test is also required, there shall not be more than 8 attempts between the first and last run number.

9.3 Reference Oil Test Frequency—Reference oil test frequency may be adjusted due to the following reasons:

9.3.1 Procedural Deviations—On occasions when a laboratory becomes aware of a significant deviation from the test method, such as might arise during an in-house review or a TMC inspection, the laboratory and the TMC shall agree on an appropriate course of action to remedy the deviation. This action may include the shortening of existing reference oil calibration periods.

9.3.2 Parts and Fuel Shortages—Under special circumstances, such as industry-wide parts or fuel shortages, the surveillance panel may direct the TMC to extend the time intervals between reference oil tests. These extensions shall not exceed one regular calibration period.

9.3.3 Reference Oil Test Data Flow—To ensure continuous severity and precision monitoring, calibration tests are conducted periodically throughout the year. There may be occasions when laboratories conduct a large portion of calibration tests in a short period of time. This could result in an unacceptably large time frame when very few calibration tests are conducted. The TMC can shorten or extend calibration periods as needed to provide a consistent flow of reference oil test data. Adjustments to calibration periods are made such that laboratories incur no net loss (or gain) in calibration status.

9.3.4 Special Use of the Reference Oil Calibration System—The surveillance panel has the option to use the reference oil system to evaluate changes that have potential impact on test severity and precision. This option is only taken when a program of donated tests is not feasible. The surveillance panel and the TMC shall develop a detailed plan for the test program. This plan requires all

reference oil tests in the program to be completed as close to the same time as possible, so that no laboratory/stand calibration is left in an excessively long pending status. In order to maintain the integrity of the reference oil monitoring system, each reference oil test is conducted so as to be interpretable for stand calibration. To facilitate the required test scheduling, the surveillance panel may direct the TMC to lengthen and shorten reference oil calibration periods within laboratories such that the laboratories incur no net loss (or gain) in calibration status.

9.4 Donated Reference Oil Test Programs—The Surveillance Panel is charged with maintaining effective reference oil test severity and precision monitoring. During times of new parts introductions, new or re-blended reference oil additions, and procedural revisions, it may be necessary to evaluate the possible effects on severity and precision levels. The surveillance panel may choose to conduct a program of donated reference oil tests in those laboratories participating in the monitoring system, in order to quantify the effect of a particular change on severity and precision. Typically, the surveillance panel requests its panel members to volunteer enough reference oil test results to create a robust data set. Broad laboratory participation is needed to provide a representative sampling of the industry. To ensure the quality of the data obtained, donated tests are conducted on calibrated test stands. The surveillance panel shall arrange an appropriate number of donated tests and ensure completion of the test program in a timely manner.

9.5 Designate a sequential test run number, for each stand, before the start of each test. All test starts, including aborted tests and operationally invalid tests, shall retain their test run number.

9.6 Instrument Calibration—Calibrate the wheel and pinion speed measuring systems and axle oil temperature control system at a minimum of every six months or 60 non-reference oil tests, whichever occurs first. Perform an instrument calibration against a known standard traceable to either the National Institute of Standards and Technology (NIST) or to a physical constant.

9.6.1 Calibrate the pinion torque measuring device, using a dead weight calibration, prior to each reference oil test sequence. Perform the calibration on both the positive (drive) and negative (coast) side of zero.

9.7 Engine Throttle Body Calibration—Calibrate prior to every calibration sequence.

9.7.1 Warm the engine up until the coolant temperature is greater than 150°F (65.6 °C).

9.7.2 Connect a voltmeter to the throttle position sensor (TPS) to measure the TPS voltage sent to the engine ECM.

9.7.3 Adjust the Foxboro/Jordon zero potentiometer to close the throttle until engine idle speed is at 675 ± 75 r/min (71 rad/s ± 8 rad/s). Record the TPS voltage.

9.7.4 Set the throttle controller at 100 % output, adjust the Foxboro/Jordon "span" potentiometer until the observed TPS voltage is (1.3 ± 0.1) V higher than the voltage recorded in 9.7.3.

# A5 | TEST VALIDITY CALCULATIONS AND LIMITS

A5.1 For a test to be operationally valid it shall not exceed the limits outlined in this annex.

A5.2 *Unscheduled Shutdowns*—Only one unscheduled shutdown allowed per test. The shutdown can only occur during Conditioning 1, Conditioning 3, or anytime the driveline is disengaged as

allowed or required by the test procedure. Downtime cannot exceed 15 min. Any other unscheduled shutdowns invalidate the test.

A5.3 *Test Length*—Calculate and report total test time starting from the beginning of Conditioning 1 to the end of Shock 2. Test length shall not exceed 80 min. Downtime is not to be included in the test length time.

A5.4 Coast Side Torque Limits

A5.4.1 Non-reference and Discrimination oil test, Shock Series 1 average coast side torque values shall be within ±15 % of the average Shock Series 1 coast side torque value of the average of the three tests from the most recent operationally and statistically valid reference oil calibration sequence for the test to be considered operationally valid. Each test in a calibration sequence is considered operationally valid if the average Shock Series 1 coast side torque values are within ±15 % of the average of the three acceptable calibration sequence tests.

A5.4.2 Non-reference and Discrimination oil test, Shock Series 2 average coast side torque values shall be within ±10 % of the average Shock Series 2 coast side torque value of the average of the three tests from the most recent operationally and statistically valid reference oil calibration sequence for the test to be considered operationally valid. Each test in a calibration sequence is considered operationally valid if the average Shock Series 2 coast side torque values are within ±10 % of the average of the three acceptable calibration sequence tests.

A5.5 Deviations from Test Operating Parameters

A5.5.1 Axle oil temperature is considered a critical operating parameter during the gear conditioning phase of this test. Axle speed and pinion torque are considered critical operating parameters during the steady state portion of the conditioning phase of the test.

A5.5.2 Calculate the percent deviation as follows:

$$percent\ out = \sum_{i=1}^{n}\left(\frac{Mi}{0.5R} \times \frac{Ti}{D}\right) \times 100 \qquad (A5.1)$$

where:

| | | |
|---|---|---|
| *Mi* | = | magnitude of test parameter out from specification limit at occurrence, *i*, |
| *R* | = | test parameter specification range, |
| *Ti* | = | length of time the test parameter was outside of specification range at occurrence, *i*. (*Ti* is assumed to be no less than the recorded data-acquisition frequency unless supplemental readings are documented.) |
| *D* | = | test or test phase duration in same units as *Ti*. |

A5.5.3 The deviation percentages for the critical operating parameters are shown in Table A5.1.

TABLE A5.1 Critical Operating Parameter Limits

| Parameter | Entire Conditioning Phase Limits | Conditioning Phase 1 Limits | Conditioning Phase 3 Limits |
|---|---|---|---|
| Axle Oil Temperature | 5 % | ... | ... |
| Axle Speed | ... | 5 % | 5 % |

A5.5.4 Calculate axle oil temperature percent deviation after 220°F (104.4 °C) is reached for the entire conditioning phase of the test.

A5.5.5 Calculate r/min percent deviation after 570 r/min (60 rad/s) is reached for the gear conditioning 1 portion of the test.

A5.5.6 Calculate pinion torque percent deviation after 50 lbf-ft (68 N·m) is reached for the gear conditioning 1 portion of the test.

A5.5.7 Calculate r/min percent deviation after 810 r/min (85 rad/s) is reached for the gear conditioning 3 portion of the test.

A5.5.8 Calculate pinion torque percent deviation after 60 lbf-ft (81 N·m) is reached for the gear conditioning 3 portion of the test.

Suggested new wording to better define when a candidate can start is shown in red (yes, i'd love to be able to use the word "candidate").

HTCT

10.3 Reference Oil Test Frequency—Conduct a passing reference oil test on the test stand after ten non-reference oil tests or six months, whichever occurs first. Any test started on or before the stand calibration expiration date is defined to have been run on a calibrated stand.

L331

10.1.3 *Reference Test Frequency*—Conduct one reference test every ten test starts or every three months, whichever comes first. This calibration frequency is subject to change as required. Current calibration information is available from the TMC. Any test started on or before the stand calibration expiration date is defined to have been run on a calibrated stand.

L37

9.2.3 *Reference Test Frequency*—One reference test is required every four months or after 650 test hours on nonreference fluids, whichever occurs first. Any test started on or before the stand calibration expiration date is defined to have been run on a calibrated stand.

L42

9.2.2 *In-Service Stand Calibration*—Calibrate previously referenced test stands:

9.2.2.1 After every twentieth non-reference oil test, or

9.2.2.2 After three months since the last acceptable reference oil test sequence, or

9.2.2.3 After a test stand is moved, or

9.2.2.4 After changing axle batches, or

9.2.2.5 After changing throttle settings, or

9.2.2.6 After changing torque settings, or

9.2.2.7 After major computer changes, or

9.2.2.8 After a test not conforming to this test method was run in the stand since the last acceptable reference test.

9.2.2.9 Any test started on or before the stand calibration expiration date is defined to have been run on a calibrated stand.

9.2 To ensure that uniform results are being obtained in the test, complete calibration of test stands by testing reference oil samples supplied by the TMC at the time calibration or recalibration is required.

9.2.1 *New Test Stand Calibration*—For a new test stand, reference tests as prescribed by the TMC shall be completed, giving results within the established limits for the reference oils. Inspection of the new test stand for compliance with this test method by the TMC is also required.

9.2.2 *In-Service Stand Calibration*—For a previously referenced test stand, reference tests giving results within the established limits for those oils shall be conducted at the frequency specified by the TMC (currently every ten tests or three months, whichever occurs first). Test oils for this purpose are distributed as blind coded samples by the TMC when request for calibration is received. All test starts and test data using reference oils shall be reported to the TMC. Calibration frequency is subject to change as required. Current calibration information is available from the TMC. Any test started on or before the stand calibration expiration date is defined to have been run on a calibrated stand.

9.3 *Reference Oil Test Frequency*—Reference oil test frequency may be adjusted due to the following reasons: