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1K/1N Information Letter No. 05-1
Sequence No. 25
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ASTM consensus has not yet been obtained on this information letter. An appropriate ASTM ballot will be issued in order to achieve such consensus.

TO: Single Cylinder Diesel Mailing List

SUBJECT: Implementation of 1N TGF and BSOC Correction Factors
Switch to Chevron Phillips PC-9 Fuel for 1N Testing
Revised Solvent Specification
Addition of Guidelines for Adjusting Calibration Frequency / Use of Donated Tests
Revised Precision Statement Wording

During a teleconference held December 3, 2004 the Single Cylinder Surveillance Panel approved TGF and BSOC correction factors for use on test results produced using the new 1Y3998 cylinder liner. All 1N tests ending on or after November 17, 2004 are required to add 7% to TGF and -0.06g/kWh to BSOC test results (in addition to any lab severity adjustment that might exist). A switch to Chevron Phillips PC-9 fuel for 1N testing and a revised solvent specification were also approved.

Additionally, on November 8, 2004, ASTM Subcommittee D02.B approved Test Monitoring Board recommended requirements for adjusting calibration frequency and surveillance panel use of donated reference oil test programs. At the request of ASTM Section D02.B0.09, the definitions of Intermediate Precision and Reproducibility have been revised and the figures in Tables 2 and 3 have been updated.

The updated sections of ASTM Test Method D 6750 are attached.

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Attachment

c: ftp://ftp.astmtmc.cmu.edu/docs/diesel/scote/procedure_and_ils/1k-1n/il05-01.pdf

Distribution: Email

(Revises Test Method D 6750-04 as modified by Information Letter 04-02)

13.1.3 Reporting Top Groove Fill (TGF):

13.1.3.1 If the test is a 1N test using a 1Y3998 liner, add the industry correction factor:
TGF + (7)

13.1.3.2 Add any lab severity adjustment

13.1.4 Reporting Top Land Heavy Carbon (TLHC) and Transformed Top Land Heavy Carbon (TTLHC):

13.1.4.1 Convert TLHC percent to transformed units: TTLHC = ln(TLHC+1)

13.1.4.2 If the test is a 1N test using a 1Y3998 liner, add the industry correction factor:
TTLHC + (-1.135)

13.1.4.3 Add any lab severity adjustment

13.1.4.4 Convert the transformed total back to TLHC percent:
final TLHC = exp(final TTLHC) – 1

13.1.5 Reporting Brake Specific Oil Consumption

13.1.5.1 If the test is a 1N test using a 1Y3998 liner, add the industry correction factor:
BSOC + (-0.06)

13.1.5.2 Add any lab severity adjustment

Renumber old section 13.1.3 and subsequent sections accordingly.

6.3.7.4 *Fuels*—The required test fuels are obtainable from Dow/Haltermann Products[14,10] as LLC 0.4 % sulfur diesel test fuel (see 7.2.1) for the 1K test and from Chevron Phillips[15,10] as PC-9 0.04 % low sulfur research diesel fuel (see 7.2.2) for the 1N test. The fuels are essentially the same in properties (although specification limits show minor variations (compare Tables A8.1 and A8.2)), except, as shown, for the marked difference in sulfur contents.

(1) Use the high heating value to calculate the fuel rate as specified in Annex A10 and Table A12.2.
(2) A fuel analysis form is provided for each batch of fuel by the supplier. Include this analysis as the Fuel Batch Analysis form of the test report.
(3) If more than one batch is used, note that on the Unscheduled Downtime & Maintenance Summary form of the test report. List appropriate percentage of run time for each batch.
(4) For stands calibrated for both 1K and 1N tests simultaneously, take a sample of the fuel at the stand prior to each test and have it analyzed for sulfur. Report the results of this analysis in the Unscheduled Downtime & Maintenance Summary form of the test report.

Revise footnote 14, add new footnote 15 and renumber subsequent footnotes accordingly.

Footnote 14 The sole source for 1K fuel known to the committee at this time is Haltermann Products, Ten Lamar, Ste. 1800, Houston, TX 77002.

Footnote 15 The sole source for 1N fuel known to the committee at this time is Chevron Phillips Chemical Co., Chevron Tower, 1301 McKinney Street, Houston, TX 77010-3030

7.3 *Solvent*—Use only mineral spirits meeting the requirements of Specification D 235, Type II, Class C for Aromatic Content (0-2% vol), Flash Point (142°F/61°C, min) and Color (not darker than +25 on Saybolt Scale or 25 on Pt-Co Scale). Obtain a Certificate of Analysis for each batch of solvent from the supplier. (Warning – Combustible. Health hazard.)

Replace the entirety of 10.1 with:

10.1 *General Requirements and Frequency of Calibration:*

10.1.1 To maintain test consistency and severity levels, calibrate the engine test stand at regular intervals in accordance with the requirements of the TMC using TMC reference oils.

10.1.2 TMC shall establish frequency of calibration testing.

10.1.3 Based on whichever occurs first, run a calibration test on a reference oil assigned by TMC either 12 months from the start of date of the last acceptable calibration test, or after 15 test starts run under the test type for which the test stand was calibrated (1K or 1N). A test stand can be calibrated as both a 1K and 1N test stand and failure to calibrate under one test shall not invalidate the calibration for the other.

10.1.4 Reference oil test frequency may be adjusted for the following reasons:

10.1.4.1 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.

10.1.4.2 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.

10.1.4.3 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.

10.1.4.4 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.

10.1.5 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.

14.1.1 Table 2 and Table 3 summarize reference oil intermediate precision and reproducibility of the test. The tabulated values are current as of February 1, 2005. The Surveillance Panel updates these values as necessary.

14.1.2.1 Intermediate Precision Limit (i.p.)—The difference between two results obtained under intermediate precision conditions that would, in the long run, in the normal and correct conduct of the test method, exceed the values shown in Tables 2 and 3 in only one case in twenty. When only a single test result is available, the Intermediate Precision Limit can be used to calculate a range (test result ± Intermediate Precision Limit) outside of which a second test result would be expected to fall about one time in twenty.

14.1.3.1 Reproducibility Limit (R)—The difference between two results obtained under reproducibility conditions that would, in the long run, in the normal and correct conduct of the test method, exceed the values shown in Tables 2 and 3 in only one case in twenty. When only a single test result is available, the Reproducibility Limit can be used to calculate a range (test result ± Reproducibility Limit) outside of which a second test result would be expected to fall about one time in twenty.

TABLE 2 1K Reference Oil Precision Data

NOTE—These statistics are based on results obtained on Test Monitoring Center reference oils between September 8, 1995 and August 9, 2004.

Variable	$S_{i.p.}$	*i.p.*	S_R	*R*
Top groove fill, %	13.2	37.0	14.5	40.6
Weighted total deposits, demerits	37.4	104.7	38.1	106.7
Top land heavy carbon, ln (TLHC + 1) [A]	0.906	2.537	1.044	2.923
Average oil consumption, g/Kw-h	0.084	0.235	0.084	0.235

[A] This parameter is transformed using ln(TLHC + 1). When comparing two test results on this parameter, first apply this transformation to each test result. Compare the absolute difference between the transformed results with the appropriate (intermediate precision, or reproducibility) precision limit.

TABLE 3 1N Reference Oil Precision Data

NOTE—These statistics are based on results obtained on Test Monitoring Center reference oils between April 3, 1995 and November 17, 2004.

Variable	$S_{i.p.}$	*i.p.*	S_R	*R*
Top groove fill, %	15.7	44.0	15.7	44.0
Weighted total deposits, demerits	24.6	68.9	28	78.4
Top land heavy carbon, ln (TLHC + 1) [A]	0.817	2.288	0.829	2.321
Average oil consumption, g/Kw-h	0.061	0.171	0.064	0.179

[A] This parameter is transformed using ln(TLHC + 1). When comparing two test results on this parameter, first apply this transformation to each test result. Compare the absolute difference between the transformed results with the appropriate (intermediate precision, or reproducibility) precision limit.

Legend:

$S_{i.p.}$	=	intermediate precision standard deviation.
i.p.	=	intermediate precision.
S_R	=	reproducibility standard deviation.
R	=	reproducibility.