



Test Monitoring Center

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1R Information Letter No. 05-1
Sequence No. 2
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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: 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 Diesel Surveillance Panel approved a revised solvent specification.

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 Table 1 have been updated.

The updated sections of ASTM Test Method D 6923 are attached.

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Attachment

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

Distribution: Email

(Revises Test Method D 6923-03)

- 7.12 *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.)
- 9.11 *Cylinder Liner*—Use a new 1Y3805 cylinder liner for each test. After removing the protective oil/grease with solvent, clean the liner bore with a hot tap water and soap solution, then rinse with hot tap water. Measure and record the liner surface finish. Oil the liner bore with only Mobil EF-411. Assemble the cylinder liner, block and head with the torque specification shown in the 1Y3700 Service Manual or Annex A8. Measure the liner with a dial bore gage to ensure that the out-of-round and taper conditions are within specified tolerances measured at seven intervals as shown in Annex A8. Measure the cylinder liner projection using the modified indicator shown in Annex A8. Torque the cylinder liner support ring using the procedure shown in Annex A8.
- 11.7.2 *Piston Ratings*—Immerse the piston assembly in solvent and air-dry it prior to any rating. Process and measure the piston deposits according to the Modified CRC Diesel Piston Rating Method described in CRC Manual No. 20 and modified by the directions listed in Annex A11. Rate only two levels of carbon (heavy and light) on the second groove and all lands, and only one level of carbon (light) for the under-crown and cooling groove. Use a combined varnish rating method for the third groove, third land, fourth land, under-crown and cooling groove (see Annex A11). An example rating worksheet is shown in Appendix X1. Another heavy duty engine deposit rater shall verify all piston deposit ratings done by the testing laboratory. In special cases where another rater is not available, the rating may be verified by other qualified laboratory personnel. Record the initials of both the rater and the verifying rater.

TABLE A9.1 Flushing Instruction Sheet

Step	Procedure	Flushing Fluid	Relief Valve ^A
1	Flushing is easier when the engine is warm Drain used oil from sump, cooler, oil scale and remove oil filter Install 1Y3916 plug in front plate (in place of fuel cam/cylinder head) Install 1Y3979 cover on top of block Install 1Y3980 piston jet aim fixture on top of 1Y3979 cover Connect flush cart outlet to filter flush adapter 1Y3935 and five spray nozzles		Open
2	Connect flush cart pump inlet to solvent tank Install new oil filter on the oil flush cart Open engine sump drain. Then pump solvent into engine to flush used oil	7.6 L Solvent No recirculation	Closed
3	Connect flush cart pump inlet to engine oil sump Close engine sump drain Circulate fluid with flush cart and oil scale pumps turned on	7.6 L Solvent	Closed 5 min Open 5 min
4	Drain mixture from sump, cooler, oil scale, flush cart, and filters		Open
5	Circulate fluid with flush cart and oil scale pumps turned on Use flush wand through side covers to clean crankcase	7.6 L Solvent	Open 5 min Closed 5 min
6	Drain fluid from sump, cooler, oil scale, flush cart, and		Open

Step	Procedure	Flushing Fluid	Relief Valve ^A
7	filters Repeat Steps 5 and 6 two times or as needed until solvent remains clean		
8	Circulate EF-411 to flush solvent	5.6 L EF-411	Open 5 min Closed 5 min Open
9	Drain oil from sump, cooler, oil scale, flush cart, and filters		
10	Circulate EF-411 at 415 kPa manifold pressure and align piston jets	5.6 L EF-411	Open 5 min
11	Drain oil from sump, cooler, and oil scale. Rebuild engine for test		Open
12	After engine is rebuilt, motor engine at a minimum of 200 r/min	5.6L EF-411	Reconnect for normal operation
13	Drain oil from sump, cooler, and oil scale		Open

^A Supply 50 kPa air pressure to open the Johnson Controls oil relief valve.

A11.4.1.3 *Surface Preparation*—Use caution in handling the liners due to the sharpness of the cut edges. Wipe both halves of the liner using solvent on a dampened soft rag followed by a clean soft dry rag.

Replace the entirety of 10.9.2 with the following, add 10.9.3 after 10.9.2:

10.9.2 *Guidelines for Adjustments to Calibration Periods*: Reference oil test frequency may be adjusted for the following reasons:

10.9.2.1 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.

10.9.2.2 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.

10.9.2.3 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.

10.9.2.4 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.

- 10.9.3 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.

Replace the entirety of section 14 with:

14. **Precision and Bias**

14.1 Test precision is established on the basis of reference oil test results (for operationally valid tests) monitored by the ASTM Test Monitoring Center. The data are reviewed semi-annually by the Single-Cylinder Diesel Surveillance Panel. Contact the ASTM TMC for current industry data.

14.1.1 Table 1 summarizes 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 *Intermediate Precision Conditions*—Conditions where test results are obtained with the same test method using the same test oil, with changing conditions such as operators, measuring equipment, test stands, test engines, and time.

NOTE 2 Intermediate precision is the appropriate term for this test method rather than repeatability which defines more rigorous within-laboratory conditions.

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 Table 1 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 \pm Intermediate Precision Limit) outside of which a second test result would be expected to fall about one time in twenty.

14.1.3 *Reproducibility Conditions*—Conditions where test results are obtained with the same test method using the same test oil in different laboratories with different operators using different equipment.

- 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 Table 1 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 \pm Reproducibility Limit) outside of which a second test result would be expected to fall about one time in twenty.
- 14.1.4 *Bias*—Bias is determined by applying an acceptable statistical technique to reference oil test results and when a significant bias is determined, a severity adjustment is permitted for non-reference oil test results (see TMC Memo 94-200, Lubricant Test Monitoring System document for details).

TABLE 1 1R Reference Oil Precision Data

NOTE—These statistics are based on results obtained on Test Monitoring Center reference oils between July 4, 2001 and February 13, 2004.

Test Parameter	$S_{i.p.}$	$i.p.$	S_R	R
TGC – top groove carbon, demerits	8.86	24.81	8.86	24.81
WD - weighted piston deposits, demerits	26.2	73.4	26.2	73.4
TLC – top land carbon, demerits	6.82	19.10	6.82	19.10
BTOC – beginning of test oil consumption	1.12	3.14	1.23	3.44
ETOC – end of test oil consumption	1.25	3.50	1.36	3.81

Legend:

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