



Test Monitoring Center

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ROLLER FOLLOWER WEAR TEST INFORMATION LETTER 06-1
Sequence No. 8

July 18, 2006

ASTM consensus has not been obtained on this information letter. An appropriate ASTM ballot will be issued in order to achieve such consensus.

TO: RFWT Mailing List

SUBJECT: 1. Cleaning Solvent
2. Test Fuel
3. Report Forms and Data Dictionary
4. Precision Estimate
5. Donated Reference Oil Programs and Calibration Period Adjustments

Cleaning Solvent

The wording regarding the use of cleaning solvent has been updated to reflect current practice for Subcommittee B lubricant engine testing. This practice requires that the solvent meet D 235 Type II Class C specifications for Aromatic Content, Color and Flash Point. Test laboratories are also required to obtain a Certificate of Analysis for each batch of solvent obtained. Accordingly, Section 7.1.1 of D 5966 has been modified and is attached. This change is effective the date of this information letter.

Test Fuel

By email ballot, the Roller Follower Wear Test Surveillance Panel changed the test fuel from Low Sulfur Reference Diesel Fuel to PC-9 Reference Diesel Fuel. Revised Sections 7.1.3, Footnote 15, 9.12.2.1, and Annex X1 of D 5966 are attached. This change went into effect with the first reference test at a laboratory occurring after September 14, 2005.

Report Forms and Data Dictionary

The RFWT Report Forms and Data Dictionary have been removed from Test Method D 5966. The TMC will continue to maintain and revise the RFWT Report Forms and Data Dictionary as done in the past. The current report forms and data dictionary may be downloaded from the ASTM Test Monitoring Center Web Page at <http://www.astmtmc.cmu.edu/> or can be obtained in hardcopy format from the TMC. Sections 11.1, 11.2, and Annex A5 of D 5966 have been modified accordingly and are attached. Additionally, Annex A10 has been deleted in its entirety.


Precision Estimate

The precision estimate and language have been updated to reflect current Subcommittee B practice. Accordingly, Section 12 of D 5966 has been completely rewritten and is attached.

Donated Reference Oil Programs and Calibration Period Adjustments

On November 8, 2004, ASTM Subcommittee D02.B approved a recommendation from the Test Monitoring Board to revise test methods monitored by the Test Monitoring Center regarding the shortening or lengthening of reference oil calibration periods and surveillance panels' use of donated reference oil test programs. This revision provides consistent language for the procedures and clarification to the end users. Accordingly, new Sections A4.4 and A4.5 (and subsections) have been added to D 5966 and are attached.

The changes mentioned above have resulted in several changes to both the Table of Contents and the Referenced Documents. For clarity, the revised Table of Contents and Referenced Documents section of D 5966 are included in this information letter.



Robert Stockwell 7-11-2006
Chairman
RFWT Surveillance Panel



John L. Zalar
Administrator
ASTM Test Monitoring Center

Attachment

c: ftp://ftp.astmtmc.cmu.edu/docs/diesel/mack/procedure_and_ils/rfwt/il06-1.pdf

Distribution: Email

(Revises Test Method D 5966-02)

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2. Referenced Documents

2.1 *ASTM Standards:*

- D 86 Test Method for Distillation of Petroleum Products at Atmospheric Pressure⁴
- D 93 Test Methods for Flash-Point by Pensky-Martens Closed Cup Tester⁴
- D 97 Test Method for Pour Point of Petroleum Products⁴
- D 130 Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test⁴
- D 235 Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)⁵
- D 287 Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)⁴
- D 445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (the Calculation of Dynamic Viscosity)⁴
- D 446 Specifications and Operating Instructions for Glass Capillary Kinematic Viscometer⁴
- D 482 Test Method for Ash from Petroleum Products⁴
- D 524 Test Method for Ramsbottom Carbon Residue of Petroleum Products⁴
- D 613 Test Method for Cetane Number of Diesel Fuel Oil⁶
- D 664 Test Method for Acid Number of Petroleum Products by Potentiometric Titration⁴
- D 976 Test Methods for Calculated Cetane Index of Distillate Fuels⁴
- D 1319 Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption⁴
- D 2274 Test Method for Oxidation Stability of Distillate Fuel Oil (Accelerated Method)⁴
- D 2500 Test Method for Cloud Point of Petroleum Products⁴
- D 2622 Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-Ray Fluorescence Spectrometry⁴
- D 2709 Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge⁷
- D 4052 Test Method for Density and Relative Density of Liquids by Digital Density Meter⁷
- D 4175 Terminology Relating to Petroleum, Petroleum Products, and Lubricants⁷
- D 4485 Specification for Performance of Engine Oils⁷
- D 4737 Test Method for Calculated Cetane Index by Four Variable Equation⁷
- D 5185 Test Method for Determination of Additive Elements, Wear Metals, and Contaminants in Used Lubricating Oils and Determination of Selected Elements in Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry⁷
- D 5186 Test Method for Determination of Aromatic Content of Diesel Fuels and Aviation Turbine Fuels by Supercritical Fluid Chromatography⁷
- D 5302 Test Method for Evaluation of Automotive Engine Oils for Inhibition of Deposit Formation and Wear in a Spark-Ignition Internal Combustion Engine Fueled with Gasoline and Operated Under Low-Temperature, Light-Duty Conditions⁷
- D 5844 Test Method for Evaluation of Automotive Engine Oils for Inhibition of Rusting (Sequence IID)⁸
- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance With Specifications⁹
- E 344 Terminology Relating to Thermometry and Hydrometry¹⁰

2.2 *Society of Automotive Engineers (SAE):*¹¹

- SAE J183 Engine Oil Performance and Engine Service Classification
- SAE J726 Air Cleaner Test Code (Includes Piezometer Ring Specifications)

2.3 *American Petroleum Institute (API):*¹²

- API 1509 Oil Licensing and Certification System

2.4 *American National Standards Institute (ANSI):*¹³

- MC96.1 Temperature Measurement Thermocouples

7.1.1 *Cleaning Solvent*— For cleaning parts, use only mineral spirits meeting the requirements of Specification D 235 for Mineral Spirits, 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). (**Warning**— Combustible. Health Hazard.) Obtain a Certificate of Analysis for each batch of solvent from the supplier.

7.1.3 *Fuel* – Approximately 600 L of PC-9 Reference Diesel Fuel is required for each test.¹⁵
(**Warning** – Combustible. Health hazard. Use adequate safety provisions.)

¹⁵PC-9 Reference Diesel Fuel is available from Chevron Phillips, Phillips 66 Co. Marketing Services Center, P.O. Box 968, Borger, TX 79008-0968.

9.12.2.1 Charge approximately 7 L of solvent into the engine by way of the flush system.

11.1 *Reporting Calibration Test Results*— Report all calibration (reference oil) tests to the TMC within five days of test completion using the standardized report forms and data dictionary, which are available on the ASTM Test Monitoring Center² Web Page at <http://www.astmtmc.cmu.edu>. Electronic transfer of the test report can be done using the ASTM Data Communications Committee Test Report Transmission Model (see Section 2 – Flat File Transmission Format) available from the ASTM TMC. A copy of the final test report (all forms) should be submitted by mail to the test developer and the TMC within 30 days of test completion (reference A9.1).

11.2 *Report Forms*—For reference oil tests, the standardized report form set and data dictionary for reporting test results and for summarizing the operational data are required. The list of final report forms is shown in Annex A5.

12. PRECISION AND BIAS

12.1 Precision

12.1.1 Test precision is established on the basis of operationally valid reference oil test results monitored by the TMC.

12.1.1.1 *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 the method rather than repeatability which defines more rigorous within-laboratory conditions.

12.1.1.2 *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 6 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.

12.1.1.3 *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.

12.1.3.4 *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 6 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 Reproducibility Limit) outside of which a second test result would be expected to fall about one time in twenty.

12.2 *Precision Estimate* – Test precision, as of June 23, 2006 is shown in Table 6.

TABLE 6 – TEST PRECISION

Parameter	Intermediate Precision (i.p.)	Reproducibility (R)
Roller follower wear	0.13	0.14

12.3 *Bias* – Bias is determined by applying a defined statistical technique to calibration test results. When a significant bias is determined, a severity adjustment is applied to the non-reference oil test result.

A4.4 *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.

A4.5 Adjustments to Reference Oil Calibration Periods

A4.5.1 *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.

A4.5.2 *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.

A4.5.3 *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.

A4.5.4 *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.

A5. FINAL REPORT FORMS

A5.1 The required report forms are available on the ASTM Test Monitoring Center Web Page at <http://www.astmtmc.cmu.edu/> or can be obtained in hard copy format from the TMC.

Form 0	Cover Sheet
Form 1	Test Lab Affidavit
Form 2	Summary of Roller Follower Wear
Forms 3 – 16	Operational Data Summary
Form 17	Oil Analysis Summary
Forms 18 – 20	Unscheduled Downtime and Maintenance Summary
Form 21	Test Fuel Analysis (Last Batch)
Form 22	Characteristics of the Data Acquisition System
Note – If the non-reference oil test results are also to be submitted as candidate oil test results to the registration organization, the report forms and data dictionary that are maintained for reporting reference oil results shall also be used for reporting the candidate oil test results. The ACC Code of Practice Test Laboratory Conformance statement shall also be included.	
Form 23	ACC Test Laboratory Conformance Statement

Delete Figs. A5.1 through A5.21.

Delete Annex A10 in its entirety.

X1. PC-9 REFERENCE DIESEL FUEL PROPERTIES

X1.1 The properties for PC-9 Reference Diesel Fuel are shown in Table X1.1.

PROPERTY	TEST METHOD	MINIMUM^A	MAXIMUM^A
Sulfur, mass %	D 2622	0.04	0.05
Gravity, °API	D 287 or D 4052	34.5	36.5 (37)
Hydrocarbon Composition, % Vol.			
Aromatics	D 1319 (FIA)	(27) 28	33
Olefin	D 1319 (FIA)		Report
Cetane Number	D 613	(40) 42	48
Cetane Index	D 4737 & D 976		Report
Copper Strip Corrosion	D 130		1
Flash Point, °C	D 93	54	
Pour Point, °C	D 97		-18
Cloud Point, °C	D 2500		Report
Carbon Residue on 10% Residuuum, mass %	D 524 (10% Bottoms)		0.35
Water & Sediment, Vol. %	D 2709		0.05
Viscosity, cSt @ 40°C	D 445	2.4	3.0
Ash, mass %	D 482		0.005
Total Acid Number	D 664		0.05
Strong Acid Number	D 664		0.00
Accelerated Stability	D 2274		Report
Distillation, °C	D 86		
IBP			Report
10% Vol.			Report
50% Vol.			Report
90% Vol.		282	338
EP			Report

A: Minimum/Maximum numbers in parentheses are EPA Certification Fuel Specifications.