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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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UNCOMFIRMED MINUTES OF THE
ASTM LIGHT DUTY RATING TASKFORCE
SAN ANTONIO, TEXAS
October 8-10, 2001

THIS DOCUMENT IS IN THE PROCESS OF DEVELOPMENT AND IS FOR ASTM COMMITTEE USE ONLY. IT SHALL NOT BE REPRODUCED, CIRCULATED, OR QUOTED, IN WHOLE OR IN PART, OUTSIDE OF ASTM COMMITTEE ACTIVITIES, EXCEPT WITH THE APPROVAL OF THE CHAIRMAN OF THE TAST FORCE.

Group leader Mr. Zack Bishop opened the ASTM Light Duty Rating Task Force Meeting at 9:00 am. Present were 18 participants and 1 guest. The attendance list and Light Meter Recording is shown as **Attachment I**. An agenda was given to all Task Force Members and attendees and is included as **Attachment II**.

MEMBERSHIP
An updated address membership (**Attachment III**) and guest list was circulated.

SCOPE AND OBJECTIVES
A copy of the scope and objectives of this Task Force are included as **Attachment IV.**

SEQUECNCE VG & IIIF RATING WORKSHOP
A meeting of the ASTM Rating Task Force was held in conjunction of the VG and IIIF Rating Workshop on October 9th. – 10th. in San Antonio, TX. at Southwest Research Institute. This workshop was limited to Laboratories that are currently running or sometime in the future will run Sequence VG and IIIF test. Mr. Frank Farber and Scott Parke of the ASTM Test Monitoring Center administered the workshop with the help of the San Antonio Laboratories.

ASTM RATER CALIBRATION PROPOSAL

Group leader Zack Bishop gave a presentation of the "ASTM Rater Calibration Proposal" (*see email attachment* – **ASTM Rater Proposal**) and some comments were brought up, such as pre-calibration exercises, and deposit ranges, and rater make-up sessions. These items are included in the ASTM proposal.

TMC RATER CALIBRATION

Mr. Frank Farber gave a presentation on "TMC Rater Calibration" and stressed that the TMC will be involved in all future ASTM Workshops gathering the data and generating statistics. This exercise was similarly held in the Gear Rating area, the outcome of this activity is pending as more data is being gathered. Mr. Mike Pansza commented that a similar procedure is being used in the C.E.C.

DEPOSIT RATING RANGE EXERCISE

After completion of workshop set-up and presentations from Mr. Zack Bishop and Mr. Frank Farber a group of parts was selected to bracket the merit scale and to establishing the Workshop deposit range. This exercise is not intended as a pre-calibration exercise. Five IIIF pistons and two sets of two VG pistons were used in the results. The TMC previously mailed all workshop data on 11/21/01.

SEQUENCE VG TEST DISCUSSION

There was a review of the Sequence VG Rating section (**Attachment V**). This was the first VG workshop held since introduction of the proposed ASTM Rater Calibration Task Force recommendations.

SEQUENCE IIIF TEST DISCUSSION

There was a review of the Sequence IIIF Rating section (**Attachment VI**). This was the first IIIF workshop held since introduction of the proposed ASTM Rater Calibration Task Force recommendations. Sequence III Surveillance Panel member Mr. Pat Lang of SwRI was present during this discussion.

PRESENTATION OF NEW VG HARDWARE

Sequence V Surveillance Panel O&H Chairman Mr. Dan Worcester of PerkinElmer gave the following presentation of the new VG Hardware:

Development work has begun on the VG replacement hardware.

1. 2000 brand-new engines were pulled from Ford production.
2. Test hardware has a different front cover, and new head castings.
3. Severity may be different from current AER engines, and ratings sites will need to be reviewed.
4. A set of heads was supplied for the rating workshop.

All of the new hardware was run at PerkinElmer and only the new heads had the biggest variance for rating sites. The set of new head was compared to VG Rating Form (FIG. A11.8 and FIG.A11.9 Sludge Rating of Left and Right Valve Deck), and a proposal was made:

Recommendation: ***New VG Hardware-Dual Rating and get with independent Laboratories and come up with good rating sites****.*

Also, a recommendation was made concerning the on going issue of the deterioration of Rocker Cover Varnish Rating surface.

Recommendation: ***Replace RC Varnish with Cam Baffle because of deterioration of RC Varnish surface. Cam Baffle is cheaper to replace than buying new RC Varnish.***

Based on rater input, a motion was made by the O&H Chairman to parallel rate the baffles and RAC units for varnish. If severity is not significantly affected, the industry would switch to rating baffles this summer. Dwight Bowden has agreed to supply brand new covers for the Romeo Engine Matrix.

Dual rating of the matrix tests will happen for the next 6 tests.

FUTURE ASTM LIGHT DUTY RATING TASKFORCE MEETINGS

Group leader Mr. Zack Bishop will retire this coming March from is work and his position on this ASTM Taskforce. Presently, no one has volunteered or has been appointed to this position, the secretary Mr. Orlando D. Garcia will maintain this position. As stated by Mr. Frank Farber that there would be more of the Test Monitoring Centers involvement in all future ASTM Workshops.

OLD BUSINESS

No old business was discussed.

NEW BUSINESS

No new business was discussed.

ADJOURN

The meeting adjourned at 5:00 p.m.

ATTACHMENT 1

ASTM LIGHT DUTY RATING WORKSHOP

Participant and Light Meter Recordings

Participants	Affiliated Company
Tony Barrera	PerkinElmer
Zack Bishop	ChevronTexaco
Dave Caproni	Ashland
George Castillo	Southwest Research
Pat Cunniff	PerkinElmer
Brain Foecking	Lubrizol
Orlando Garcia	PerkinElmer
Pat Garcia	Southwest Research
Tom Garrett	Lubrizol
Barry Hills	ExxonMobil
Jack Kobrinetz	Ethyl
Frank Lopez	Southwest Research
Mike Pansza	LTS
Robert Ramirez	PerkinElmer
Jesse Rodriguez	Southwest Research
Ray Sietz	Infineum
Ron Walker	Ashland

Light Meter Recordings

VG AREA		**IIIF AREA**	
Overhead Lights	Reading	Booth Lighting	Reading
Left	293	A	436
Right	290	B	410
Table Lamps		C	378
Left	460	D	359
Right	400		

Attachment II

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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

July 31, 2001

TO: ASTM Light-Duty Rating Task Force

LIGHT-DUTY RATING WORKSHOP ANNOUNCEMENT

8-9 The next meeting of the ASTM Light-Duty Rating Workshop is scheduled for ~~September~~ October ~~18-20~~, 2001 in San Antonio, TX. The workshop will be held at Southwest Research Institute. A block of hotel rooms have been reserved at the Embassy Suites (Briarridge St. – (210)-340-5421) until August 24, 2001 with a single rate of $96/night. To get the rate you must mention 'Southwest Research Institute'. A check for $400 payable to 'ETMC – Carnegie Mellon University' is due prior to the workshop and should be mailed as soon as possible. The check can be mailed to:

ASTM TMC – Ellen Young
6555 Penn Avenue
Pittsburgh, PA 15206

A tentative agenda is attached. If there are revisions or something you would like added to the agenda, please let me know.

Sincerely,

Frank M. Farber

WORKSHOP AGENDA

ASTM LIGHT DUTY RATING TASK FORCE
SOUTHWEST RESEARCH INSTITUTE - SAN ANTONIO, TX
Building 71 – Bottom Floor Conference Room
September 18 - 20, 2001

SEQUENCE VG & IIIF Rating Workshop

Date	Time	Subject
	8:00 am	Call to Order
10/8 ~~9/18~~		IIIF & VG Test Procedures Rating Section Review
		IIIF & VG Workshop Format Discussion
		Old Business (Time Allowing)
10/9		Sequence VG Ratings
~~9/19~~		Sequence IIIF Ratings
~~9/20~~		Questions, Answer & Re-Rate Session
10/10 ~~9/20~~		Adjournment

Note: The San Antonio lab staff and the TMC will set-up for the workshop on 10/8 ~~9/17~~. In addition, after the set-up is complete, a group of parts will be selected to bracket the merit scale. These parts will then be rated for consensus means. Any Category I* rater is welcome to participate in this activity.

* An individual whose ratings results (reference and non-reference) are used in final test reports that support the quality level of experimental fluids and/or whose ratings are used to support the quality level of marketable product

ATTACHMENT III

ASTM LIGHT DUTY RATING TASK FORCE MEMBERSHIP LIST

NAME	COMPANY
Zack Bishop – Chairman	Oronite Technology Group
Orlando Garcia – Secretary	PerkinElmer Automotive Research
Frank Farber	ASTM-TMC
Phil Van Acker	BP Amoco
John H. Kirkpatrick	Chevron Chemical Co.
Pat Cunniff	PerkinElmer Automotive Research
Jack Kobrinetz	Ethyl Petroleum Additives, Inc
Sid Clark	GM NOA R&D Center
Ray Seiz	Infineum
Paul Yanchar	Lubrizol Corporation
Pete Radonich	Lubrizol Corporation
Steve W. Avis	ExxonMobil Research and Engineering.
Michael T. Pansza	LTS
Ronald Walker	Ashland Inc.
Dave Jones	Ricardo Consulting Engineers
George Castillo	Southwest Research Institute
Pat Garcia	Southwest Research Institute
Frank Lopez	Southwest Research Institute
Jesus M. Rodriguez, Jr.	Southwest Research Institute
Brain Foecking	Lubrizol Corporation
Tom Garrett	Lubrizol Corporation
Patrick R. Adams	Ethyl Petroleum Additives, Inc
Scott Parke	ASTM-TMC

Revised 07/30/01

MEMBERSHIP LIST
ASTM LIGHT DUTY RATING TASK FORCE
2001

NAME, ADDRESS	PHONE NO. Email	SIGNATURE
Orlando Garcia PerkinElmer Automotive Research 5404 Bandera Road San Antonio, TX 78238	(210) 647-9472 (FAX) 684-6074 orlando.garcia@perkinelmer.com	Present
Pat Garcia Southwest Research Institute 6220 Culebra Road San Antonio, TX 78238-5166	(210) 522-2870 (FAX) 680-8305 pgarcia@swri.org	Present
Tom Garrett Lubrizol Corporation Mail Drop: 121B 29400 Lakeland Blvd. Wickliffe, OH 44092-2298	(440) 347-4568 (FAX) 347-2894 trg@lubrizol.com	Present
Frank Farber ASTM-TMC 6555 Penn Ave. Pittsburgh, PA 15206-4489	(412) 365-1030 (FAX) 365-1047 fmf@tmc.astm.cmri.cmu.edu	Present
Dave Jones Ricardo Consulting Engineers Bridge Works, Shoreham-by-Sea West Sussex, BN43 5PG England	011 44 1273 794441 (FAX) 1273 794564 DTJones@rce.recardo.com	Present
John H. Kirkpatrick Chevron Chemical Co. Additive and Fuel Development Ric/61-4137 100 Chevron Way Richmond, CA 94802	(510) 242-2920 (FAX) 242-1989 KIJO@chevron.com	Present
Jack Kobrinetz Ethyl Petroleum Additives, Inc. 500 Spring St. P.O. Box 2158 Richmond, VA. 23218-2158	(804) 788-5251 (FAX) 788-6358 jack_kobrinetz@ethyl.com	Present

Revised 07/30/01

MEMBERSHIP LIST
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2001

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Ronald Walker Ashland Inc. 22nd and Front Street Ashland, KN. 41102	(606) 329-5811 (FAX) 329-3009 rlwalker@ashland.com	Present
Phil Van Acker BP Amoco Oil 150 West Warrenville Road Mail Code J-9 Naperville, IL. 60563-8460	(630) 420-5972 (FAX) 420-4831 vanackpa@BP.com	Present
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Revised 07/30/01

VISITOR LIST
ASTM LIGHT DUTY RATING TASK FORCE
2001

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Sid Clark GM NOA R&F Center MC480-106-160 30500 Mound Road Warren, MI 48090-9055	(810) 986-1929 (FAX) 986-2094 sidney.l.clark@GM.com	Present _____
Pat Cunniff PerkinElmer Automotive Research 5404 Bandera Road San Antonio, TX 78238	(210) 647-9472 (FAX) 684-6074 pat.cunniff@perkinelmer.com	Present P Cunniff
Brain Foecking Lubrizol Corporation Mail Drop: 121B 29400 Lakeland Blvd. Wickliffe, OH 44092-2298	(440) 347-2130 (FAX) 347-3789 bjf@lubrizol.com	Present B Foecking

Revised 07/30/01

ATTACHMENT IV

ASTM LIGHT DUTY RATING TASK FORCE

SCOPE and OBJECTIVES

SCOPE

The ASTM Light Duty Rating Task Force will be comprised of a core of expert raters who will provide the needed working group the expertise to evaluate rating related areas of concern and provide recommendations to the appropriate surveillance panel or group. The Task Force will be under ASTM jurisdiction reporting concurrently to the Sequence II, III and V Surveillance Panels. The Task Force will work cooperatively with the CRC Deposit/Distress Rating Methods Advisory Panel and New Procedure Development & Guidance Sub-Panel in achieving the common goal of improved precision.

OBJECTIVES

1. The Task Force will act upon Surveillance Panel or Sub-panel requests in addressing those items that influence deposit evaluations and make recommendations back to the appropriate group.

2. Provide a communications link and act as a liaison between the CRC Panel & Sub-Panel and the ASTM Surveillance Panels.

3. Evaluate, define, and make recommendations to the appropriate ASTM Surveillance Panel or Sub-panel for inclusion of deposit evaluation modifications and interpretations in the specific ASTM standardized test procedures and proposed procedures.

4. As requested by the Surveillance Panels, provide the means to ensure that all active raters are provided with the latest deposit evaluation modifications and interpretations.

5. Provide reports on the Task Force activities to the appropriate Surveillance Panel or Subgroup as directed by the Surveillance Panels.

6. Bring to the attention of the TMC, the Test Developer and the appropriate Surveillance Panel or Sub-panel, any rating related item(s) that might require Surveillance Panel action.

ATTACHMENT V

12.6.3 *Parts Layout for Rating*:

12.6.3.1 Arrange the following parts in the parts rating area in accordance with the layouts detailed in this session. After the parts have been arranged, allow the parts to drain for a minimum of 4 h before rating. Do not attempt to accelerate or force the oil draining. Any fixtures can be used to support the parts as long as they orient the parts in the specified configuration.

12.6.3.2 R*ocker Arm Covers* – Position the RAC's vertically (upper jacket surface perpendicular to the ground) with the front of the RAC at the bottom.

12.6.3.3 *Camshaft Baffles* – Position the camshaft baffles vertically (top baffle surface perpendicular to the ground) with the rear of the camshaft baffle pointing down.

12.6.3.4 *Cylinder Heads* – Position the cylinder heads with RAC gasket surface pointing down.

12.6.3.5 *Oil Pan* – Position the oil pan upside down, with the pan rail at a 45° angle, with sump end pointing down.

12.6.3.6 *Oil Pan Baffles* - Position the oil pan baffles vertically on the front edges.

12.6.3.7 *Oil Screen and Pickup Tube* – Position the oil screen and pickup tube in the same orientation as they are installed in the engine. The screen should be raised off of the supporting surface to allow drainage. A fixture is necessary to support the oil screen and pickup tube.

13. Interpretation of Results

13.1 *Parts Rating Area – Environment*:

13.1.1 Ensure that the ambient atmosphere of the parts rating area is reasonably free of contaminants, and the temperature maintained at 24 ± 3°C (75 ± 5°F).

13.1.2 Rate all engine parts except the pistons and RAC's under cool white fluorescent lighting exhibiting approximately 4100 K color temperature, a CRI of 62 and an illumination level of 350 to 500 fc (3800 to 5400 lx). All background and adjacent surfaces shall be flat white.

13.1.3 Rate pistons and RAC's against a white background using white fluorescent bulbs and a 100% white deflector. Maintain the illumination level between 350 and 600 fc (3800 to 6500 lx), and measure the illumination level 355 mm (14 in.) from the desk top. ~~Provide a 15-W bore light with a cool white fluorescent tube for the cylinder wall varnish rating.~~

13.1.4 Rater shall attend at least one ASTM or CRC Rating Workshop having VG specific or comparable hardware.

13.2 *Sludge Ratings:*

13.2.1 Rate the following parts for sludge deposits: RAC (2), valve deck (2), camshaft baffle (2), timing chain cover, oil pan and oil pan baffle. Use the rating locations identified on the rating worksheets (see A11). Determine the ratings using the techniques detailed in CRC Manual No. 12. Perform the sludge ratings before performing any other required ratings or measurements.

13.2.2 *Average Sludge (Unweighted Average of 9 Parts):*

13.2.2.1 Use the self-weighting procedure detailed as follows to determine the sludge rating merit for each part.

(a) Determine the sludge depth at each of the sites shown on rating worksheets. A site is defined as a 20-mm (0.79-in.) diameter circular area.

(b) Determine an interpolated sludge value for a designated site which exhibits more than one level of sludge depth within this area. This value is generated by multiplying each rated value's volume factor by the percentage of area covered, totaling these volume factor percentages, and comparing the total to the values given in Table 6 to determine the rating for the site: As an example, if a site was determined to be 50% A and 50% E, the calculation would be: 50% of the average sludge depth factor for A (or 1.0), plus 50% of the average sludge depth factor for E (or 16.0); that is: ([0.5 x 1.0 = 0.5] + [0.5 x 16.0 = 8] = 8.5), and the calculated site sludge depth would be a D. In the event that there are areas where it is apparent that deposits had been formed, but are no longer adhering to the part, the rating site is the closest point to the designated point which will eliminate the voided area from the 20-mm (0.79-in.) rating area.

(c) Add the total rating checks made for each line on the appropriate worksheets. These shall equal 10 or 20, depending on the part that is rated.

(d) Multiply the total rating checks made on each line by ten or five, respectively (refer to (c), to obtain the percent covered by the rated sludge depth. The grand total shall equal 100%.

(e) Convert the percent covered by the rated sludge depth at each location to a volume factor using the procedure shown in CRC Manual No. 12.

(f) Add the volume factors on each line to determine the total volume factor. Use CRC Manual No. 12 to convert the total volume factor to the sludge merit rating.

Table 6 Interpolated Average Sludge Site Ratings

Total	Site Ratings	Total	Site Ratings
<0.125	Clean	≥3.500<6.000	C
≥0.125<0.375	~~½ A~~ 1/4A	≥6.000<12.00	D
≥0.375<0.625		≥12.00<24.00	E
≥0.625<0.875		≥24.00<48.00	F
≥0.875<1.250		≥48.00<96.00	G
≥1.250<1.750		≥96.00<192.0	H
≥1.750<2.500		≥192.0<384.0	I
≥2.500<3.500		≥384.0	J

13.2.2.2 *Flaky, Bubbly Sludge Deposits* – Since the occurrence of flaky, bubbly sludge deposits is thought to have a possible detrimental effect on long-term engine lubrication system performance, document the occurrence of this type of deposit in the Supplemental Operational Data section of the Final Test Report. Record the engine part(s) where this type of deposit was observed and the total percent of the surface area covered. Suggested wording is as follows: Approximately 6% of the (left or right) rocker arm cover was found to exhibit flaky, bubbly sludge deposits.

13.3 *Varnish Ratings:*

13.3.1 *Preparation of Parts* – Rate the following parts for varnish deposits: piston skirts (8, thrust side only) and left and right rocker arm covers (RAC). Perform the varnish ratings after the sludge ratings are completed. The rating locations and dimensions shall conform with the locations and dimensions detailed on the rating worksheets (see A11). Avoid disturbing adjacent sludge deposits when the parts are being prepared for varnish ratings. Heavy sludge can be removed from a varnish rating area with a 25 mm rubber spatula prior to wiping. Wipe all parts firmly with wiping materials specified in CRC Manual No. 14. Firmly rub all wiping areas in the same direction until the surface is dry and free of sludge (until no more deposit is present on the wiping material after wiping).

13.3.2 *Average Varnish (Unweighted Average of three Parts)* – Use the procedure detailed as follows to determine the varnish rating of each part.

13.3.2.1 Rate any areas where varnish deposits have been altered during disassembly or sludge removal according to deposits on the surrounding non-altered areas. Do not rate altered areas as "clean."

13.3.2.2 Determine varnish ratings of all parts by comparison of the deposit on the rating location using the CRC Rust/Varnish/Lacquer Rating Scale for Non-rubbing Parts from CRC Manual No. 14.

13.4 *Clogging:*

13.4.1 *Oil Screen Clogging* – Determine the percentage of the total screen opening that is obstructed with sludge and debris. Transfor the oil screen results by taking the natural log (ln) of the oil screen rating plus 1 (ln(oil screen clogging + 1)). Report both transformed and original result on the appropriate forms(s).

13.4.1.1 Flexible, transparent rating aids can be made for different surface areas so that when compared to the test screen's surface, a more accurate determination of surface slogging is possible.

13.4.1.2 Insert Blowing Device Section in Information Letter. If there is any question whether the screen is covered with oil or sludge, blow lightly on the screen (see CRC Manual No. 12). Note an analysis of deposits identified as debris in the Supplemental Operational Data.

13.4.2 *PCV Valve Clogging* – Determine the percent clogging of the PCV valve according to the following procedure:

13.4.2.1 Measure the PCV valve flow rate at differential pressures of 25 and 60 kPa. Calculate the percent clogging in accordance with the following equation:

$$\text{PCV valve clogging, \%} = [(I - F) / I] \times 100$$

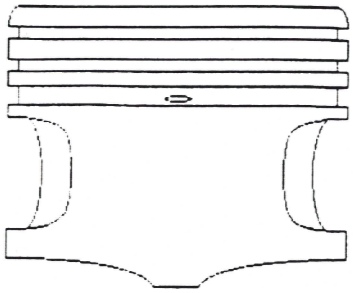
Where: I = initial flow rate,
and
F = final flow rate.

13.4.2.2 If there has been replacement of the PCV valves during the test, calculate and report the PCV valve clogging for all the PCV valves. Report the percent clogging of the last valve used on the Ratings and Measurements Page.

13.4.3 *Oil Ring Clogging* – Determine the percentage of slot clogging for each oil ring in accordance with the procedure detailed in CRC Manual No. 12. Calculate and record the average clogging for all eight rings.

13.5 *Sticking:*

13.5.1 *Compressions Rings* – Record the number of stuck compression rings. Definitions to classify the degree and type of sticking are detailed in Section 3. List both hot and cold stuck compression rings on the Test Results Summary page. Denote hot or cold stuck rings on the Supplemental Operational Data page and include the ring location (top or second) and the piston number. Remove "Tight Ring" and "Free Ring" from rating form section and definition Section 3.1.14.



OIL Ring Clogging

Piston Number		Piston Number	
1	%	5	%
2	%	6	%
3	%	7	%
4	%	8	%
Average	%		

Piston Number	Thrust
1	
2	
3	
4	
5	
6	
7	
8	
Total	
Average	

Piston Ring Sticking

Piston Number	Top Ring	Second Ring	Oil Ring
1			
2			
3			
4			
5			
6			
7			
8			
Total Hot Stuck			
Total Cold Stuck			

0 = Free Ring H = Hot Stuck Ring
~~T = Tight Ring~~ C = Cold Stuck Ring
Oil Rings Will Either Be Cold Stuck or Free

Varnish Rating = Avg.Thrust = _____

Piston 1

%Area	Rate	Merit

Piston 2

%Area	Rate	Merit

Piston 3

%Area	Rate	Merit

Remove
T - Tight Ring

Piston 4

%Area	Rate	Merit

Piston 5

%Area	Rate	Merit

Piston 6

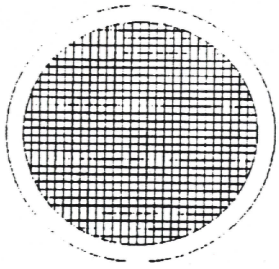
%Area	Rate	Merit

Piston 7

%Area	Rate	Merit

Piston 8

%Area	Rate	Merit



Oil Screen
% Plugging

Sludge %___

Debris %___

FIG. A11.10 Varnish Rating Of Piston Skirts Piston Ring Sticking and Oil Ring Clogging. Oil Screen % Plugging

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(412) 365-1000

Sequence VG Information Letter 01-3
Sequence No. 9
July 27, 2001

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

TO: Sequence VG Mailing List

SUBJECT: 1. Deletion of Benzene Measurement in Fuel Stored at the Laboratory
2. Definition of Consensus Rating
3. Dropping of Pentane Insolubles, TBN and Viscosity @ 100 ° C

1. At the May 23, 2001 meeting of the Sequence V Surveillance Panel, the panel agreed to drop the requirement to monitor Benzene levels in the fuel stored at the laboratories. Section 8.2.6 has been revised to remove this requirement.

2. A description of consensus rating, supplied by the Technical Guidance Committee, was also approved by the panel. Section 13.1.4 has been added to Test Method D6593 to describe consensus rating.

3. Finally, the panel agreed to no longer require that pentane insolubles, TBN and viscosity @ 100 ° C be measured from oil samples taken at various points during the test. Section 13.6.1 has been revised and Section 13.6.3 has been deleted to remove the requirements to do these analyses. References to Test Methods D893, D3606 and D4739 have been removed from Section 2.1 also.

The attached changes to Test Method D6593 are effective the date of this letter.

Peter Misangyi
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Attachment

c: ftp://www.tmc.astm.cmri.cmu.edu/documents/gas/sequencev/procedures_and_ils/vgil01-3-9

8.2.6 *Laboratory Storage Tank Fuel Analysis*—Analyze the contents of each fuel storage tank that contains fuel used for calibrated Sequence VG tests bi-monthly. Analyze the fuel in run tanks, those with a direct feed line to test engines every month. Laboratories should take composite samples using Table 1 in Practice D 4057, as a guideline. The fuel supplier shall have the capability to analyze the fuel samples using the test methods specified in Table 3 and this section. The fuel supplier shall provide an adequate supply of fuel sample containers with packaging and pre-addressed return labels to each Sequence VG laboratory. Upon receipt of all fuel samples required in Section 8.2.6 from the laboratories, the fuel supplier shall perform the following analyses, report the results to the submitting laboratory, and tabulate the results in a database.

Reid Vapor Pressure (Test Method D 323)	Washed Gums (Test Method D 381)
API Gravity (Test Method D 287 or D1298)	Unwashed Gums (Test Method D 381)
Distillation (Test Method D 86)	Lead (Test Method D 3237 or D 5059)

13.1.4 If multiple ratings are deemed necessary of a given part or parts, consensus rating may be used according to the following: The raters shall be from the same laboratory or from an outside rater if required (no category 1 rater available in the lab). No averaging of ratings is permitted. Report only one rating value and this value shall be agreed to by the original rater involved. Document any consensus rating in the comment section of the test report.

13.6.1 Perform the following analyses on the used oil samples taken every 24 h and on the final drain: Viscosity at 40°C (Test Method D 445), wear metal (Test Method D 5185), and fuel dilution (Test Method D 3525). Take samples at 0, 24, 48, 72, 96, 120, 144, 168, 192, and 216 h.

13.6.3 Deleted

2. Referenced Documents

2.1. *ASTM Standards:*

D86 Test Method for Distillation of Petroleum Products[4]
D287 Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)[4]
D323 Test Method for Vapor Pressure of Petroleum Products (Reid Method)[4]
D381 Test Method for Existent Gum in Fuels by Jet Evaporation[4]
D445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)[4]
D525 Test Method for Oxidation Stability of Gasoline (Induction Period Method)[4]
D873 Test Method for Oxidation Stability of Gasoline (Potential Residue Method)[4]
D1266 Test Method for Sulfur in Petroleum Products (Lamp Method)[4]
D1298 Practice for Density, Relative Density (Specific Gravity) or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method[4]
D2622 Test Method For Sulfur in Petroleum Products by X-Ray Spectrometry[5]
D2789 Test Method for Hydrocarbon Types in Low Olefinic Gasoline By Mass Spectrometry[5]
D3237 Test Method for Lead in Gasoline by Atomic Absorption Spectrometry[5]
D3525 Test Method for Gasoline Diluent in Used Gasoline Engine Oils by Gas Chromatography[5]
D4057 Practice of Manual Sampling of Petroleum and Petroleum Products[5]
D4175 Terminology Relating to Petroleum, Petroleum Products, and Lubricants[5]
D4294 Test Method for Sulfur in Petroleum Products by Non-dispersive X-Ray Fluorescence Spectroscopy[5]
D4485 Specification for Performance of Engine Oils[5]
D5059 Test method for Lead in Gasoline by X-Ray Spectroscopy[6]
D5185 Test Method for Determination of Additive Elements, Wear Metals and Contaminants in Used Lubricating Oils by Inductively Coupled Plasma Atomic Emissions Spectrometry[6]
D6304 Test Method for Determination of Water in Petroleum Products, Lubricating Oils and Additives by Coulometric Karl Fischer Titration[7]
E29 Practice for Using Significant Digits in Test Data to Determine Conformance With Specifications[8]
G40 Terminology Relating to Erosion and Wear[9]

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[4] Annual Book of ASTM Standards, Vol. 05.01.

[5] Annual Book of ASTM Standards, Vol. 05.02.

[6] Annual Book of ASTM Standards, Vol. 05.03

[7] Annual Book of ASTM Standards, Vol. 05.04

[8] Annual Book of ASTM Standards, Vol. 03.02.

[9] Annual Book of ASTM Standards, Vol. 14.02

ATTACHMENT VI

13. *Determination of Test Results:*

13.1 This section describes techniques used to evaluate the oils performance with respect to oxidation (viscosity increase), wear (camshaft and lifter), piston deposits, ring sticking, sludge deposits, oil pump screen plugging, and oil consumption.

13.2 Engine Disassembly-Disassemble the engine according to the following instructions, in preparation for inspection, rating, and measurement.

13.2.2 Remove the components from the top of the engine in order to gain access to the cylinder bores.

13.2.3 Remove the carbon deposits from the top portion of the cylinder walls, above the top compression ring travel, before removing the pistons from the engine.

13.2.4 Disassemble the remainder of the engine.

13.3 Preparation of Parts for Rating of Sticking, Deposits, and Plugging-Prepare the specified parts for rating according to the following instructions:

13.3.1 Check all piston rings for freedom of action in the grooves as the pistons are removed from the engine. See 13.5.1 through 13.5.1.~~3~~.2.

Piston Ring Sticking-Rate the piston rings for hot-stuck and cold-stuck rings as follows:

See Section 3 for the definition of hot-stuck and cold-stuck rings.

Determine which rings are hot-stuck or cold-stuck and record the piston number and ring identification (for example, piston No. 3, top ring) for such rings on Form 8, Summary of Oil Ring Land Deposit Rating, in standardized report form set (See Annex A6). Record the total number of hot-stuck rings on Form 4, Test Result Summary, in the standardized report form set (See Annex A6).

13.3.2 Determination by rater or mechanic at time disassembly. Remove all piston rings that are free. Leave stuck rings (includes pinched or pivot condition) in place. Definition in CRC Manual No. 18 - Pinched (Cold Stuck). Stuck rings will be rated as having 100% heavy carbon in the groove.

13.3.3 If the piston deposits cannot be rated immediately after the pistons are removed from the engine, store the pistons in a ~~vacuum~~ desiccator, or humidity controlled environment, for no longer than 72 h from end of test before rating. Do not wipe the pistons before storing them. See 13.7.

13.4 Piston deposit ratings - The pistons are rated for skirt varnish, oil ring land deposits, and overall piston deposits using the (Weighted Piston Deposit – ~~WPR~~ WPD).

13.4.1 Establish the proper environment for parts rating (see section xxx). Rate all parts against a white background.

~~13.4.2 Rate piston skirt deposits use CRC manual 14 rating scale and breakdown method under a lamp with two 15-watt cool-white fluorescent tubes which together produce 350 to 500 fc (3800 to 5400 lx) at the rating surface. These ratings will be used for IIIF deposit determinations.~~

~~13.4.3 Blank~~

~~13.4.3.1 Rate the oil pump screen for percent plugging (using CRC manual 12).~~

13.4.3.2 ~~In addition to the ratings generated in section 13.4.2,~~ Rate each piston top groove, 2nd groove, oil ring groove, 2nd land, 3rd land undercrown (Band-Aid area where the horizontal and vertical planes meet), and piston skirts, for deposits using CRC Manual No. 14 and No. 18 rating techniques and breakdown method. Carbon deposit ratings will consist of only two levels: Heavy = 0.00 merit value or Light = 0.75 merit value. These ratings should be performed in a rating booth, using a 20-segment piston rating cap, a piston rating stand, and a 22watt circular rating lamp.

13.4.4 If multiple ratings are deemed necessary of a given part or parts, consensus rating may be used according to the following:

13.4.4.1 The raters shall be from the laboratory in question, no outside raters can be used unless requested and directed through the Sequence IIIF Surveillance Panel.

13.4.4.2 No averaging of ratings is permitted.

13.4.4.3 Only one rating value is to be reported and is to be agreed to by the raters involved.

~~13.6 Intentionally left blank~~

13.7 Piston Skirt Deposits Rating-Rate the piston skirts for deposits using CRC manual 14 rating scale and breakdown method to a tenth of a number. Average the results and report them to the nearest hundredth of a number. Proceed according to the following instructions:

~~13.7.1 Rate the piston skirt deposits immediately upon removal of the pistons from the engine, or within 2-hours after removal of pistons stored in a desiccator. See 13.3.3.~~

13.7.3 Gently wipe off any excess oil from the piston skirts with a soft cloth.

13.7.4 Do not apply any chemicals or build-up oil to the skirts prior to rating them for deposits.

13.7.7 Average each individual piston (thrust side and anti-thrust side) for inclusion in Weighted Deposit Rating (~~WDR~~ WPD).

~~13.7.9 Record ratings on Form 9, Summary of Piston Deposits, in standardized report form set (See Annex A6).~~

~~13.7.10 Calculate the average thrust and anti-thrust values and record on Form 9, Summary of Piston Deposits, and on Form 4, Test Results Summary, in standardized report form set (See Annex A6). Calculate the average of the values of the twelve skirts, and record it as the official piston skirt varnish average on Form 9, Summary of Piston Deposits, and on Form 4, Test Results Summary, in standardized report form set (See Annex A6). Report average results to two places after the decimal point (for example, 8.65).~~

13.7.11 Report any unusual piston skirt deposits observed in the comments section of ~~Form 9~~, Summary of Piston Deposits, in standardized report form set (See Annex A6)

~~13.7.12 Upon completion of the rating and photographing of the pistons, apply build-up oil to the pistons to help preserve their condition during storage.~~

~~13.8 Oil Ring Land Deposits Rating-Rate the piston oil ring land (the face of the land above the oil ring) deposits to the nearest hundredth of a number. Use CRC manual 14 and breakdown method. Refer to Practice E 29 for any needed rounding; use the rounding-off method. Proceed according to the following instructions:~~

~~13.8.1 Rate the piston oil ring land deposits immediately upon removal of the pistons from the engine, or within 2-hours after removal of pistons stored in a desiccator. See 13.3.3.~~

~~13.8.3 Gently wipe off any excess oil from the piston oil ring lands with a soft cloth.~~

~~13.8.4 Do not apply any chemicals or build-up oil to the oil ring lands.~~

13.8.5 Use the rating procedures contained in CRC Manual 14 (non-rubbed scale).

13.8.6 Rate only the deposits present. Though chipped areas might sometimes appear, rate what appears and do not interpolate deposits.

~~13.8.8 Record the rating results on Form 8, Summary of Oil Ring Land Deposit Rating, in standardized report form set (See Annex A6)~~

13.8.9 Calculate the average of the six ratings; record this as the official ring land deposit average on Form 8, Summary of Oil Ring Land Deposit Rating, and on Form 4, Test Results Summary, in standardized report form set (See Annex A6).

13.9 Weighted Piston Deposit Rating (WPD) - This weighted piston rating is comprised of skirt varnish ~~(section 13.7), oil ring land deposit (section 13.8)~~, top groove, 2nd groove, oil ring groove, undercrown, 2nd land, and 3rd land.

13.9.1 Prepare pistons for rating - Gently wipe excess oil from the grooves and lands using a clean and dry soft cloth.

13.9.2 Rate each piston top groove, 2nd groove, oil ring groove, 2nd land, and undercrown (Band-Aid area) using CRC manual 14 rating techniques and breakdown method. Carbon deposit ratings will consist of only two levels: Heavy = 0.00 merit value or Light = 0.75 merit value. These ratings should be performed in a rating booth, using a 20-segment piston rating cap, a piston rating stand, and a 22watt circular rating lamp.

13.9.3 The Weighted Deposit Rating (~~WDR~~ WPD) for each individual piston is calculated using the following factors:

Piston Undercrown	10%
2nd Land	15%
3rd Land (ORLD)	30%
Piston Skirts (avg)	10%
Top Groove	5%
2nd Groove	10%
Oil Ring Groove	20%

13.9.4 The Weighted Deposit Rating (~~WDR~~ WPD) for the test is calculated by a simple average of the six individual piston WDR ratings. ~~Report this value Form 9, Summary of Piston Deposits, in standardized report form set (See Annex A6).~~

~~13.10 Oil Ring Plugging Observations-Rate the specified parts for plugging to the nearest whole percentage number. Refer to Practice E 29 for any needed rounding; use the rounding-off method. Proceed according to the following instructions:~~

~~13.10.1 Rate the oil rings for percent plugging of the rail separators. Record the results on Fig. A6.8.~~

~~13.10.2 Calculate the average percent plugging. Record the answer on Form 8, Summary of Oil Ring Land Deposit Rating, in standardized report form set (See Annex A6).~~