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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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January 31, 2006

Reply to: Richard Grundza
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Unapproved Minutes of the January 24 and 25, 2006 Sequence IVA Metrology Workshop Held in San Antonio, Texas

The workshop was opened with comments from the Sequence IVA Surveillance Panel Chair, Bill Buscher. A list of attendees is included as attachment 1. The agenda (included as attachment 2) was reviewed. The group reviewed the results of the round robin conducted in 2005. Two concerns were identified with the round robin results. The first concern was the overall variability of results. The second concern was the large differences between labs on individual lobes. Review of the lobe data indicated that perhaps labs were identifying before top dead center (BTDC) and after top dead center (ATDC) differently. The measurement technicians all verified that they are installing the cams in the measurement device in the same manner. It was suggested that perhaps transposition errors occurred or some other explanation may exist. Rich Grundza was tasked with reviewing the traces to see if the trace data matched.

Measurement technicians from Southwest Research, Intertek, Lubrizol and Ashland all reviewed alignment of the stylus, and PDI machine set up. Southwest Research metrology technicians demonstrated their technique and the remaining technicians measured one lobe from the round robin cam and one lobe from a low wear cam. The group met and discussed the day's activities, after which, the group adjourned for the day.

On the morning of the 25th, the group reviewed the previous day's measurements and it was agreed to conduct another set of measurements using a common method for leveling when a worn edge is encountered. Repeat measurements were conducted and reviewed. Several procedure changes were recommended and Bill Buscher will forward these to the surveillance panel for inclusion in the IVA Test Method, D6891. A copy of these changes is included as Attachment 3. Discussions on the topic of worn edges were undertaken and two of the four labs participating do not encounter this phenomenon. Dan Worcester of Intertek informed the group that his lab encounters edge wear on a very infrequent basis. He has taken time to ensure that the followers are centered on the lobe. Several participants noted that the retaining clips tend to lose some of there tension. Dan informed the group that these clips are available from Nissan Dealers and would forward the part numbers (see Attachment 4). The measurement sheets are included as Attachment 5. A review and critique of the workshop was conducted and all participants felt it was a valuable and worthwhile exercise. It was agreed to conduct these workshops every other year. The workshop was adjourned at 1 PM.

Attachment 1
Page 1 of 2
Reference

SIGN-IN SHEET
ASTM SEQUENCE IVA METROLOGY WORKSHOP

January 24-25, 2006

NAME	COMPANY-ADDRESS-PHONE-FAX-EMAIL	SIGNATURE
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JERRY BRYS	LUBRIZOL Phone No.: 440 347-2631 Fax No.: Email:	[illegible]
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ROBERT RAMIREZ	INTERTEK A. RES. Phone No.: 210-647-9438 Fax No.: Email: ROBERT.RAMIREZ@INTERTEK.COM	[illegible]
Charlie McMillan	Intertek Auto. Research Phone No.: 210-647-9438 Fax No.: Email: CHARLIE.MCMILLAN@INTERNET.COM	[illegible]
DAN WORCESTER	INTERTEK Phone No.: 210.410.9436 Fax No.: Email:	[illegible]
Rich Grundza	ASTM TMC Phone No.: 412-365-1031 Fax No.: Email: reg@astmtmc.cmu.edu	[illegible]
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Attachment 1
Page 1 of 2
Reference

SIGN-IN SHEET
ASTM SEQUENCE IVA METROLOGY WORKSHOP
January ~~24-25~~, 2006

NAME	COMPANY-ADDRESS-PHONE-FAX-EMAIL	SIGNATURE
Larry Garcia	SWRI Phone No.: 210-522-3858 Fax No.: 210-522-4933 Email: Larry.Garcia@SWRI.ORG	Larry Garcia
Bill Buscher	SwRI Phone No.: Fax No.: Email:	Bill Buscher
	Phone No.: Fax No.: Email:	
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	Phone No.: Fax No.: Email:	
	Phone No.: Fax No.: Email:	
	Phone No.: Fax No.: Email:	

Attachment 2
Page 1 of 2
Reference

Sequence IVA Metrology Workshop

San Antonio, TX
SwRI, Building 209, Conference Room 103
SwRI, Building 75, Metrology Lab
January 24, 2006
9:00 a.m. - 5:00 p.m.

AGENDA

1. Introductions.
2. Attendance sign-in sheet distribution.
3. Action recorder.
4. Overview of 2005 camshaft wear measurement round-robin.
5. Comparison of PDI hardware and software versions among labs.
6. Review, demonstrate and discuss PDI set-up, maintenance and trouble-shooting.
7. Lunch.
8. Discuss use of the TEI fixture and degree wheel and determination of BTC and ATC.
9. Review, demonstrate and discuss Sequence IVA camshaft wear measurements procedures and techniques (including anomalies such as missing non-worn edges, scratches, unusual wear patterns for extremely low wear, etc.).
10. Hands-on wear measuring for all metrology technicians.
11. Wrap-up discussion.
12. Adjourn.

Attachment 2
Page 2 of 2
Reference

Sequence IVA Metrology Workshop

San Antonio, TX
SwRI, Building 209, Conference Room 103
SwRI, Building 75, Metrology Lab
January 25, 2006
9:00 a.m. - 1:00 p.m.

AGENDA

13. Review previous day's accomplishments.
14. Review, demonstrate and discuss Sequence IVA camshaft wear measurements procedures and techniques (including anomalies such as missing non-worn edges, scratches, unusual wear patterns for extremely low wear, etc.).
15. Hands-on wear measuring for all metrology technicians.
16. Review and compare the technicians' wear measurements from metrology workshop.
17. Recommend procedural changes to the Surveillance Panel.
18. Plan future activity (2005 round-robin).
19. Lunch.
20. Wrap-up discussion.
21. Adjourn.

Attachment 3
Page 1 of 1
Reference

2006 Sequence IVA Metrology Workshop's Recommended Procedural Changes
January 25, 2006

1) Correct the wording of section 11.5.3.5 of the ASTM D6891 Sequence IVA Test Method as indicated below:

11.5.3.5 If two unworn edges are ~~*missing*~~ present, level the trace by the two-point line method (electronic leveling).

2) Modify the wording of section 11.5.3.11 of the ASTM D6891 Sequence IVA Test Method to read as indicated below:

11.5.3.11 When leveling by the no form method, mechanically level the camshaft on the ATC side of the cam lobe for the ATC traces and the BTC side of the cam lobe for the BTC traces. Run the ATC and BTC leveling traces at a point closest to TDC where two unworn edges are present, or where at least 30% of the lobe exhibits no wear. Use the leveling trace closest to TDC for the TDC trace.

3) Correct the wording of section 12.1 of the ASTM D6891 Sequence IVA Test Method as indicated below:

12.1 …The ACW value is severity adjusted as ~~*show*~~ shown in TMC 94-200…

Attachment 4
Page 1 of 1
Reference

Rich Grundza

From: Dan Worcester CBW-San Antonio [dan.worcester@intertek.com]
Sent: Wednesday, January 25, 2006 4:53 PM
To: Bill Buscher III (E-mail); Dan Worcester; Jerry Brys (E-mail); Tim Caudill (E-mail)
Subject: PARTS IS PARTS

One action for the Workshop was for me to supply the part numbers for the springs that hold the rocker arms in place and can be adjusted to reduce edge wear. Here they are:

13256-40F10	2
13256-40F11	1
13256-40F12	1
13256-40F13	1
13256-40F14	2

One set runs about $20.

While at it, here are the part numbers that will work for injector seals and that cute little clip to hold the wire plug in place:

16618-78A00	O-RING
16636-V5000	O-RING
84111-U7602	SPRING CLIP
14035-40F10	INTAKE GASKET
16600-86G10	INJECTOR

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Intertek **Automotive Research**

2006 Metrology Workshop
Sequence IVA Valve Train Wear Test
Camshaft Lobe Wear

2005 ROUND ROBIN CAM: Lobe # 11

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	Two-Point Line Leveling Method.	4.16	4.64	5.35	5.08	5.07	3.79	4.36	32.45
B	Two-Point Line Leveling Method.	5.08	4.84	5.45	5.37	4.28	4.11	4.61	33.74
C	Two-Point Line Leveling Method.	4.01	4.41	4.21	4.03	4.01	3.24	3.43	27.34
D	Two-Point Line Leveling Method.	4.20	4.81	4.98	4.53	4.33	3.89	4.35	31.09
Average		**4.36**	**4.68**	**5.00**	**4.75**	**4.42**	**3.76**	**4.19**	**31.16**
Standard Deviation		**0.485**	**0.197**	**0.563**	**0.594**	**0.454**	**0.370**	**0.519**	**2.764**

SwRI REFERENCE TEST CAM: Lobe # 8

Laboratory	Comment	14° BTC Wear, μm	10° BTC Wear, μm	4° BTC Wear, μm	0° (Nose) Wear, μm	4° ATC Wear, μm	10° ATC Wear, μm	14° ATC Wear, μm	Lobe Wear, μm
A	No Form Filter Leveling Method.	4.38	15.13	23.39	22.43	23.37	15.91	11.51	116.1
B	No Form Filter Leveling Method.	2.97	15.57	23.83	23.24	22.61	15.14	10.07	113.4
C	No Form Filter Leveling Method.	3.08	15.11	24.47	23.06	22.24	14.85	9.88	112.69
D	No Form Filter Leveling Method.	3.07	15.63	23.20	22.46	22.46	15.44	10.06	112.82
Average		**3.38**	**15.36**	**23.72**	**22.80**	**22.67**	**15.34**	**10.38**	**113.64**
Standard Deviation		**0.672**	**0.278**	**0.564**	**0.414**	**0.491**	**0.453**	**0.758**	**1.717**

Page Reference
Attachment 3