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INTERNATIONAL
Standards Worldwide

Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

February 3, 2007

Reply to:
Chris Schenkenberger
The Lubrizol Corporation
29400 Lakeland Blvd.
Wickliffe, OH 44092
(440) 347-2388
(440) 347-2878 (FAX)
Chris.Schenkenberger@lubrizol.com

ASTM D02.B0.03 L-60-1 Surveillance Panel
Members and Guests:

Attached for your review and comment are the unconfirmed minutes of the November 7, 2007 L-60-1 Surveillance Panel meetings held at the PRI Headquarters, Warrendale, PA. Please direct any corrections or comments to my attention.

Sincerely,

Chris Schenkenberger
Chairman
L-60-1 Surveillance Panel

Attachments

Report of Meeting
L-60-1 Surveillance Panel
PRI Headquarters - Apollo Room, Warrendale, Pa.
November 7, 2007

Sign-in/Review of Membership: The meeting was called to order at 9:43 am. The sign-in sheet is ***attachment # 1***. A review of membership was not performed.

Meeting Agenda – The meeting agenda is included as ***attachment # 2***.

Approval of Minutes
In order to give the panel membership time for review, a motion to approve the minutes was delayed until the next meeting.

Summary of Meeting Discussions
Clarification of test downtime definition in D5704
An open action item from the last SP meeting was to revise the L-60-1 test downtime definition. Based on panel member input, Mr. Lind had provided the following proposal for section 10.7 of the D5704 which covers the definition for downtime:

10.7 Run the test at the conditions specified for 50.0 ± 0.1 hour. Terminate the test if more than 5 minutes of total downtime occurs during the test period. Record any downtime on Form 4, Annex A5.
10.7.1 A downtime occurrence is defined as the time at which the test is shut down until the time the test returns to test operating specifications.
10.7.2 Do not calculate percent deviations during downtime occurrences.

Motion 1 ⇒ (Mr. Bartlett, Second ⇒ Mr. Rae) – Approve the proposal as submitted. The motion to approve was unanimous (7, 0, 0).

Alternator specified in D5704 Procedure
Prior to the meeting, a lab had expressed concern about the AC Delco alternator required by the test procedure being unavailable for purchase. GM has cross-referenced the part number of 1105360 to a new model number. The alternator provides a small load to the spur gears and is used to drive the small DC heater. The factory alternator is modified for use in the L-60-1 for allowing it to be controlled by laboratory equipment and controlling the heater output to 128 watts.

Prior to the meeting, the chairman had purchased one of the new alternators and brought both new and old models for the panel members to view physical differences. The amperage ratings for each model are the same and they are used on many different GM model automobiles (***see attachment # 3***). Afton reported they ran 1 test with the new model with no issues.

Mr. Bartlett checked with the service shop that performs the procedural modifications to the alternators for Lubrizol. They have enough inventory of original parts to keep laboratories running for many years. The contact information is as follows:

Finucane and Brennan, Inc
1630 East 361st Street
Eastlake, OH 44095
Phone: (440) 951-1342

The panel discussed the following short-term fix and long-term plans.

- Until a future replacement model can be thoroughly investigated, the short-term fix will be to keep the current alternator models in service by using the rebuild shops.
  - The TMC will be confirming alternator stamping numbers during lab visits to insure the correct ones are being used.
- The Long-term fix is to investigate a new alternator.
  - Questions include:

1. Are the efficiencies at the test operating speed similar?
2. How do we address the procedure requirement without running multiple tests? Mr. Koehler volunteered to investigate an in-house measurement of alternator efficiency through a bench test apparatus with a torque meter.

- **Action Item** (Chris Schenkenberger) - TMC requesting chair to go back and confirm with Mr. Huron and Mr. Akucewich if we know why the procedure wording was so specific for this alternator. Are there additional technical specs to be aware of?

Lab Gear Case Cover Measurements with Clear Cover

A prior action item for the test labs and TMC was to perform additional measurements on the gear case assembly. The gear case assembly dimensions are specified in the ASTM drawings but the panel wanted to see if there were any differences once the unit is built. The primary interest was to quantify the variability between test rigs of the large/small spur gears once installed. SwRI built a clear cover with holes for allowing a depth gauge to conduct measurements (***see attachment # 4***).

The chairman and TMC performed a complete review of the data which is included as ***attachment # 5.*** The following points were discussed.

- Mr. Lind reviewed the data to see if any of the dimensions looked significantly different from another stand and then compare to average carbon varnish severity. All measurements within test labs and between labs looked similar with no correlations able to be drawn.
- The chairman reiterated the same conclusions of the TMC and said this a good exercise to have done.
- Mr. Lind shared that he is starting to see a trend with Sludge. The TMC was asked by the chairman to review the control charts for all stands, lab, and industry for parameters at the next meeting.
- **Action item** - Chairman to go back and check the minutes to confirm compliant changes
- Mr. Lind commented that the panel first needs to address two things that would significantly improve the precision and repeatability.
    1. Based on recent workshops, rater variability appears to be increasing.
    2. The reference fluid targets for one of the reference fluids might be wrong based on a shift in TMC 148 and TMC148-1. Details on this have been documented in prior meeting minutes from 11/2/05 with an excerpt from these minutes being ***attachment # 6***. Mr. Lind went on to say that before making target updates, rater variability needs to be significantly reduced. A big hurdle is overcoming rater beliefs and practices that might be creating inconsistency.
- A short brainstorming discussion about whether there was any remaining stand differences not covered in the drawings that could contribute to severity. One difference could be inside of the oven box itself. The chairman was asked to revisit the insulation test matrix conducted a few years back. The chairman was also asked to revisit the prior panel decisions on drawing compliance which is included as ***attachment # 7***.

L-60-1 Hardware

Action Item: All labs look at the L-60-1 gear inventory and prepare to consider ordering new hardware in 2008.

The meeting was adjourned at 10:36 am (Cory Koglin/Dale Smith).

Respectfully submitted,

Chris Schenkenberger
L-60-1 Surveillance Panel Chairman

ASTM L-60-1 Surveillance Panel Membership/Mailing List

Meeting Date: November 7, 2007

Initials*	Name	Voting Status	Company Name & Address	Phone & Fax & E-Mail
	Anderson, Greg	Non-voting	Falex Corporation 1020 Airpark Drive Sugar Grove, Illinois 60554-9585	Phone: 630-556-3669 Fax: 630-556-3679 E-Mail:
DTB	Bartlett, Don	Non-voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2388 Fax: 440-347-2878 E-Mail: dtb@lubrizol.com
DRB	Bell, Don	Non-voting	Afton Chemical Corporation 500 Spring Street Richmond, Virginia 23219	Phone: 804-788-6332 Fax: 804-788-6342 E-Mail: Don.Bell@aftonchemical.com
	Boschert, Tom	Non-voting	Afton Chemical Corporation 2000 Town Center, Suite 1750 Southfield, MI 48075	Phone: 248-350-0640 Fax: 248-350-0025 E-Mail: tom_boschert@ethyl.com
	Bryson, Tom	Voting	Mack Trucks 13302 Pennsylvania Avenue Hagerstown, Maryland 21740	Phone: 301-790-5454 Fax: 301-790-6744 E-Mail: tom.bryson@macktrucks.com
	Buitrago, Juan	Voting	Chevron Oronite Co. 100 Chevron Way Richmond, California 94802-0627	Phone: 510-242-1161 Fax: 510-242-3392 E-Mail: jabu@chevrontexaco.com

* Initial to indicate attendance at subject meeting

Attachment 1
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Reference L-60-1

ASTM L-60-1 Surveillance Panel Membership/Mailing List

Meeting Date: November 7, 2007

Initials*	Name	Voting Status	Company Name & Address	Phone & Fax & E-Mail
	Chambers, Harold	Non-voting	Cube C290 81 17000 Rotunda Drive Dearborn, MI 48120	Phone: (313) 755-4246 Fax: E-Mail: hchamber@visteon.com
	Comfort, Allen	Non-voting	AMSTA-TR-D/210 (Allen Comfort) U S Army Tank, Automotive, and Armament Command Warren, Michigan 48397-5000	Phone: 586-574-4225 Fax: 586-574-4244 E-Mail: comforta@cc.tacom.army.mil
	De La Fuente, Hector	?	Oronite	
	Purnell, Keith	Non-voting	Performance Review Institute 161 Thornhill Road Warrendale, Pennsylvania 15086-7527	Phone: 724-772-1616 X8182 Fax: 724-772-1699 E-Mail: kpurnell@sae.org
	Duckstein, Ron	Non-voting	Parc Technical Services Inc. 100 William Pitt Way Pittsburgh, Pennsylvania 15238	Phone: 412-826-5115 Fax: 412-826-5443 E-Mail: rhd@usaor.net
	Eliot, Stephen W.	Non-Voting	Commercial Vehicle Lubricants ExxonMobil Lubricants & Specialties Leesburg, Virginia	Phone: 703-669-9916 Fax: 703-669-9917 E-Mail: stephen.w.eliot@exxonmobil.com
	Farber, Frank	Non-voting	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pensylvania 15206	Phone: 412-365-1030 Fax: 412-365-1047 E-Mail: fmf@astmtmc.cmu.edu

* Initial to indicate attendance at subject meeting

Attachment 1
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Reference

ASTM L-60-1 Surveillance Panel Membership/Mailing List

Meeting Date: November 7, 2007

Initials*	Name	Voting Status	Company Name & Address	Phone & Fax & E-Mail
JLG	Gropp, Jerry	Non-voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-1223 Fax: 440-347-1555 E-Mail: jlg@lubrizol.com
	Huron, John	Non-voting	Chevron Oronite 4502 Centerview Drive, Suite 210 San Antonio, Texas 78228	Phone: 210-731-5609 Fax: 210-731-5699 E-Mail: HURO@ChevronTexaco.com
	Kanga, Percy R.	Non-Voting	Commercial Vehicle, Marine & Gas Engine Lubricants ExxonMobil Research & Engineering 600 Billingsport Road Paulsboro, NJ. 08066	Phone: 856-224-2094 Fax: 856-224-3613 E-Mail: percy.r.kanga@exxonmobil.com
	Koehler, Brian	Voting	Southwest Research Institute 6220 Culebra Road Bldg. 61 San Antonio, TX 78238-5166	Phone: (210) 522-3588 Fax: (210) 680 1777 E-Mail: bkoehler@swri.org
C.K.	Koglin, Cory	~~Non-Voting~~ Voting	Afton Chemical Corporation 500 Spring Street Richmond, Virginia 23219	Phone: 804-788-5305 Fax: 804-788-6358 E-Mail: cory.koglin@aftonchemical.com
	Layton, Kevin	~~Voting~~ Non voting	Afton Chemical Corporation 500 Spring Street Richmond, Virginia 23219	Phone: 804-788-5363 Fax: 804-788-6358 E-Mail: kevin.layton@aftonchemical.com
DML	Lind, Don	Voting	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pensylvania 15206	Phone: 412-365-1034 Fax: 412-365-1047 E-Mail: dml@astmtmc.cmu.edu

* Initial to indicate attendance at subject meeting

Attachment 1
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ASTM L-60-1 Surveillance Panel Membership/Mailing List

Meeting Date: November 7, 2007

Initials*	Name	Voting Status	Company Name & Address	Phone & Fax & E-Mail
	Marougy, Thelma	Voting	Eaton Corporation 26201 Northwestern Highway Southfield, Michigan 48037	Phone: 248-354-6985 Fax: 248-354-2739 E-Mail: thelmaemarougy@eaton.com
	Marty, Steve	Non-voting	Southwest Research Institute 6220 Culebra Road San Antonio, Texas 78238	Phone: 210-522-5929 Fax: 210-680-1777 E-Mail: smarty@swri.edu
	McGlone, Bruce	Voting	ArvinMeritor 2135 West Maple Troy, Michigan 48084	Phone: 248-435-9929 Fax: 248-435-1411 E-Mail: mcglonbf@meritorauto.com
SR	Rea, Salvatore	Voting	Infineum USA L.P. 1900 East Linden Avenue PO Box 536 Linden NJ, 07036	Phone: 908-474-6602 Fax: 908-474-3597 E-Mail: Salvatore.Rea@Infineum.com
	Rettmann, Kevin	Non-voting	PerkinElmer Fluid Sciences 5404 Bandera Road San Antonio, Texas 78238	Phone: 210-706-1546 Fax: 210-523-4614 E-Mail: Kevin.Rettmann@perkinelmer.com
CS	Schenkenberger, Chris	Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2927 Fax: 440-347-2878 E-Mail: csc@lubrizol.com
	Shah, Rajesh	Non-voting	Koehler Instrument Company 1595 Sycamore Avenue Bohemia, New York 11716	Phone: 516-589-3800 Fax: 516-589-3815 E-Mail:

* Initial to indicate attendance at subject meeting

Attachment 1
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ASTM L-60-1 Surveillance Panel Membership/Mailing List

Meeting Date: November 7, 2007

SLI	Higuchi, Sam	NV	Same as Cory Koglin	Phone: 804-788-5375 Fax: 804-788-6358 Email: Samuel.Higuchi@Afton Chemical.com

Initials*	Name	Voting Status	Company Name & Address	Phone & Fax & E-Mail
	Smith, Dale	Non-voting	Parc Technical Services Inc. 100 William Pitt Way Pittsburgh, Pennsylvania 15238	Phone: 412-423-1120 X 403 Fax: 412-826-5444 E-Mail: Dale.Smith@intertek.com
	Sullivan, Bill	Voting	WTSullivan, Inc. 5 Scheiber Drive Brick, New Jersey 08723	Phone: 908-930-3512 Fax: 267-220-7750 E-Mail: wtsullivan@comcast.net
	Vettel, Paula	Voting	D. A. Stuart Company 4580 Weaver Parkway Warrenville, Illinois 60555	Phone: 630-393-8859 Fax: 630-393-8577 E-Mail: pvettel@dastuart.net
	Villahermosa, Luis	Non-voting	AMSTA-TR-D/210 (Luis Villahermosa) U S Army Tank, Automotive, and Armament Command Warren, Michigan 48397-5000	Phone: 586-574-4207 Fax: 586-574-4123 E-Mail: villahel@cc.tacom.army.mil
	Whitton, Claire	Non-voting	Ethyl Research Center 500 Spring Street P. O. Box 2158 Richmond, Virginia 23218-2158	Phone: 804-788-5052 Fax: 804-788-6243 E-Mail: Claire_Whitton@ethyl.com
	Zakarian, Jack	Non-voting	Chevron Products Company 100 Chevron Way Richmond, California 94802-0627	Phone: 510-242-3595 Fax: 510-242-3758 E-Mail: jaza@chevron.com

Attachment 1
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Reference L-60-1

Agusti, Rachel | Non | AMSRD-TAR-D/210
US Army RDECOM
6501 E. 11 Mile Rd
Warren, MI 48397 | p: 586.574.4222
f: 586.574.4244
rachel.agusti@us.army.mil

* Initial to indicate attendance at subject meeting Haire, Mike, Non | Chevron
100 Chevron Way Rm 71-7302 | Phone 510 242-2740
Fax 510 242-3750

L-60-1 Surveillance Panel

November 7, 2007
9:00 a.m. – 10:30 a.m.
PRI Apollo Room – Warrendale, PA

Agenda

I. Call to order

II. Review Agenda

III. Approval of meeting minutes

IV. Clarification of downtime definition

V. Alternator specified in D5704 Procedure

VI. Lab gear case measurements

VII. Adjournment

Attachment	2
Page	1 of 1
Reference	L-60-1

References to the alternator within the D5704:

6.1.3 *Heater Elements*—Since this test method is extremely sensitive to temperature, the following specified heater elements (two total) are mandatory:

6.1.3.1 *Primary Heater Element*, one only allowed.[10,11]

6.1.3.2 *Alternator Load Heater*, one only allowed.[11,12]

[11] If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will be given careful consideration at a meeting of the responsible technical committee,[1] which you may attend.

.....

[13] The sole source of supply of the Delco-Remy GM Part No. 1105360, Model No. 10-SI Series Type 100, 63 A; 12 V negative ground known to the committee at this time is S. E. Chevrolet Co., 2810 Bishop Rd; Willoughby Hills, OH 44092 or any other GM dealer.

6.1.7 *Alternator*—The alternator for loading is specified.[11,13] No substitutions are allowed. Wiring for the alternator shall be modified as shown in the engineering drawings. Modify the alternator load circuit as shown in Annex A7.

10.5 Adjust the field supply of the alternator for a net output of 128 ± 5 W.

10.6 The large gear shall maintain a speed of 1750 ± 50 r/min throughout the heat-up and test time.

10.7 Run the test at the conditions specified and without interruption for 50.0 ± 0.1 h. Terminate the test if it is interrupted for more than 5 min total during the test period. Record any downtime on Form 4, Annex A5.

14.5 Calculate percent out for each parameter in Table 1 using the following equation and record results in Form 6, Annex A5.

TABLE 1 Test Validity Parameters

	Parameter			
	Oil Temperature	Air Flow	Alternator Load	Large Gear Speed
Specification	325°F	22.08 mg/min	128 W	1750 r/min
Range	2°F	4.02 mg/min	10 W	100 r/min
% Out of specification (warm up)	NA	10 %	10 %	5 %
% Out of specification (test)	5 %	5 %	5 %	2 %

new part # 1979865

Cost = $63.90

66 amp alternator

69-82 Corvette

82-89 Malibu

82-86 Citation

82-84 Caprice

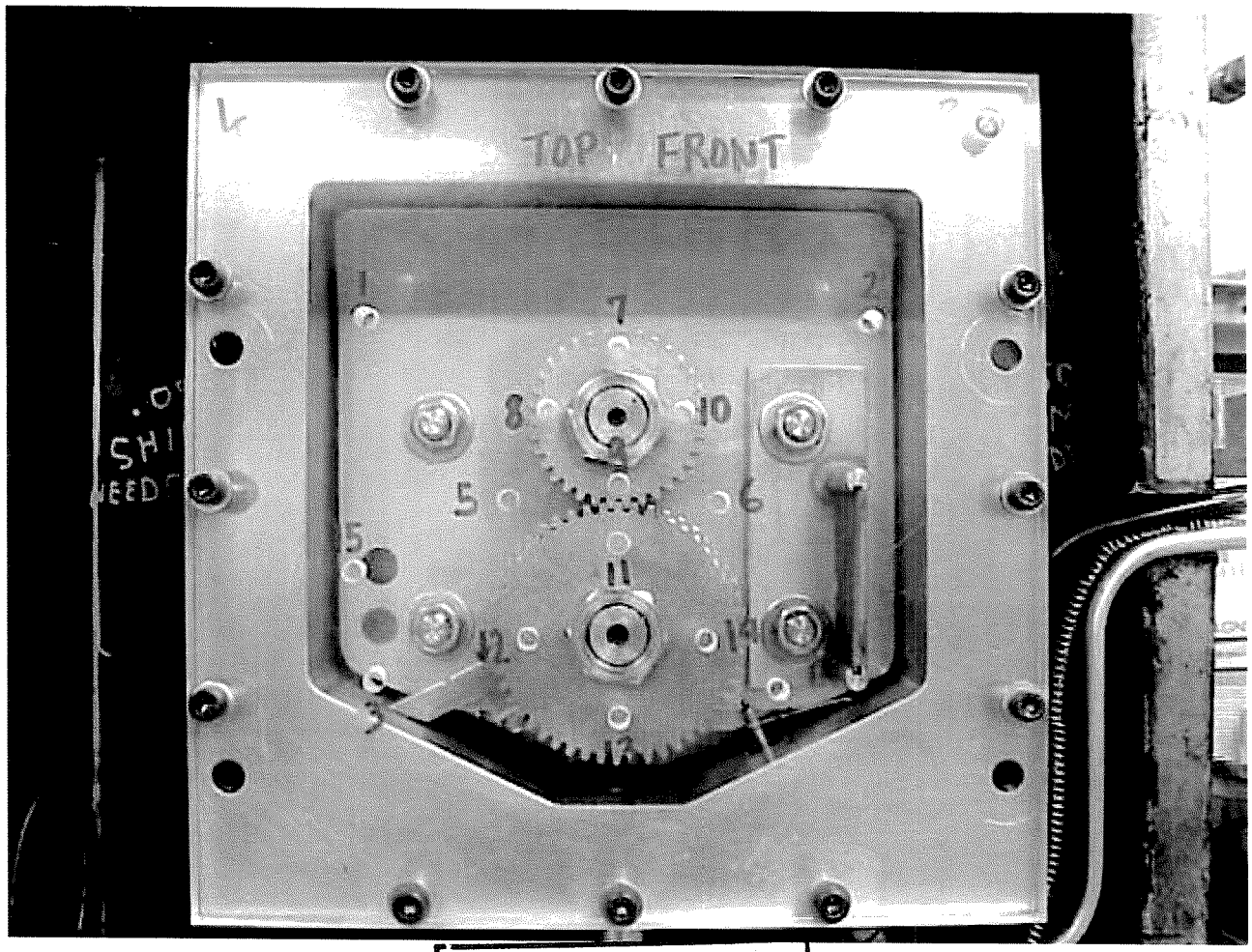
82-84 Chevy Van

83 Chevette

82-85 Citation

Attachment 3
Page 1 of 1
Reference L-60-1

Clear Gear Cover Template



Attachment	4
Page	1 of 1
Reference	L-60-1

Summary, All Laboratories

	SwRI L-60-1 Stand 12A	SwRI L-60-1 Stand 15A	LZ L-60-1 Stand 181A	LZ L-60-1 Stand 182A	LZ L-60-1 Stand 183A (Koehler	Afton L-60-1 Stand 4A	Afton L-60-1 Stand 5A	Afton L-60-1 Stand 6A	Minimum	Maximum	Delta
1	1.744	1.748	1.707	1.714	1.747	1.769	1.763	1.765	1.707	1.769	**0.062**
2	1.747	1.754	1.732	1.732	1.748	1.779	1.763	1.785	1.732	1.785	**0.053**
3	1.722	1.752	1.707	1.711	1.741	1.779	1.752	1.771	1.707	1.779	**0.072**
4	1.625	1.628	1.581	1.592	1.616	1.650	1.611	1.656	1.581	1.656	**0.075**
5	1.751	1.749	1.706	1.729	1.743	1.767	1.748	1.763	1.706	1.767	**0.061**
6	1.755	1.750	1.720	1.754	1.747	1.768	1.745	1.770	1.720	1.770	**0.050**
7	0.750	0.753	0.760	0.766	0.691	0.736	0.712	0.733	0.691	0.766	**0.075**
8	0.752	0.758	0.767	0.760	0.680	0.733	0.714	0.733	0.680	0.767	**0.086**
9	0.749	0.753	0.749	0.765	0.688	0.735	0.726	0.733	0.688	0.765	**0.077**
10	0.747	0.748	0.744	0.773	0.700	0.737	0.723	0.734	0.700	0.773	**0.073**
11	0.750	0.731	0.750	0.766	0.703	0.732	0.735	0.736	0.703	0.766	**0.063**
12	0.752	0.739	0.758	0.749	0.691	0.724	0.741	0.736	0.691	0.758	**0.067**
13	0.743	0.729	0.737	0.754	0.699	0.722	0.751	0.735	0.699	0.754	**0.055**
14	0.743	0.722	0.730	0.771	0.711	0.730	0.752	0.738	0.711	0.771	**0.060**
15	2.400	2.396	2.401	2.399	2.382	2.408	2.400	2.420	2.382	2.420	**0.038**

Attachment 5
Page 1 of 54
Reference L-60-1

Lubrizol

Lubrizol L-60-1 Stand **181A**				
Location No.	Measurement No. 1	Measurement No. 2	Measurement No. 3	Average
1	1.707	1.707	1.706	**1.707**
2	1.732	1.732	1.732	**1.732**
3	1.708	1.707	1.707	**1.707**
4	1.581	1.581	1.581	**1.581**
5	1.706	1.705	1.706	**1.706**
6	1.719	1.720	1.721	**1.720**
7	0.759	0.760	0.760	**0.760**
8	0.766	0.767	0.767	**0.767**
9	0.748	0.749	0.749	**0.749**
10	0.744	0.744	0.744	**0.744**
11	0.750	0.750	0.750	**0.750**
12	0.758	0.758	0.758	**0.758**
13	0.737	0.737	0.737	**0.737**
14	0.730	0.730	0.730	**0.730**
15	2.401	2.401	2.401	**2.401**

Lubrizol L-60-1 Stand **182A**				
Location No.	Measurement No. 1	Measurement No. 2	Measurement No. 3	Average
1	1.714	1.714	1.714	**1.714**
2	1.732	1.732	1.733	**1.732**
3	1.711	1.711	1.711	**1.711**
4	1.592	1.593	1.592	**1.592**
5	1.729	1.730	1.729	**1.729**
6	1.754	1.754	1.753	**1.754**
7	0.767	0.766	0.766	**0.766**
8	0.760	0.760	0.760	**0.760**
9	0.765	0.766	0.765	**0.765**
10	0.773	0.773	0.773	**0.773**
11	0.766	0.766	0.766	**0.766**
12	0.748	0.750	0.748	**0.749**
13	0.752	0.755	0.755	**0.754**
14	0.771	0.771	0.771	**0.771**
15	2.399	2.399	2.399	**2.399**

Lubrizol L-60-1 Stand **183A, uncorrected**				
Location No.	Measurement No. 1	Measurement No. 2	Measurement No. 3	Average
1	1.820	1.820	1.820	**1.820**
2	1.821	1.821	1.821	**1.821**
3	1.813	1.814	1.814	**1.814**
4	1.689	1.689	1.689	**1.689**
5	1.816	1.816	1.816	**1.816**
6	1.820	1.820	1.821	**1.820**
7	0.764	0.764	0.765	**0.764**
8	0.753	0.753	0.754	**0.753**
9	0.761	0.761	0.761	**0.761**
10	0.773	0.772	0.773	**0.773**
11	0.776	0.776	0.776	**0.776**
12	0.764	0.764	0.763	**0.764**
13	0.772	0.771	0.772	**0.772**
14	0.784	0.784	0.783	**0.784**
15	2.455	2.455	2.455	**2.455**

Lubrizol L-60-1 Stand **183A, CORRECTED**				
Location No.	Measurement No. 1	Measurement No. 2	Measurement No. 3	Average
1	1.747	1.747	1.747	**1.747**
2	1.748	1.748	1.748	**1.748**
3	1.740	1.741	1.741	**1.741**
4	1.616	1.616	1.616	**1.616**
5	1.743	1.743	1.743	**1.743**
6	1.747	1.747	1.748	**1.747**
7	0.691	0.691	0.692	**0.691**
8	0.680	0.680	0.681	**0.680**
9	0.688	0.688	0.688	**0.688**
10	0.700	0.699	0.700	**0.700**
11	0.703	0.703	0.703	**0.703**
12	0.691	0.691	0.690	**0.691**
13	0.699	0.698	0.699	**0.699**
14	0.711	0.711	0.710	**0.711**
15	2.382	2.382	2.382	**2.382**

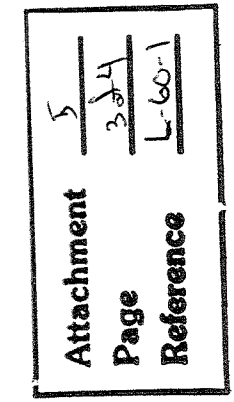
Avg. shim thickness (in): **0.073**

Attachment 5
Page 2 of 4
Reference L-60-1

SwRI

SwRI L-60-1 Stand **12A**				
Location No.	Measurement No. 1	Measurement No. 2	Measurement No. 3	Average
1	1.744	1.743	1.744	**1.744**
2	1.747	1.747	1.747	**1.747**
3	1.722	1.722	1.722	**1.722**
4	1.625	1.624	1.625	**1.625**
5	1.750	1.751	1.751	**1.751**
6	1.755	1.755	1.755	**1.755**
7	0.750	0.750	0.750	**0.750**
8	0.752	0.752	0.752	**0.752**
9	0.749	0.749	0.749	**0.749**
10	0.747	0.747	0.747	**0.747**
11	0.750	0.750	0.751	**0.750**
12	0.752	0.753	0.752	**0.752**
13	0.743	0.743	0.743	**0.743**
14	0.743	0.743	0.743	**0.743**
15	2.400	2.399	2.400	**2.400**

SwRI L-60-1 Stand **15A**				
Location No.	Measurement No. 1	Measurement No. 2	Measurement No. 3	Average
1	1.749	1.748	1.748	**1.748**
2	1.754	1.754	1.754	**1.754**
3	1.751	1.752	1.752	**1.752**
4	1.628	1.628	1.627	**1.628**
5	1.749	1.749	1.749	**1.749**
6	1.750	1.750	1.750	**1.750**
7	0.753	0.753	0.753	**0.753**
8	0.758	0.758	0.758	**0.758**
9	0.753	0.752	0.753	**0.753**
10	0.749	0.748	0.747	**0.748**
11	0.731	0.731	0.731	**0.731**
12	0.739	0.739	0.739	**0.739**
13	0.729	0.729	0.729	**0.729**
14	0.722	0.722	0.722	**0.722**
15	2.396	2.396	2.396	**2.396**



Afton

Afton L-60-1 Stand 4A, **uncorrected**				
Location No.	Measurement No. 1	Measurement No. 2	Measurement No. 3	Average
1	1.842	1.842	1.842	**1.842**
2	1.852	1.852	1.851	**1.852**
3	1.852	1.852	1.852	**1.852**
4	1.723	1.723	1.722	**1.723**
5	1.840	1.840	1.840	**1.840**
6	1.841	1.841	1.841	**1.841**
7	0.809	0.809	0.809	**0.809**
8	0.806	0.806	0.806	**0.806**
9	0.808	0.808	0.808	**0.808**
10	0.810	0.810	0.810	**0.810**
11	0.805	0.805	0.806	**0.805**
12	0.796	0.797	0.797	**0.797**
13	0.795	0.795	0.796	**0.795**
14	0.804	0.802	0.802	**0.803**
15	2.481	2.481	2.481	**2.481**

Afton L-60-1 Stand 4A, **CORRECTED**				
Location No.	Measurement No. 1	Measurement No. 2	Measurement No. 3	Average
1	1.769	1.769	1.769	**1.769**
2	1.779	1.779	1.778	**1.779**
3	1.779	1.779	1.779	**1.779**
4	1.650	1.650	1.649	**1.650**
5	1.767	1.767	1.767	**1.767**
6	1.768	1.768	1.768	**1.768**
7	0.736	0.736	0.736	**0.736**
8	0.733	0.733	0.733	**0.733**
9	0.735	0.735	0.735	**0.735**
10	0.737	0.737	0.737	**0.737**
11	0.732	0.732	0.733	**0.732**
12	0.723	0.724	0.724	**0.724**
13	0.722	0.722	0.723	**0.722**
14	0.731	0.729	0.729	**0.730**
15	2.408	2.408	2.408	**2.408**

Afton L-60-1 Stand 5A, **uncorrected**				
Location No.	Measurement No. 1	Measurement No. 2	Measurement No. 3	Average
1	1.836	1.836	1.835	**1.836**
2	1.837	1.836	1.836	**1.836**
3	1.825	1.825	1.825	**1.825**
4	1.684	1.684	1.684	**1.684**
5	1.820	1.821	1.821	**1.821**
6	1.817	1.818	1.818	**1.818**
7	0.785	0.785	0.786	**0.785**
8	0.787	0.787	0.786	**0.787**
9	0.800	0.799	0.798	**0.799**
10	0.796	0.796	0.796	**0.796**
11	0.805	0.810	0.810	**0.808**
12	0.814	0.814	0.813	**0.814**
13	0.824	0.824	0.825	**0.824**
14	0.824	0.825	0.825	**0.825**
15	x	x	x	**#DIV/0!**

Afton L-60-1 Stand 5A, **CORRECTED**				
Location No.	Measurement No. 1	Measurement No. 2	Measurement No. 3	Average
1	1.763	1.763	1.762	**1.763**
2	1.764	1.763	1.763	**1.763**
3	1.752	1.752	1.752	**1.752**
4	1.611	1.611	1.611	**1.611**
5	1.747	1.748	1.748	**1.748**
6	1.744	1.745	1.745	**1.745**
7	0.712	0.712	0.713	**0.712**
8	0.714	0.714	0.713	**0.714**
9	0.727	0.726	0.725	**0.726**
10	0.723	0.723	0.723	**0.723**
11	0.732	0.737	0.737	**0.735**
12	0.741	0.741	0.740	**0.741**
13	0.751	0.751	0.752	**0.751**
14	0.751	0.752	0.752	**0.752**
15	2.400	2.400	2.400	**2.400**

Afton L-60-1 Stand 6A, **uncorrected**				
Location No.	Measurement No. 1	Measurement No. 2	Measurement No. 3	Average
1	1.838	1.838	1.837	**1.838**
2	1.858	1.858	1.859	**1.858**
3	1.844	1.844	1.844	**1.844**
4	1.729	1.729	1.729	**1.729**
5	1.835	1.836	1.836	**1.836**
6	1.843	1.843	1.843	**1.843**
7	0.806	0.807	0.806	**0.806**
8	0.806	0.805	0.806	**0.806**
9	0.806	0.806	0.805	**0.806**
10	0.807	0.808	0.807	**0.807**
11	0.809	0.809	0.809	**0.809**
12	0.809	0.809	0.808	**0.809**
13	0.808	0.808	0.807	**0.808**
14	0.811	0.811	0.811	**0.811**
15	x	x	x	**#DIV/0!**

Afton L-60-1 Stand 6A, **CORRECTED**				
Location No.	Measurement No. 1	Measurement No. 2	Measurement No. 3	Average
1	1.765	1.765	1.764	**1.765**
2	1.785	1.785	1.786	**1.785**
3	1.771	1.771	1.771	**1.771**
4	1.656	1.656	1.656	**1.656**
5	1.762	1.763	1.763	**1.763**
6	1.770	1.770	1.770	**1.770**
7	0.733	0.734	0.733	**0.733**
8	0.733	0.732	0.733	**0.733**
9	0.733	0.733	0.732	**0.733**
10	0.734	0.735	0.734	**0.734**
11	0.736	0.736	0.736	**0.736**
12	0.736	0.736	0.735	**0.736**
13	0.735	0.735	0.734	**0.735**
14	0.738	0.738	0.738	**0.738**
15	2.420	~~2.420~~	~~2.420~~	~~2.420~~

Avg. shim thickness (in): **0.073**

Attachment 5
Page 4 of 4
Reference L-60-1

Report of Meeting
L-60-1 Surveillance Panel
PRI Headquarters, Apollo Room, Warrendale, Pa.
November 02, 2005

Sign-in/Review of Membership: The meeting was called to order at 8:06am. The sign-in sheet is *Attachment 1*. A review of membership was not performed.

Meeting Agenda
In order to preserve enough time for the L-42-1 SP meeting, the L-60-1 SP meeting agenda (*Attachment 2*) focused on the TMC proposal for updating reference oil test targets. Items 3 and 5 were tabled for a future meeting.

Summary of Meeting Discussions

TMC Proposal for Updating Targets for TMC 148-1 and TMC 151-2

Mr. Lind presented the background to the TMC proposal for updating test targets. During the August L-60-1 Surveillance Panel (SP) meeting, the open action item of bringing TMC 133 into the system was revisited. The SP has historically desired a reference fluid that would yield an end of test viscosity increase near the SAE J2360 pass/fail limit of 100%. Significant laboratory differences were observed in the initial matrix conducted many years ago. The SP Chairman had noted that many significant findings from L-60-1 Task Force visits conducted in 2002 were uncovered. With these issues now addressed, his thought was that reproducibility in TMC 133 should be improved. However the TMC mentioned that current reference oil targets were a concern and should be addressed before bringing this into the system.

The TMC proposal for updating the reference bands is similar to methods taken in other industry test types that utilize the LTMS system. The proposal is based on a feeling that test targets are not applicable for the current situation of the L-60-1 test. The situation can be summarized as follows:

- An industry severity trend with average carbon varnish was observed in the 1999 time frame with TMC 148. During the severity trend, many changes were made to improve test precision but the cause of the severity trend could not be identified.
- Stand differences in severity, while still present, have been minimized.
- Industry severity has leveled off.

At present, the current reference fluids consist of TMC 148-1 and TMC 151-2 which were introduced in the same time frame during the severe trend. TMC 148-1 was introduced as a reblend to TMC 148. At the time, an industry matrix was conducted which showed TMC 148-1 to be slightly more severe than TMC 148 in some parameters. The L-60-1 SP elected to not issue new LTMS Shewhart reference acceptance bands for TMC 148-1 because new bands could give a false impression that a severity issue did not exist when looking at control charts. It was also thought to be wise to wait until the results from an L-60-1 Task Force conducting lab visits to investigate the severity trend were known.

Similar to TMC 148-1, TMC 151-2 was introduced as a reblend to TMC 151. However the TMC 151 was brought into the L-60-1 referencing system after the reference trend began. An acceptance matrix was conducted for TMC 151 but the L-60-1 SP used a pooled standard deviation across all oils for calculating LTMS Shewhart reference acceptance bands. This is a common approach that many surveillance panels will use to minimize the financial burden for labs to generate enough data to calculate reference acceptance bands with a new oil. The pooled standard deviation using all oils is typically replaced with the single oils standard deviation once 10 valid reference tests have been completed. The bands are then updated after 20 tests and locked after the n-size reaches 30 tests. Since TMC 151 was introduced in the L-60-1 during the severity trend, the pooled standard deviation across all reference fluids continues to be in use.

As previously documented, the average carbon varnish severity trend had been identified as starting in January of 1999. It appears that the severity has somewhat leveled off with respect to average carbon varnish especially. With the test being in control, the TMC proposed an option for the L-60-1 SP to consider if it is desired to update reference targets. The current and proposed targets are shown in ***Attachment 3***. The proposal involves a one time severity adjustment which uses the new reference bands as compared to the current reference bands. This is a method which surveillance panels have used in other test types within LTMS. The method allows changing reference targets and having a severity adjustment application for the subsequent stand reference period. This is a one time correction in the reference oil targets on TMC 148 to the 30 initial reference oil tests on TMC 148-1. The adjustment is for the 30 tests to get us back to the initial targets for future references and then use the appropriate severity adjustments for future candidates.

In order to understand the effect of the possible change, many questions surfaced from surveillance panel members on the mechanics behind the application of this one-time severity adjustment. As a way of gaining a better understanding for the SP, Mr. Buitrago commented that it might be wise to take the most recent 30 reference tests and plot them in the LTMS control charts by the current and proposed reference bands. This should be done for all parameters (sludge, average carbon varnish, viscosity increase, pentane and toluene). Test lab representatives voiced concerns over the affect of new reference bands on the pentane and toluene reference results. Particularly for one lab, Mr. Lind felt concerns with pentane, toluene, and viscosity are valid. In general, the SP wants to fully understand the impact of this change. The SP requested the following action item for the TMC to help in their level of understanding the proposed changes to the reference bands.

Action Item: TMC to chart all the reference data since August 1, 2005 with the proposed bands and identify references tests that would now fail under the new targets. The data is also requested to be shown in non-transformed units (merit numbers) with an estimate of a possible stand severity adjustment. In this hypothetical case, an example of how the severity adjusted reference might affect a future candidate test was also requested.

<u>Procedural Clarification to the annex of D5704</u>

Mr. Lyle Bowman had requested the SP resolve an issue which he identified in annex A10.9 of the D5704. Mr. Bowman's request, which was addressed to [redacted] in an e-mail, is ***Attachment 4***. The

Morner lab had an error in their calibration process. The chairman requested a detailed explanation from Bowser Morner which is included as ***Attachment 3.***

The SP felt a wise action would be to consider an alternate supplier that is ISO 17025 certified. Mr. De Le Fuente has offered to search for an alternate supplier. Mr. Rae asked if a 30% shift would make a significant impact on the test. The chairman provided additional detail in an effort to provide more information to new SP members and guests. A change of this magnitude would certainly result in different operational warm-up times that would need to be addressed for meeting the required test warm-up in 45 to 60 minutes. In terms of test severity, it is unknown whether a 30% change in air flow would affect results such as ACV, sludge, viscosity increase, and insolubles. Knowing that standardization would only serve to bring the labs closer together on results, the SP elected to go to a common air flow measurement device without conducting testing. Numerous changes were made around this same time making it difficult to confirm the affects of these changes. Since the 2003 time frame, Mr. Lind mentioned that lab variability had been reduced.

Action Item: Mr. De Le Fuente has offered to search for an alternate calibration supplier for the panel to discuss at a future meeting.

ASTM L-60-1 Apparatus Drawings
Background
The SP chairman provided a background to prepare the panel for discussion and action. As believed to be a result of a long-term standardization effort, the current status of the L-60-1 is such that ACV severity has leveled off and lab-to-lab differences appear to be minimized. During the initial severity investigation, significant differences in performance between stands within labs were observed. The surveillance panel asked the task force to conduct an in depth review of the apparatus drawings that were never updated when the D5704 transferred from the L-60 to the L-60-1. This was a large effort for the task force and culminated in revised drawings being approved by the SP during the August 2004 meeting. The motion required all labs to be in compliance by January 1, 2005.

In previous meetings, the Surveillance Panel discussed the time commitment and logistical issues involved with conducting stand audits to review compliance with the drawings. While the intent was to have the TMC eventually review all stands at each lab, the Panel members agreed that it would be sufficient for the TMC to pick one test stand within a laboratory to conduct an initial review. Depending on the findings, additional stands could be checked on the first visit if the TMC felt it is necessary.

After the TMC first lab visit, Don Lind and the SP Chairman decided to wait until all visits were completed and then hold an L-60 Task Force meeting to discuss observations. This stemmed from the feeling that areas of identified as being noncompliant were insignificant to test severity. The task force met from 8:30 am until 3 pm on 6/20/06 to discuss the lab findings. Don Lind mentioned that measurement task was difficult because of the lack of a reference point such as determining distances between the centerlines of holes. There were many commonalities in the findings. The task force classified the observations into a three categories:

1. Parts being outside of tolerances and judged to be non-critical.
2. Parts being outside of tolerances and assumed to be non-critical while acknowledging that data doesn't exist to prove this hypothesis.
3. Parts being outside of tolerances and labs making changes to conform.

Attachment 7
Page 1 of 3
Reference L-60-1

Between the lab visits and the Task Force meeting, outcomes were aimed at building a secondary set of drawings that contain performance specific dimensions which labs and the TMC can use to check the stand apparatus set-up. While most of the findings from the lab visits are felt to be noncritical to test severity, the Task Force felt that significantly modifying the existing drawings would compromise the ability to manufacture new rigs or replacement parts.

Attachment 4 details the TMC summary of drawing differences identified from the "single stand audit" by the TMC at each lab. Areas with issues are identified with handwritten dimensions or notes on the drawings. As an example, the chairman presented a couple dimensions out of compliance for one lab on the driveshaft. The lab was outside of the tolerances on snap ring groove width and location by thousands of an inch. The Task Force felt that the magnitude of these deviations weren't critical to test operation or severity. However these tolerances should not be increased because it could compromise future fabrication of parts.

The Task Force believes focus should be placed on apparatus dimensions that could affect test severity. An example of an adequate dimension in the test method would be the location of the thermocouple. The x, y, z dimensions for the installed thermocouple location is clearly labeled in the procedure. An example of a deficiency would be the location of the gears installed in the gear case assembly. Differences in the gear location could affect the lubricant splash and deposit formation. The Task Force agreed that more importance should be placed on the gear location and some flexibility should exist in the manufacturing of the shaft for locating the gears. Action items and details from the 6/20/06 Task Force meeting are included as ***Attachment 5***.

Mr. Lind provided a verbal summary of his lab audits. After completing all three lab visits, approximately 25% of the 19 drawings had some component dimensions outside of the tolerance on the prints. These are likely a result of the minor design differences at various labs, mostly due to the different production companies that manufactured the rigs. Other tolerance issues come from general wear on the hardware.

Per the previously approved motion from the June 15, 2004 L-60-1 SP meeting, the labs were to be in compliance with the revised drawings by January 1, 2005. In addition, section 6.2 of the D5704 standard (***Attachment 6***) does not allow much room for interpretation. Even though the discrepancies found during lab visits appear minor, the TMC voiced concern that the industry could be shutdown based on the interpretation of section 6.2 and asked the Surveillance Panel for guidance. Some panel members also voiced concern that the second sentence in section 6.2 could give future L-60-1 apparatus manufactures too much leniency in varying the product design. This margin could lead to future increase in test variability.

As for guidance to the TMC about handling the compliance issues identified in the lab audits, SP members commented about the deviations from the prints being very minor and not likely to impact the test. Additional points were raised about the L-60-1 test method utilizing stand severity bias adjustments which would mathematically correct any severity offsets in rig performance. The SP felt that shutting down the test from the findings in these lab visits was not warranted. The Chairman also commented that it would not be a wise use of resources to require labs to build new rigs for the purpose of addressing these minor deviations. The SP went on to agree that the L-60 Task Force should be allowed to continue on its plan to address critical performance areas. The TF action plan includes designing a template for locating the position of the gears within the case and building performance drawings that can be placed within the D5704 procedure.

The Chairman described to the panel a template that Lubrizol volunteered to develop (with help from the other two labs) that effectively would measure the X and Y distances and holes with in the template that would allow the TMC to use depth micrometers to measure all of the Z component measurements. The following action item was collectively agreed upon by the labs and committee members.

Action Item: By the November 2006 Panel meeting, the Task Force shall present the proposed performance drawings with critical dimensions and new template for locating the gears within the gear case to the Surveillance Panel members for discussion. The SP will also need to address section 6.2 with any proposed changes at that time. SwRI and Lubrizol will work collectively to develop the performance drawings within the TF and build a template for confirming gear placement. Also noted was that there will be a 30-day implementation time frame after the November implementation.

Attachment 5 details the issues needing resolved and the Task Force proposal for modifying section 6.2.

Task Force Recommendation on Saving Parts.

During the L-60-1 Task Force meeting, Mr. Lind indicated that some panels had previously approved motions directing labs to keep parts for them to be used at the Gear Rating Calibration Workshop. However no memo was ever issued and the panel requests have gone unheard or forgotten in some instances. In an effort to draw attention to the need for keeping parts to conduct future Gear Rating Calibration Workshops the Task Force requests all L-test Surveillance Panels, including the L-60-1 SP, to adopt a motion for the TMC to issue a memorandum requiring all labs to follow. Page 3 of ***Attachment 5*** details the Task Force Recommendation on saving reference test parts.

Motion 3 (Motion ⇒ Bill Sullivan, Second ⇒ Cory Koglin) The L-60-1 Surveillance Panel directs the TMC to issue a memorandum for all labs to keep the rated parts for all reference tests for 1-year from the end of test. The parts are to be made available to the TMC for purposes such as Gear Oil rating Calibration Workshops or other defined panel needs.

Motion Results: Passed

In favor: 6
Opposed: 0
Abstain: 0

Procedural Housekeeping Items

Section 12 of the D5704 pertains to the cleaning of the catalyst strip after the test. Section 12.1.1 specifies to remove the deposits by soaking in Oakite 811 or Penmul L460 but places a limit of 30 minutes. A lab requested to either add a tolerance or make the 30 minute limit approximate. Knowing that the purpose is to remove the deposits, it was decided that a fixed time limit was inappropriate. The 30 minutes could be left as a guide but flexibility was needed.

Motion 4 (Motion ⇒ Cory Koglin, Second ⇒ Hector De Le Fuente) Direct the TMC to issue an information letter to clarify the 30 minute soak time in Section 12.1.1 of the D5704 as approximate.

Motion Results: Passed

In favor: 4
Opposed: 0
Abstain: 2