INTERNATIONAL
Standards Worldwide

Address 100 Barr Harbor Drive
PO Box C700
W. Conshohocken, PA
19428-2959 | USA

Phone 610.832.9500
Fax 610.832.9555
e-mail service@astm.org
Web www.astm.org

Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

April 25, 2005

Reply to:
Donald T. Bartlett
The Lubrizol Corporation
29400 Lakeland Blvd.
Wickliffe, OH 44092
(440) 347-2388
(440) 347-2878 (FAX)

ASTM D02.B0.03 L-37 Surveillance Panel
Members and Guests:

Attached for your review and comment are the corrected confirmed minutes of the February 2nd, 2005 L-37 Surveillance Panel Meeting held at the PRI Headquarters in Warrendale, PA. **The minutes were reviewed and corrected at the April 6, 2005 Surveillance panel meeting**. Please direct any corrections or comments to my attention.

Sincerely,

Donald T. Bartlett

Donald T. Bartlett, Chairman
L-37 Surveillance Panel
Attachments

Report of Meeting
L-37 Surveillance Panel
PRI Headquarters, Apollo Room, Warrendale, Pa.
February 2nd, 2005

Sign-in/Review of Membership: The meeting was called to order at 01:14 p.m. The sign-in sheet is included as Attachment 1. There were no membership changes to report, see Attachment 2.

Meeting Agenda: The meeting agenda was reviewed and is included as Attachment 3.

Approval of Minutes:

Motion 1- Mr. Koglin motioned, second by Mr. Koehler) -We accept the minutes from the November 3, 2004 Surveillance Panel and January 20, 2005 Surveillance Panel Teleconference meetings as presented with no corrections. The motion was approved unanimously.

Action Items assigned from this meeting:

- After completion of the L247/T758A hardware approval, the panel will address the request for low temperature definition of a calibration process.

- The chairman was asked to call a panel teleconference call by the end of February to address several of the action items on the list.

- With respect to lubrited hardware batch L247/T758A hardware:
  - The industry was asked to perform a count of their current inventory of lubrited gears.
  - SwRI will speak with management to see if they would like to participate if they were given hardware for testing.
  - **SP approved Correction to original minutes 4-6-05. Pending any outlying results from the initial 5 (hardware exchange) tests, we will discuss the option and/or need to conduct two standard runs at each lab on TMC 152 and TMC 153. The intent is to have at least 3 tests on each oil at a minimum.*

- With respect to the next 2005 non lubrited hardware order and the February teleconference call:
  - The chairman will consult with Mr. Okamuro and start the price quoting process.
  - The labs are asked to disclose the amount of hardware they wish to purchase.
  - Since a teleconference call is slated for the end of February, labs are asked to disclose the amount of hardware they wish to purchase and prepare to submit binding PO's to Dana.

- L-37 Chairman to call Mr. Sanchez to discuss the current SP feelings on the RTF rating issues as noted in the TF minutes.

Motions approved from the February 2nd, 2005 Meeting:

Motion #1 ⇒ Mr. Koglin, Second ⇒ Mr. Koehler - That we accept the minutes from the November 3, 2004 Surveillance Panel and January 20, 2005 Surveillance Panel Teleconference meetings as presented with no corrections.

Motion #2 ⇒ Mr. Smith, Second ⇒ Mr. Sullivan based on the matrix tests the panel approves the V1L351/P4T771 hardware gear batch.

Motion #3 ⇒ Mr. Sullivan, Second ⇒ Mr. Farber- We accept the V1L351/P4T771 current targets presented based on a pooled standard deviation and automatically update targets for TMC 153 at 10, and 15 tests, then all 3 reference oils (151, 152, and 153) at 20, and 30 tests.

Motion #4 ⇒ Mr. Sullivan, Second ⇒ Mr. Smith - Recommend the use of the V1L351/P4T771 gears for both Low Temperature and Standard L-37 testing without the use of any correction factors.

Motion #5 ⇒ Mr. Castanien, Second ⇒ Mr. Sullivan) that we conduct 5 more standard L-37 tests on TMC 151-3 and use the following hardware exchange:

- Lab B to conduct 3 more runs on TMC 151-3. Hardware use and exchange is: 1 on lab B hardware, 1 on lab D hardware, and 1 on Lab E hardware.
- Lab B to send 1 axle each to labs D and E with Lab D & E running 1 standard test each on TMC 151-3.
- A teleconference call will be scheduled to discuss/review.
- Tests to be completed by the end of February.

Motion # 6 ⇒ Mr. Sullivan, Second ⇒ Mr. Koehler- We issue an information letter stating: Use cleaning Solvent meeting ASTM D235 – Type II, Class C requirements 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) may be used. Obtain a Certificate of Analysis for each batch of solvent from the supplier.

Summary of Meeting Discussion, Actions, Proposals and Motions:

Pending Action Items:

1. Cleaning Solvent, IL 05-1 Proposal: It was determined that we would address this for all panels at the end of the days meetings.

2. LT-1 (TMC152) and LT-2 (TMC 153) fluid confirmation. Mr. Lind commented that cross blending is typically done with the PCMO reference fluids to minimize any drum-to-drum effects/differences. However the TMC cannot cross-blend gear lubes due to their high viscosity. In order to understand if any drum-to-drum effects would be possible, the TMC was trying to confirm that the recent large batch obtained was from the same batch as the original quantity received. Additional details can be found in the November 3, 2004 L-37 meeting minutes. Don Lind is unable to receive confirmation on the batches of TMC 152 versus TMC 153.

3. Update on TMC 151 Re-blend:
   - The supplier reports that the base stocks have changed. The L-60-1 results appear to be in the neighborhood of TMC 151-3 other than some minor differences between insolubles.
   - L-33-1, L-37, and HTCT testing pending these results. The full re-blend will take place prior to the next meeting.
   - The TMC states that, due to the base stock change, test targets will not be able to simply be rolled with the new batch blend without running some confirmation tests. The amount of testing will be discussed at a future meeting.

2004 V1L351/P4T771 Non-Lubrited Hardware Approval:

The Chairman opened the discussion on this item by covering a comprehensive timeline of the events surrounding the initial order approval, material changes, build issues, 44-test matrix. See Attachment # 4.

The TMC presented the following information to assist the panel in discussion and resolution:
- Attachment # 5 is a summary table of the matrix test results.
- Attachment # 6 details plots of L-37 Reference Oil Performance by Pinion Batch.
- Attachment # 7 details plots of L-37 Reference Oil Performance by Oil and Test Version.
- Attachment # 8 details plots of L-37 Reference Oil Performance by LTMS Lab.

Mr. Lind – For TMC 153- On the V1L351/P4T771 gear batch sees a difference between Low Temperature and Standard tests, standard being slightly more severe. Looking back on the recent panel decision on the V1L686/P4L626A gear batch, he doesn't believe the Low Temperature and Standard L-37 should have been given different correction factors. He feels that the correction factor for the Standard test was the proper choice and this should have been rolled over directly into the Low Temperature tests. For V1L351/P4T771 hardware matrix he didn't see a difference in tests run with TMC 152.

Motion 2 Motion ⇒ Mr. Smith, Second ⇒ Mr. Sullivan- based on the matrix tests the panel approves the V1L351/P4T771 hardware gear batch. Motion 2 passed unanimously with 5 in favor, none opposed, and no abstentions.

With the above motion, the panel set forth to review/approve targets for the Standard Test:

1. TMC 151; all tests would be acceptable.
2. TMC 152; one test at lab D would not be acceptable on Rippling.
3. TMC 153; three tests would not be acceptable. One test is out on Wear and Rippling at lab A, one test is out on Ridging at lab D, and one test is out on Rippling at Lab A.
4. Engineering judgment was used to slightly tweak the standard deviation for pitting/spalling to allow a 9.3 value to be acceptable in the future.

See Attachment # 9 that details a table and plots of Target and Shewhart Severity Limits by distress and oil code.

Motion 3 Motion ⇒ Bill Sullivan, Second ⇒ Frank Farber- Accept the current targets based on a pooled standard deviation, and automatically update targets for TMC 153 at 10, 15 tests , then all 3 reference oils (151, 152, and 153) at 20, and 30 tests. Motion 3 passed unanimously with 5 in favor, none opposed and no abstentions.

Motion 4 (Motion ⇒ Bill Sullivan, Second ⇒ Dale Smith) recommend the use of these gears for both low temperature and standard L-37 testing without the use of any correction factors.

Discussion:
Mr. Sullivan stated that the rational behind this is that the tests are passing more than the majority of the time. Secondly if you had a correction factor, there is some risk that it could be set too high such that failing oils could exceed the pass/fail limit.

Mr. Farber asked the SP Chairman where the panel was at with respect to defining a calibration process for the L-37 low temperature. Mr. Gropp reminded the panel that B.03 had received a letter from the LRI committee requesting ASTM to develop a reference process and standardized test procedures for low temperature version of the ASTM D6121 (L-37) and L-42 test procedures.

The chairman reported that the subject letter was initially presented to the L-37 SP as attachment # 7 of the January 28th, 2004 meeting minutes. A copy of that letter was reviewed and is included as Attachment # 10 of these meeting minutes. **Due to many intertwined ongoing activities the panel direction given at that time was to:**

1. Address standardization of the test procedure for both Standard and Low Temperature tests across the labs. Information letters 04-1 through 04-3 completes this action item.

2. Conduct a low temperature matrix on V1L686/P4L626A lubrited hardware. The task was completed and the panel reviewed and made recommendations at the August 24th and 25th 2004 meeting.

3. A 44-test matrix (Standard and Low Temperature tests) was to be conducted on the 2004-V1L351/P4T771 non-lubrited hardware and reviewed by the panel. The action item is now complete.

4. The 2003-L247/T758A lubrited hardware batch was put on hold after phase three of the matrix to address the new V1L351/P4T771 non-lubrited hardware industry needs. After resolution of the L247/T758A testing and approval, the panel will address the request for low temperature definition of a calibration process.

Mr. Sullivan stated his opinion that the industry currently cannot double the resources given to referencing because it is not feasible. Mr. Gropp commented that it would be good to revisit this issue with some statisticians to see if there are some unique approaches.

Motion 4 passed with 4 votes in favor, none opposed and one abstention.

2003 Lubrited Hardware Discussion and Decision

Since the resolution of testing and approval of this hardware batch was tabled in April 2004 to address other necessary issues and needs, the chairman updated the panel on the history of this topic. It is included as Attachment # 11. Only three labs purchased this hardware batch code and participated in the matrix approval process.

Mr. Lind presented a summary review to the panel. Attachment # 12 is representative of the data spreadsheet and charts of L-37 Reference Oil Performance by Pinion/Ring Batch.

**SP approved Correction to original minutes 4-06-05: With respect to TMC 128-1, Mr. Gropp expressed concerns that the gear batch was performing more severe because of the over-all failure rate on certain distress categories. For example, rippling failed on 7 out of 12 tests. Lab E tests were much more severe than the other two labs. Lab E confirmed that the ripple ratings were indeed 4's and 5's. We are seeing an overall failure rate of 100% on TMC 128. Mr. Gropp stated that he believes this is higher than typical. Mr. Lind reminded Mr. Gropp that he had looked at the over-all failure rate for TMC 128 for other batches and it was very high.*

With respect to TMC 151, Mr. Gropp commented that we are seeing an overall failure rate of 50% on TMC 151. He believes this is unusually and unacceptably high. It should be noted, however, that most of these fail results are related to Rippling distress and are from one lab. Perhaps this is a lab issue? Wear on TMC 151 appears to be about one merit number severe versus historical results. There seems to be a lot of variability in Pitting/Spalling with both oils.

Since lab B failed all four of their tests on TMC 151-3 (6 and 7's) while the other two labs had all 9's, it was suggested that the labs exchange some hardware and rerun some TMC 151 tests.

Motion 5 Motion ⇒ Mr. Castanien, Second ⇒ Mr. Sullivan- that we conduct 5 more Standard L-37 tests on TMC 151-3 and use the following hardware exchange (Note: denoted as phase 4) :

- Lab B to conduct 3 more runs on TMC 151-3. Hardware use and exchange is: 1 on lab B hardware, 1 on lab D hardware, and 1 on Lab E hardware.
- Lab B to send 1 axle each to labs D and E with Lab D & E running 1 Standard test each on TMC 151-3.
- A teleconference call will be scheduled to discuss/review.
- Tests to be completed by the end of February.

Motion 5 passed with 6 in favor, none opposed, and one abstention.

Action Items:

- ** SP approved Correction to original minutes 4-6-05. Pending any outlying results from the initial 5 (hardware exchange) tests, we will discuss the option and/or need to conduct two standard runs at each lab on TMC 152 and TMC 153. The intent is to have at least 3 tests on each oil at a minimum.*
- The industry was asked to perform a count of their current inventory of lubrited gears.
- SwRI will speak with management to see if they would like to participate if they were given hardware for testing.

2005 Non-Lubrited Hardware Order

Labs previously indicated the need for pursuing the next non-lubrited hardware. Many issues are contributing to this issue:

- The industry was shorted 20 percent of their 2004 order due to Ft. Wayne learning curve.
- The pervasive steel shortage continues.
- Dana is closing the Statesville facility and the assembly line has started its move to the Lugoff, SC facility, responsibility changes, and lead-time to bring Mr. Miller into the process as the primary contact.

All laboratory personnel present agreed that the order is needed. The proposal is to get the purchase orders tendered in 30-45 days. The chairman will consult with Mr. Okamuro and start the price quoting process. The goal is to time the hardware production for late 2005 and assembly for late 2005/1st quarter 2006.

Since a teleconference call is slated for the end of February, labs are asked to disclose the amount of hardware they wish to purchase and prepare to submit binding PO's to Dana.

The lab tentative estimates as of today are: Ethyl 350 ± 50, Parc 350 ± 50, SwRI 275 ± 50, and Lubrizol 350 ± 50. Approximate total is 1125 to 1525 axles.

January 2005 GO RTF Workshop Review

The L-37 rater workshop data is included as Attachment # 13. Mr. Lind opened the discussion with an explanation of how the workshop is conducted. Mr. Lind was asked to note on the data sheet the raters that are high volume raters. When there is a difference of 2 numbers, Don asks them to talk about it. When there is a difference of 3 number's, Don asks them to get up and review the part once again.

Mr. Bartlett thanked Mr. Sanchez and RTF group for the detailed preliminary summary for the L-37 that was shared with the panel. It is included as attachment # 14. The final RTF minutes will be released later this week.

Mr. Lind presented Attachment # 15, "Rater Calibration Alarms". The panel consensus was that the RTMS system is apparently doing its job. With respect to the noted request from the RTF to expand the EWMA limits because of the concern that the limits are too tight, panel consensus was that there is no basis for this request because technical data wasn't presented to support the request. The panel requests that a task force representative present/provide data and rational for this request at a future meeting.

As noted in the RTF minutes, a small group within the rating task force has begun to look at all of the rating photos and decide if any should be replaced. Mr. Sullivan asked what the basis was for this effort. A history on the development to standardize LRI gear boards and manual 21 photos was discussed. The panel consensus was that if there are any issues, a representative from the rating group should appear before the panel for discussion that all panel members can participate in. The chairman asked to call Mr. Sanchez to discuss the current SP feelings on these issues.

With no further business to be conducted, a motion to adjourn was made by Mr. Smith /seconded by Mr. Koglin. The meeting was adjourned at 4:22 p.m.

Secretary Note: It was decided to re-open the respective surveillance panels one at a time to discuss one common issue that was an action item from the November B.03 section meeting. At 4:25 p.m., the L-37 panel meeting was reopened.

Motion 6 ⇒ Mr. Sullivan, Second ⇒ Mr. Koehler- We issue an information letter stating: Use cleaning Solvent meeting ASTM D235 - Type II, Class C requirements 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) may be used. Obtain a Certificate of Analysis for each batch of solvent from the supplier. Implementation date effective the date of the information letter. Motion 6 passed unanimously. The meeting was adjourned at 4:26.

Respectfully submitted,

Donald T. Bartlett

Donald T. Bartlett
L-37 Surveillance Panel Chairman

ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: February 2, 2005

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
	Akucewich, Ed	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2415 Fax: 440-347-9011 E-Mail: esak@lubrizol.com
DTB	Bartlett, Don	Voting/Chair	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2388 Fax: 440-347-2878 E-Mail: dtb@lubrizol.com
	Boschert, Tom	Non Voting	Afton Chemical 2000 Town Center, Suite Southfield, MI 48075	Phone: 248-350-0640 ext. 228 Fax: 248-350-0025 E-Mail: Tom_boschert@aftonchemical.com
	Bryson, Tom	Voting	Mack Trucks 13302 Pennsylvania Avenue Hagerstown, Maryland 21740	Phone: 301-790-6744 Fax: 301-790-5605 E-Mail: thomas.bryson@volvo.com
	Buitrago, Juan	Voting	Chevron Oronite Company 100 Chevron Way Richmond, California 94802	Phone: 510-242-1161 Fax: 510-242-3392 E-Mail: jabu@chevrontexaco.com

DRB Bell, Dan NV

Afton Chemical
500 Spring St.
Richmond, VA 23219

8047886332
8047886243
dan.bell@aftonchemical.com

* Initial to indicate attendance at subject meeting

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ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: February 2, 2005

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
	Chambers, Harold	Non-voting	Visteon Corporation 17000 Rotunda Drive, Cube C290 81 Dearborn, MI 48120	Phone: 313-755-4246 Fax: E-Mail: hchamber@visteon.com
	De La Fuente, Hector	Non Voting	Southwest Research Institute PO Drawer 28510 San Antono, Texas 78228-0510	Phone: 586-522-5996 Fax: 210-684-7523 E-Mail: hdelafuente@swri.edu
	Dharte, John	Voting	American Axle & Manufacturing 2965 Technology Drive Rochester Hills, MI 48309-3589 78228-0510	Phone: 248-299-6478 Fax: 248-293-6945 E-Mail: Dhartej@aam.com
fmf	Farber, Frank	Non Voting	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pennsylvania 15206	Phone: 412-365-1030 Fax: 412-365-1047 E-Mail: fmf@astmtmc.cmu.edu
	Fett, Greg	Non Voting	Dana Corporation P.O. Box 955 Toledo, Ohio 43697	Phone: 419-887- Fax: 419-887-5962 E-Mail: greg.fett@dana.com

CASTANIEN, CHRIS NV — LUBRIZOL — 440 347 2973 — 440 347 2878 — CCA@LUBRIZOL.com

* Initial to indicate attendance at subject meeting

Attachment 1
Page Page 2 of 9
Reference L-37

ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: February 2, 2005

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
	Follis, Mike	Non Voting	Dana Corporation P.O. Box 955 Toledo, Ohio 43697	Phone: 419-887-3424 Fax: 419-887-5962 E-Mail: mike.follis@dana.com
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 Company LLC Suite 210 San Antonio, Texas 78228-1374	Phone: 210-731-5609 Fax: 210 731 5699 E-Mail: HURO@chevrontexaco.com
	Koehler, Brian	Voting	Southwest Research Institute PO Drawer 28510 San Antono, Texas 78228-0510	Phone: 210-522-3588 Fax: 210-684-7523 E-Mail: bkoehler@swri.edu
C.K.	Koglin, Cory	Voting	Afton Chemical 500 Spring Street Richmond, VA 23218	Phone: 804-788-5305 Fax: 804-788-6358 E-Mail: Cory_Koglin@aftonchemical.com

* Initial to indicate attendance at subject meeting

ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: February 2, 2005

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
	Kozlowski, Ralph	Non Voting	PARC Technical Services, Inc. 100 William Pitt Way Pittsburg, PA 15238	Phone: 412-826-5044 Fax: 412-826-5443 E-Mail:
	Layton, Kevin	Non Voting	Afton Chemical 500 Spring Street Richmond, VA 23218	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, Pennsylvania 15206	Phone: 412-365-1034 Fax: 412-365-1047 E-Mail: dml@astmtmc.cmu.edu
	Linden, Jim	Voting	GM Research & Development 30500 Mound Rd. MC 480-106-160 Warren, MI 48090	Phone: 586-986-1888 Fax: 586-986-2094 E-Mail: James.L.Linden@GM.com
	Purnell, Keith	Non Voting	Performance Review Institute 161 Thornhill Rd. Warrendale, Pa. 15086-7527	Phone: 724-772-1616 ext 8182 Fax: 724-772-1699 E-Mail: kpurnell@sae.org

* Initial to indicate attendance at subject meeting

Attachment 1
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Reference L-37

ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: February 2, 2005

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
	Lochte, Michael	Non Voting	Southwest Research Institute PO Drawer 28510 San Antono, Texas 78228-0510	Phone: 210-522-5430 Fax: 210-684-7523 E-Mail: Mlochte@swri.edu
	Marougy, Thelma	Voting	Eaton Corporation 26201 Northwestern Highway Southfiled, MI 48034	Phone: 248-226-6985 Fax: 248-226-2739 E-Mail: thelmaemarougy@eaton.com
	McGlone, Bruce	Voting	Meritor Automotive 2135 West Maple Troy, Michigan 48084	Phone: 248-435-9929 Fax: 248-435-1411 E-Mail: Bruce.McGlone@ArvinMeritor.com
	Miller, Kenny	Non Voting	Dana Corporation 1293 Glenway Drive Statesville, NC 28677	Phone: 704-878- Fax: 704-878-5735 E-Mail: Kenny.miller@dana.com
	Okamuro, Ken	Voting	Dana Corporation 1293 Glenway Drive Statesville, NC 28677	Phone: 704-878-5642 Fax: 704-878-5735 E-Mail: Ken.Okamuro@dana.com

* Initial to indicate attendance at subject meeting

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Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
	Radonich, Peter	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2184 Fax: 440-347-9011 E-Mail: pdr@lubrizol.com
	Sanchez, Art	Non Voting	Southwest Research Institute PO Drawer 28510 San Antono, Texas 78228-0510	Phone: 210-522-3445 Fax: 210-680-1777 E-Mail: asanchez@swri.edu
CLS	Schenkenbeger, Chris	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2927 Fax: 440-347-2878 E-Mail: csc@lubrizol.com
	Smith, Dale	Voting	PARC Technical Services, Inc. 100 William Pitt Way Pittsburgh, PA 15238	Phone: 412-826-5051 Fax: 412-826-5443 E-Mail: dsmith@parctech.com
	Sopko, Harry	Non Voting	PARC Technical Services, Inc. 100 William Pitt Way Pittsburg, PA 15238	Phone: 412-826-5165 Fax: 412-826-5443 E-Mail: hsopko@parctech.com

* Initial to indicate attendance at subject meeting

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Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
WJS	Sullivan, Bill	Voting	ExxonMobil Chemical Company P. O. Box 3140 Edison, New Jersey 08818	Phone: 732-321-3354 Fax: 732-321-6064 E-Mail: william.t.sullivan@exxonmobil.com
	Tschirhart, Garland	Non Voting	Southwest Research Institute PO Drawer 28510 San Antono, Texas 78228-0510	Phone: 210-522-3445 Fax: 210-680-1777 E-Mail: gtschirhart@swri.edu
	Vermilyia, Denise	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-4681 Fax: 440-347- E-Mail: drc@lubrizol.com
	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
	Whitton, Claire	Non Voting	Afton Chemical PO Box 2158, 500 Spring St. Richmond, VA 23218	Phone: 804-788-5052 Fax: 804-788-6243 E-Mail: Claire_Whitton@aftonchemical.com

* Initial to indicate attendance at subject meeting

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Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
	Yanchar, Paul	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-3474468 Fax: 440-347-9011 E-Mail: pjy@lubrizol.com
	Zakarian, Jack	Non Voting	Chevron Products 100 Chevron Way Richmond, CA 94802	Phone: 510-242-3595 Fax: 510-242-3758 E-Mail: jaza@chevron.com
	Zreik, Khaled A.	Voting	AMSTA-TR-D/210 Tank Automotive & Armament 6501 East 11 Mile road Warren, MI 48397-5000	Phone: 586-574-4227 Fax: 586-574-4244 E-Mail: Zreikk@@tacom.army.mil
				Phone: Fax: E-Mail:
				Phone: Fax: E-Mail:

* Initial to indicate attendance at subject meeting

L-37 Surveillance Panel Voting Members

Donald Bartlett	The Lubrizol Corporation (Chairman)
Tom Bryson	Volvo Powertrain Corporation
Juan Buitrago	Chevron Oronite Company
John Dharte	American Axle & Manufacturing
Brian Koehler	Southwest Research Institute
Cory Koglin	Afton Chemical Company
Don Lind	ASTM Test Monitoring Center
Jim Linden	GMR Research and Development
Thelma Marougy	Eaton Corporation
Bruce McGlone	ArvinMeritor Materials Engineering
Ken Okamuro	Dana Corporation
Dale Smith	PARC Technical Services
William Sullivan	ExxonMobil Chemical Company
Paula Vettel	D.A. Stuart Company
Khaled A. Zreik	AMSTA-TR-D/210 US Army Tacom-Tardec

L-37 Surveillance Panel
PRI/ Headquarters, Apollo Room - Warrendale, PA
February 2nd, 2005

AGENDA

Call to Order/ Membership & Agenda Review

Approval of Minutes:

- November 3rd, 2004 SP Meeting
- January 20th, 2005 Teleconference Meeting

Pending Action Items:

- Cleaning Solvent, IL 05-1 Proposal
- LT-1 (TMC 152) and LT-2 (TMC 153) fluid confirmation
- Update TMC 151 Re-blend

2004 V1L351/P4T771 Non-Lubrited Hardware Approval

2003 Lubrited Hardware Discussion & Decision

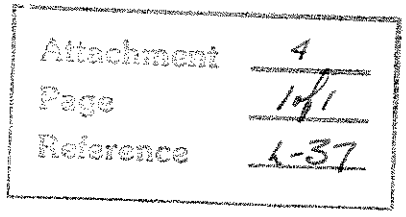
Next Non-Lubrited Hardware Order

January 2005 GO RTF Workshop Review

Adjournment

2004 V1L351/P4T771 Non-Lubrited Hardware Approval

- Axles ordered January 2004.
- Only 3 labs participated in ordering.
- Changes recommended by Dana & approved by panel:
    - Ring & Pinion will have the same gear geometry development/finite analysis process as the T758A/L247 lubrited hardware produced by the Glasgow Ky. facility. – April 2004
    - Production moved from Glasgow facility to Ft. Wayne facility. – April 2004
    - More attention will be paid to the tooling marks/process. – April 2004
    - Hardware build out will be all at one time (no preliminary matrix). – April 2004
    - Pinion gear surface hardness should be a little harder than the ring. Ring gear surface hardness reduced from 61-63 to 58-60 HRC. – April 2004
    - Pinion heat of steel changed from SAE 8625 to SAE 8822. – June 2004.
        - Steel shortage.
        - SAE 8822 alloy has slightly lower carbon level/slightly higher molly.
        - Both used in gearing where increased hardenability is desired.
- Axles received in August 2004, Industry shorted 149 axles, 19 % due to Dana development curve.
- 44-test matrix completed by 12/15/04 by 4 labs.
- Review and decision time - TMC



L-37 Non-Lubrited Hardware V1L351/P4T771
as of 1-14-05

Page 5
Reference L-37 1 of 2

CMIR	Lab	Std.	Oil	Pinbat	Ringbat	DTCOMP	Pwear	Pridg	Pripp	Pspit	Rwear	Rridg	Rripp	Rspit	Test Type	Match #	ASMBDT	lpcrat	fpcrat
49553	A	2	127	V1L351	P4T771	20040909	5	3	7	9.9	5	4	9	9.9	STANDARD	0N	036-04-A	2	0
45997	B	191	127	V1L351	P4T771	20040905	6	6	9	9.9	6	5	10	9.9	STANDARD		231-04-A	2	0
44307	D	3A	127	V1L351	P4T771	20040919	7	6	5	9.8	6	8	9	10	STANDARD	1C	233-04-B	2	0
44288	E	2	127	V1L351	P4T771	20040917	6	7	7	9.9	7	8	9	9.9	STANDARD	2L	233-04-B	2	0
52490	A	2	152	V1L351	P4T771	20041027	8	9	10	9.9	8	10	10	9.9	LOWTEMP	5N	236-04-A	2	0
53486	A	2	152	V1L351	P4T771	20041119	8	10	9	9.9	8	10	9	9.9	LOWTEMP	0L	236 04 A	2	0
52397	B	191	152	V1L351	P4T771	20041012	8	9	8	9.9	8	10	9	10	LOWTEMP	2L	232-04-B	2	0
53452	B	191	152	V1L351	P4T771	20041025	8	10	8	10	8	10	9	10	LOWTEMP	7J	232-04-B	2	0
52417	D	3A	152	V1L351	P4T771	20041007	9	10	9	9.9	9	10	10	10	LOWTEMP	1A	233-04-B	2	0
53446	D	3A	152	V1L351	P4T771	20041101	8	9	10	9.9	9	10	10	10	LOWTEMP	2V	233-04-A	2	1
52405	E	2	152	V1L351	P4T771	20041020	8	9	9	9.6	7	10	9	9.4	LOWTEMP	0V	231-04-A	2	1
52407	E	2	152	V1L351	P4T771	20041029	6	9	9	9.9	7	10	9	9.9	LOWTEMP	2X	232-04-B	2	0
52489	A	2	152	V1L351	P4T771	20041026	8	9	8	9.9	8	10	9	9.9	STANDARD	5A	236-04-A	2	0
53485	A	2	152	V1L351	P4T771	20041113	6	10	8	9.9	7	10	9	9.9	STANDARD	1J	234-04-B	2	0
52396	B	191	152	V1L351	P4T771	20041010	8	9	9	10	8	10	10	10	STANDARD	0X	233-04-A	2	1
52398	B	191	152	V1L351	P4T771	20041015	7	9	9	9.9	8	10	9	9.9	STANDARD	5P	234-04-A	2	0
52418	D	3A	152	V1L351	P4T771	20041016	7	10	9	9.9	9	10	9	10	STANDARD	1L	236-04-A	1	1
53447	D	3A	152	V1L351	P4T771	20041108	8	10	(10)	9.9	9	10	10	10	STANDARD	0P	237-04-B	1	1
52406	E	2	152	V1L351	P4T771	20041021	8	9	9	9.9	7	10	9	9.9	STANDARD	2P	236-04-B	2	0
52408	E	2	152	V1L351	P4T771	20041102	8	9	9	9.9	7	10	9	9.9	STANDARD	5A	232-04-B	2	0
52392	A	2	153	V1L351	P4T771	20041111	8	10	9	9.9	8	10	9	9.9	LOWTEMP	0H	192-04-A	2	1
53489	A	2	153	V1L351	P4T771	20041130	8	10	9	9.8	8	10	9	9.9	LOWTEMP	5J	236-04-B	3	0
52403	B	191	153	V1L351	P4T771	20041014	8	10	9	10	8	10	10	10	LOWTEMP	1A	236-04-A	2	0
53457	B	191	153	V1L351	P4T771	20041027	6	10	9	10	8	10	10	10	LOWTEMP	7V	232-04-A	2	0
52422	D	3A	153	V1L351	P4T771	20041030	8	9	10	9.9	9	10	10	10	LOWTEMP	5T	236-04-A	2	1
53448	D	3A	153	V1L351	P4T771	20041116	8	10	9	9.9	8	10	10	10	LOWTEMP	1P	233-04-A	2	0
52412	E	2	153	V1L351	P4T771	20041022	8	10	9	9.9	7	10	9	9.9	LOWTEMP	1H	232-04-B	2	0
53463	E	2	153	V1L351	P4T771	20041103	8	10	9	9.9	7	10	9	9.9	LOWTEMP	2J	232-04-B	2	0
52391	A	2	153	V1L351	P4T771	20041028	8	9	(10)	9.8	8	10	10	9.9	STANDARD	0J	236-04-A	2	0
52393	A	2	153	V1L351	P4T771	20041123	(5)	5	(5)	9.8	7	6	9	9.9	STANDARD	2T	234-04-A	2	0
52402	B	191	153	V1L351	P4T771	20041013	6	7	6	9.3	7	9	9	9.5	STANDARD	2J	236-04-A	2	0
53455	B	191	153	V1L351	P4T771	20041026	6	7	8	9.8	7	8	9	9.9	STANDARD	5L	234-04-A	2	0
53449	D	3A	153	V1L351	P4T771	20041122	7	(10)	8	9.9	8	10	10	10	STANDARD	0C	233-04-A	2	1
53535	D	3A	153	V1L351	P4T771	20041206	8	9	9	9.9	7	10	10	10	STANDARD	0T	233-04-A	2	0
52413	E	2	153	V1L351	P4T771	20041027	8	8	9	9.5	7	9	9	9.9	STANDARD	0X	232-04-B	2	0
53464	E	2	153	V1L351	P4T771	20041104	8	9	9	9.9	7	9	9	9.9	STANDARD	0N	232-04-B	2	0

L-37 Non-Lubrited Hardware V1L351/P4T771
as of 1-14-05

CMIR	Lab	Std.	Oil	Pinbat	Ringbat	DTCOMP	Pwear	Pridg	Pripp	Pspit	Rwear	Rridg	Rripp	Rspit	Test Type	Match #	ASMBDT	lpcrat	fpcrat
49558	A	2	151-3	V1L351	P4T771	20040929	8	9	8	9.9	8	10	9	9.9	STANDARD	2P	236-04-A	2	0
49559	A	2	151-3	V1L351	P4T771	20041022	6	9	9	9.9	7	10	9	9.9	STANDARD	1J		2	0
51847	B	191	151-3	V1L351	P4T771	20040930	6	10	9	10	8	10	10	9.8	STANDARD	7P	196-04-A	2	1
51848	B	191	151-3	V1L351	P4T771	20041009	7	10	9	9.7	8	10	9	9.9	STANDARD	7T	243-04-B	2	0
50181	D	3A	151-3	V1L351	P4T771	20041002	8	9	9	9.9	8	10	10	10	STANDARD	5H	233-04-A	2	0
50337	D	3A	151-3	V1L351	P4T771	20041202	6	10	9	9.9	9	10	10	10	STANDARD	7T	234-04-A	1	0
50083	E	2	151-3	V1L351	P4T771	20040924	7	9	9	9.9	7	10	9	9.9	STANDARD	2L	232-04-A	2	0
50084	E	2	151-3	V1L351	P4T771	20041105	7	9	9	9.9	7	10	9	9.9	STANDARD	7P	232-04-B	2	0

ADDITIONAL TESTS FOR MATRIX EVALUATION

CMIR	Lab	Std.	Oil	Pinbat	Ringbat	DTCOMP	Pwear	Pridg	Pripp	Pspit	Rwear	Rridg	Rripp	Rspit	Test Type	Match #	ASMBDT	lpcrat	fpcrat
53449	B	191	127	V1L351	P4T771	20050111	6	4	6	9.9	6	5	9	9.9	LOWTEMP	5C	231-04-B	2	0
52393	B	191	128-1	V1L351	P4T771	20050110	8	9	5	10	7	10	8	10	LOWTEMP	7X	232-04-B	2	0
53535	B	191	153	V1L351	P4T771	20041127	8	10	9	9.9	8	10	10	10	LOWTEMP	7T	232-04-B	2	0

Attachment 5
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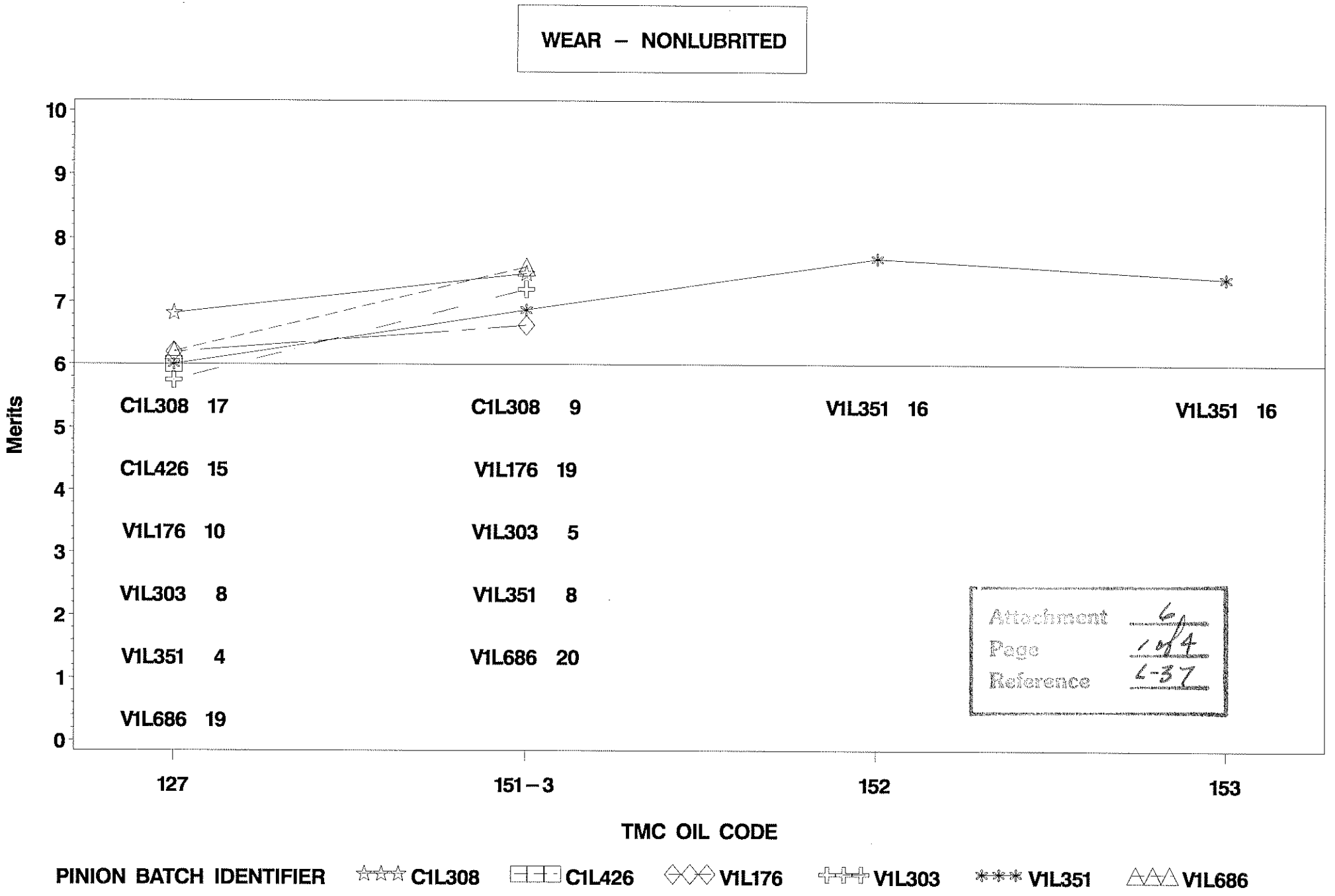
Reference L-37

L-37 Reference Oil Performance by Pinion Batch



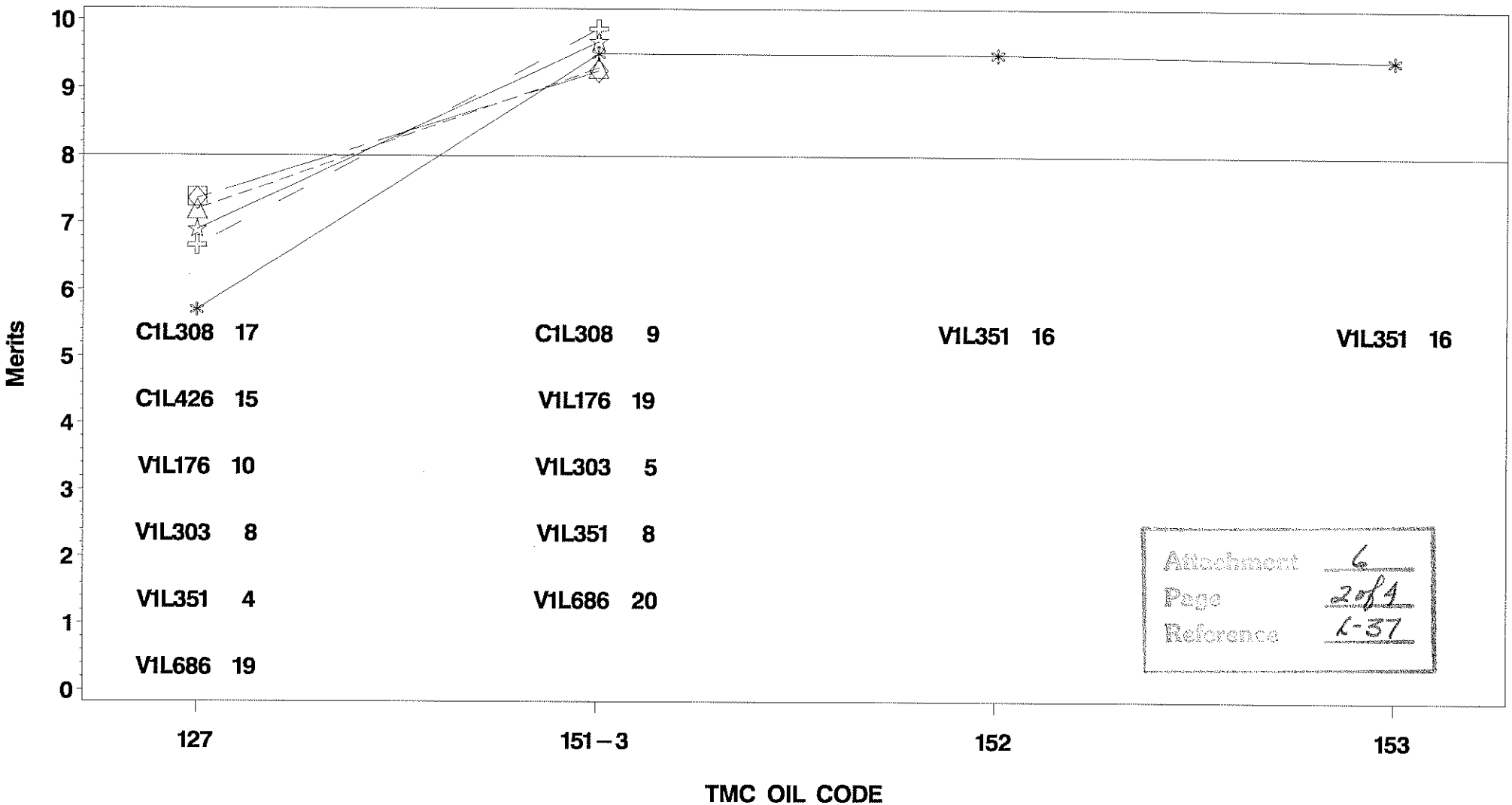
Attachment 6
Page 4 of 4
Reference L-37

151-2 results included with 151-3

L – 37 Reference Oil Performance by Pinion Batch

RIDGING – NONLUBRITED

Back Transformed Averages



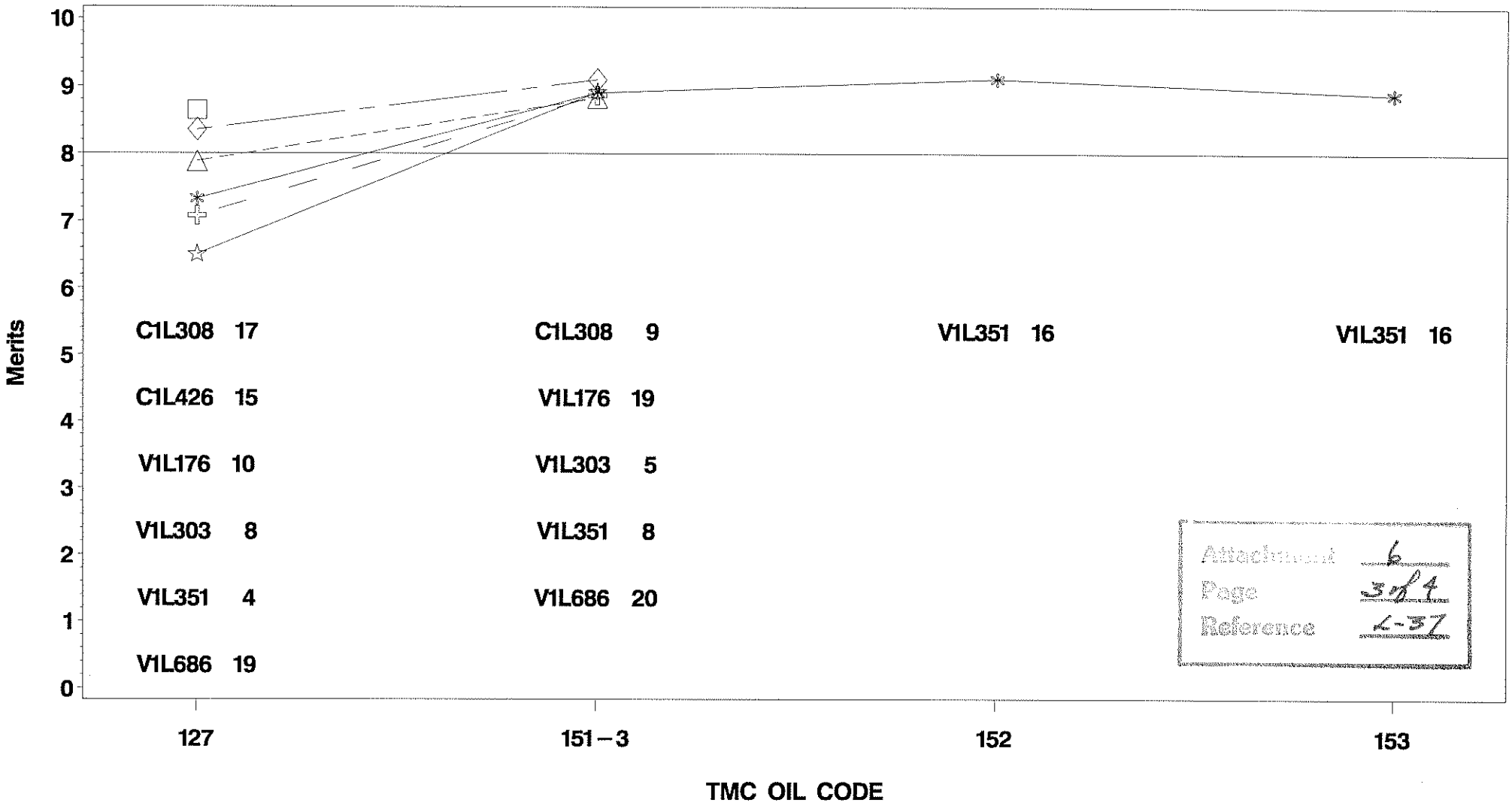
Attachment 6
Page 2 of 4
Reference L-37

151 – 2 results included with 151 – 3

L-37 Reference Oil Performance by Pinion Batch

RIPPLING – NONLUBRITED

Back Transformed Averages



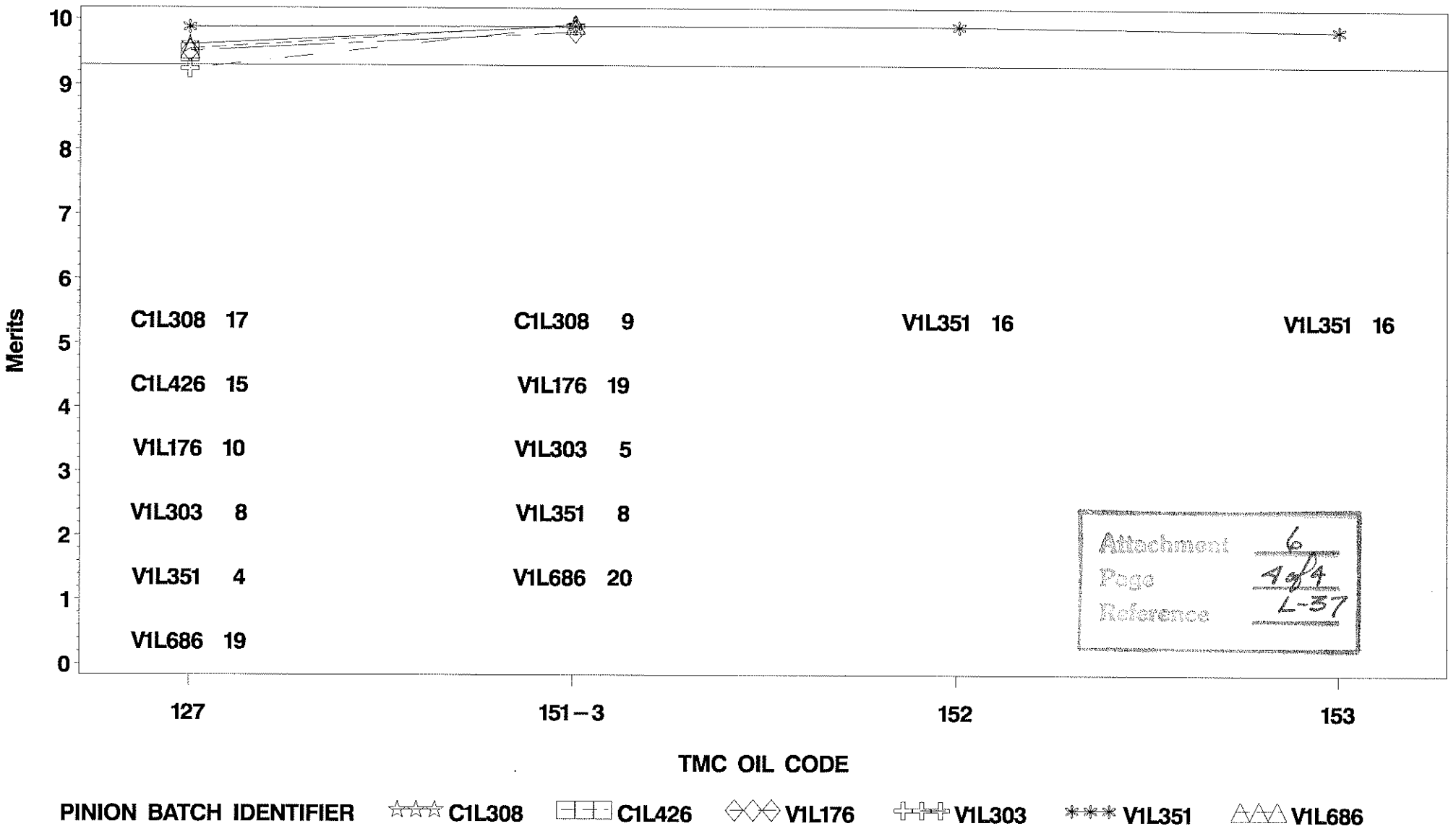
Attachment 6
Page 3 of 4
Reference L-37

151-2 results included with 151-3

L-37 Reference Oil Performance by Pinion Batch

PITTING/SPALLING – NONLUBRITED

Back Transformed Averages



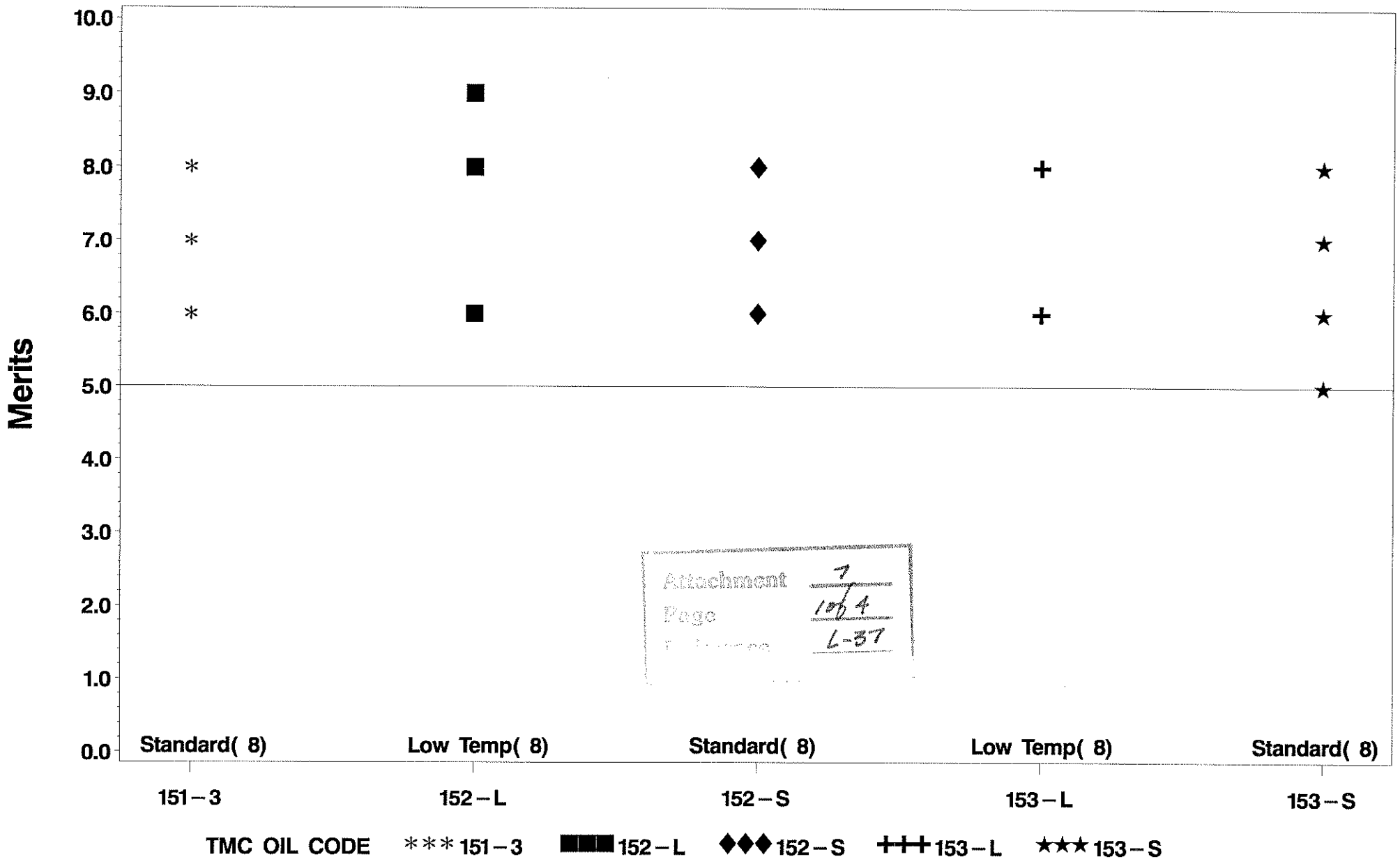
Attachment 6
Page 4 of 4
Reference L-37

151–2 results included with 151–3

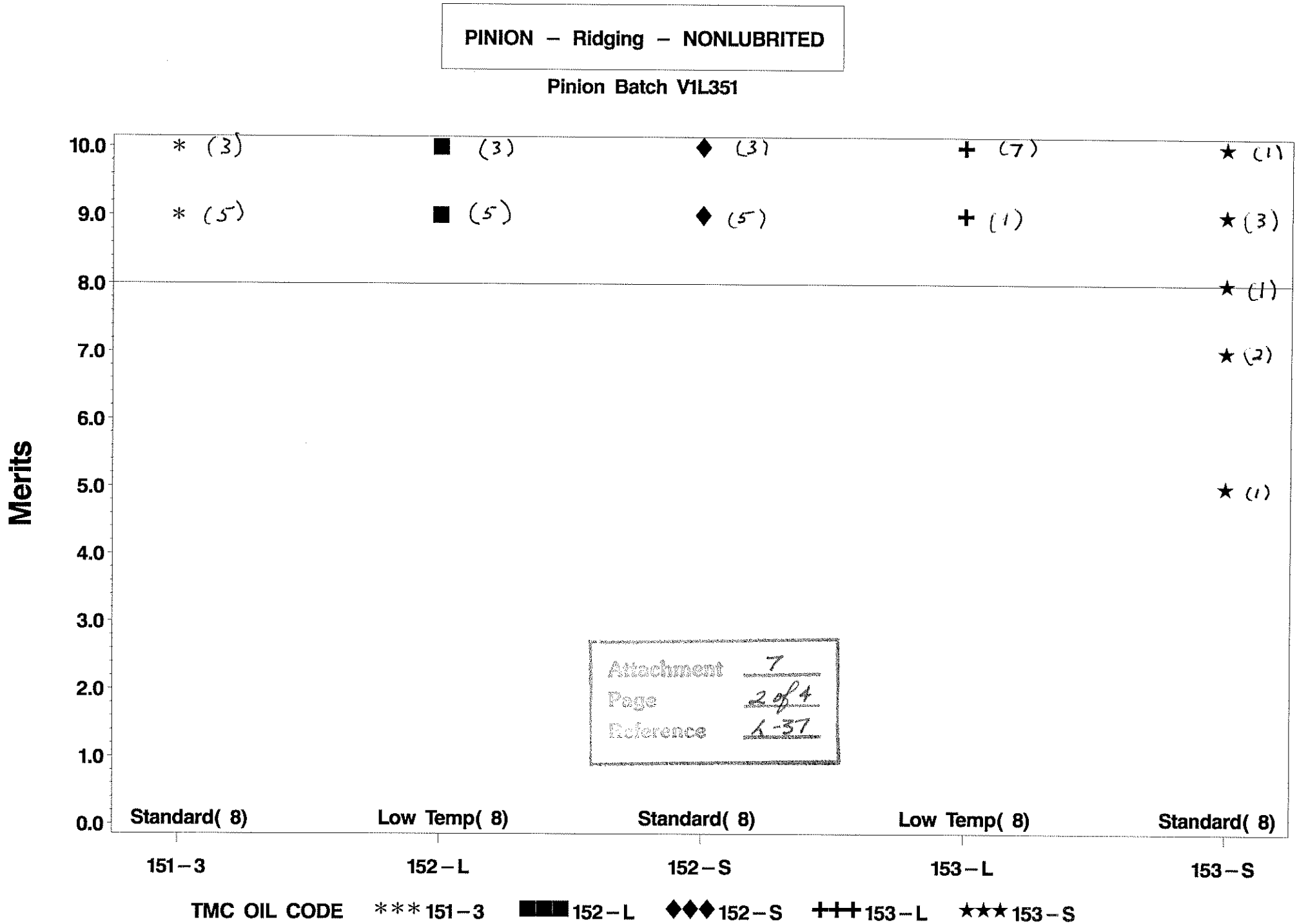
L-37 Reference Oil Performance by Oil and Test Version

PINION – Wear – NONLUBRITED

Pinion Batch V1L351



L–37 Reference Oil Performance by Oil and Test Version



Attachment 7
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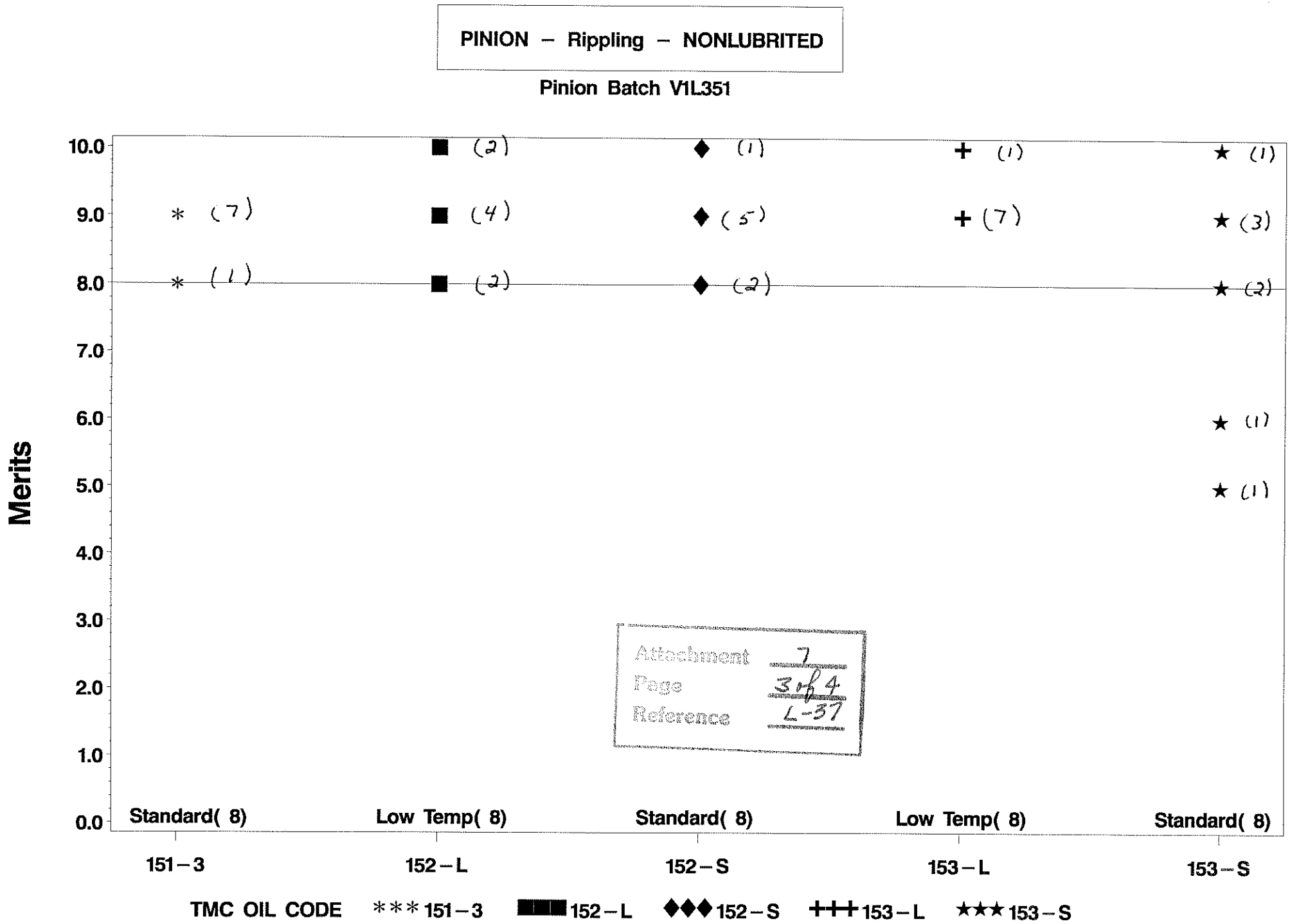
Reference L-37

L–37 Reference Oil Performance by Oil and Test Version

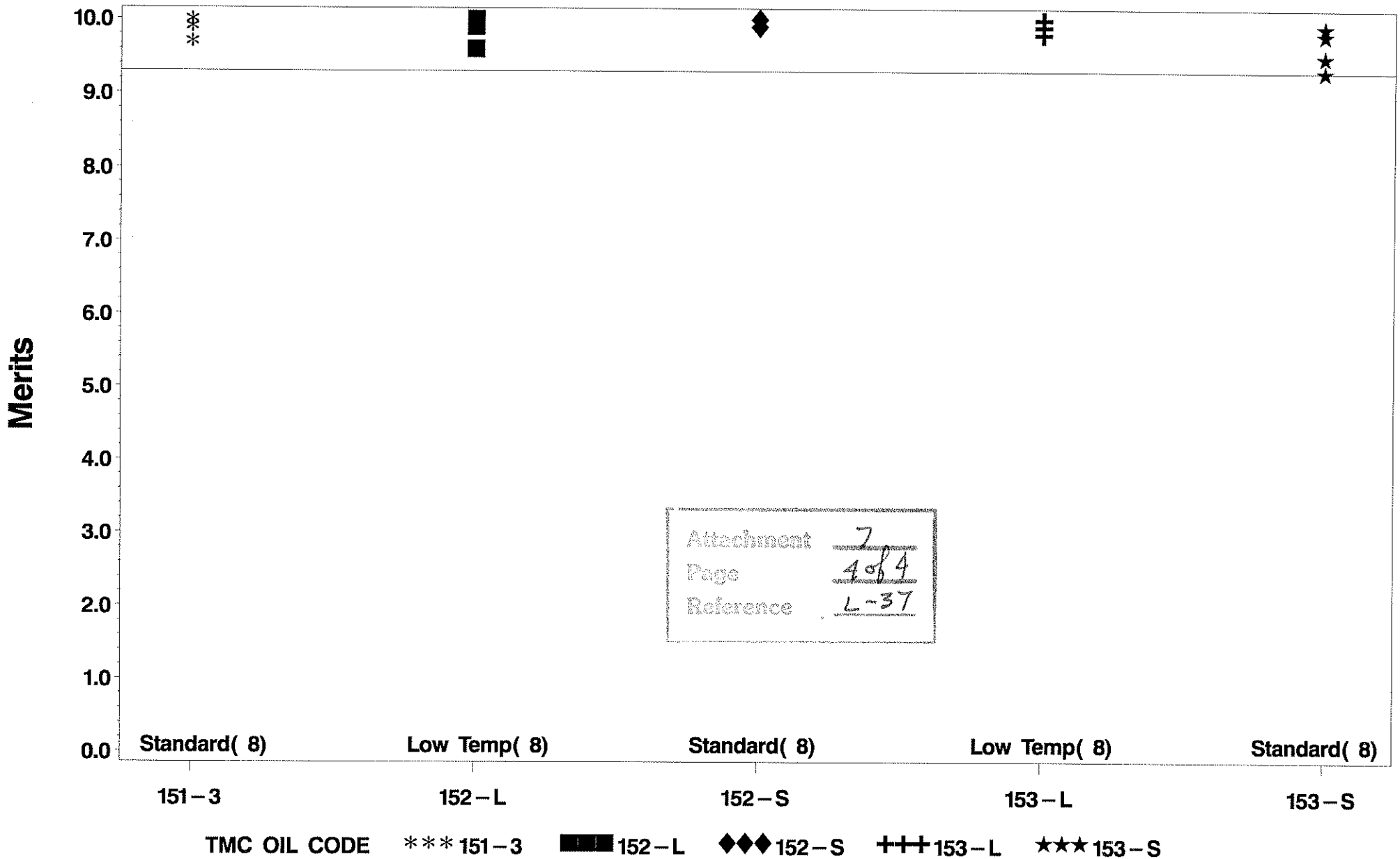


Attachment 7
Page 3 of 4
Reference L-37

L-37 Reference Oil Performance by Oil and Test Version

PINION – Spitting – NONLUBRITED

Pinion Batch V1L351



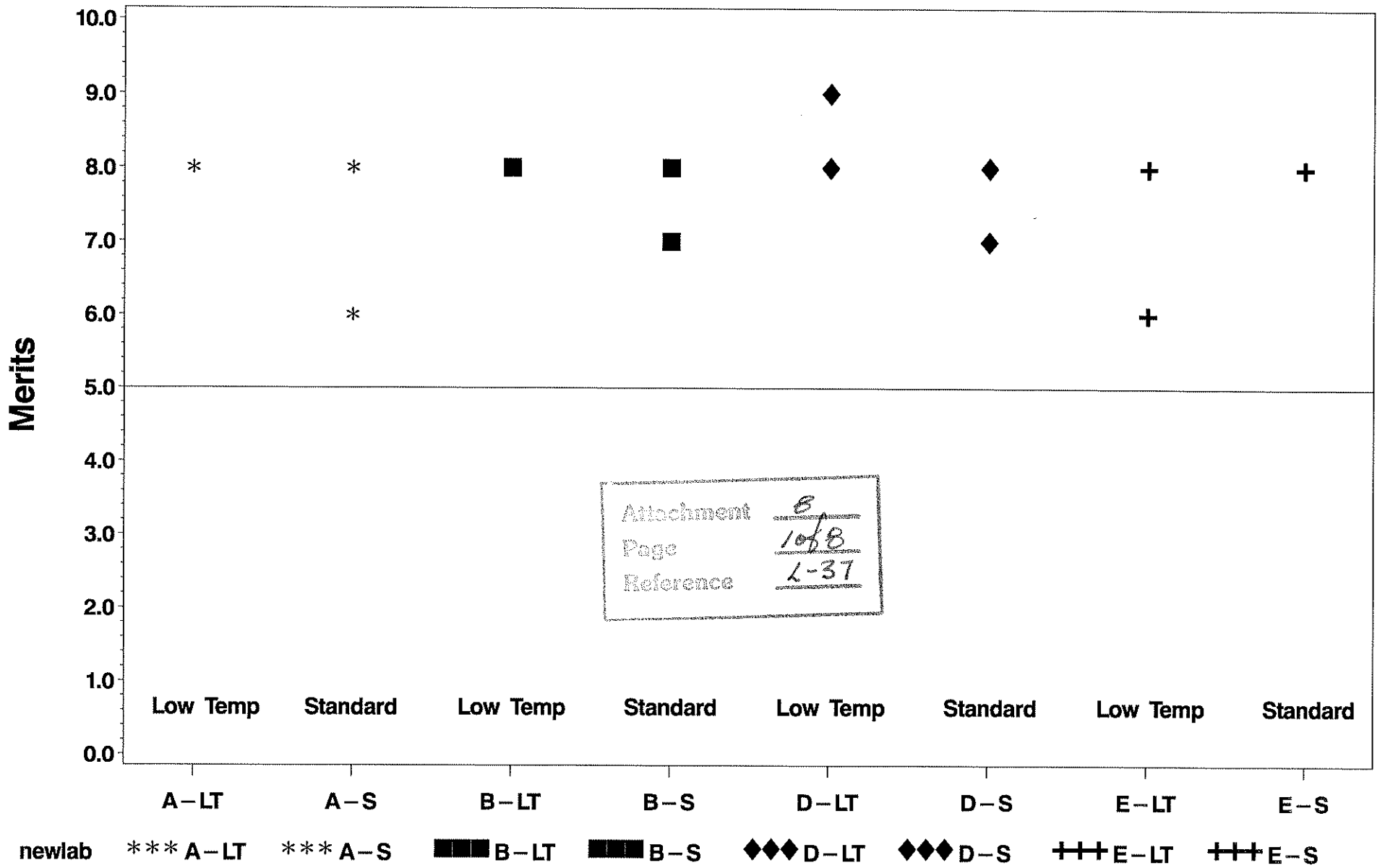
Attachment 7
Page 4 of 4
Reference L-37

L-37 Reference Oil Performance by LTMSLAB

PINION – Wear – NONLUBRITED

Reference Oil 152

Pinion Batch V1L351



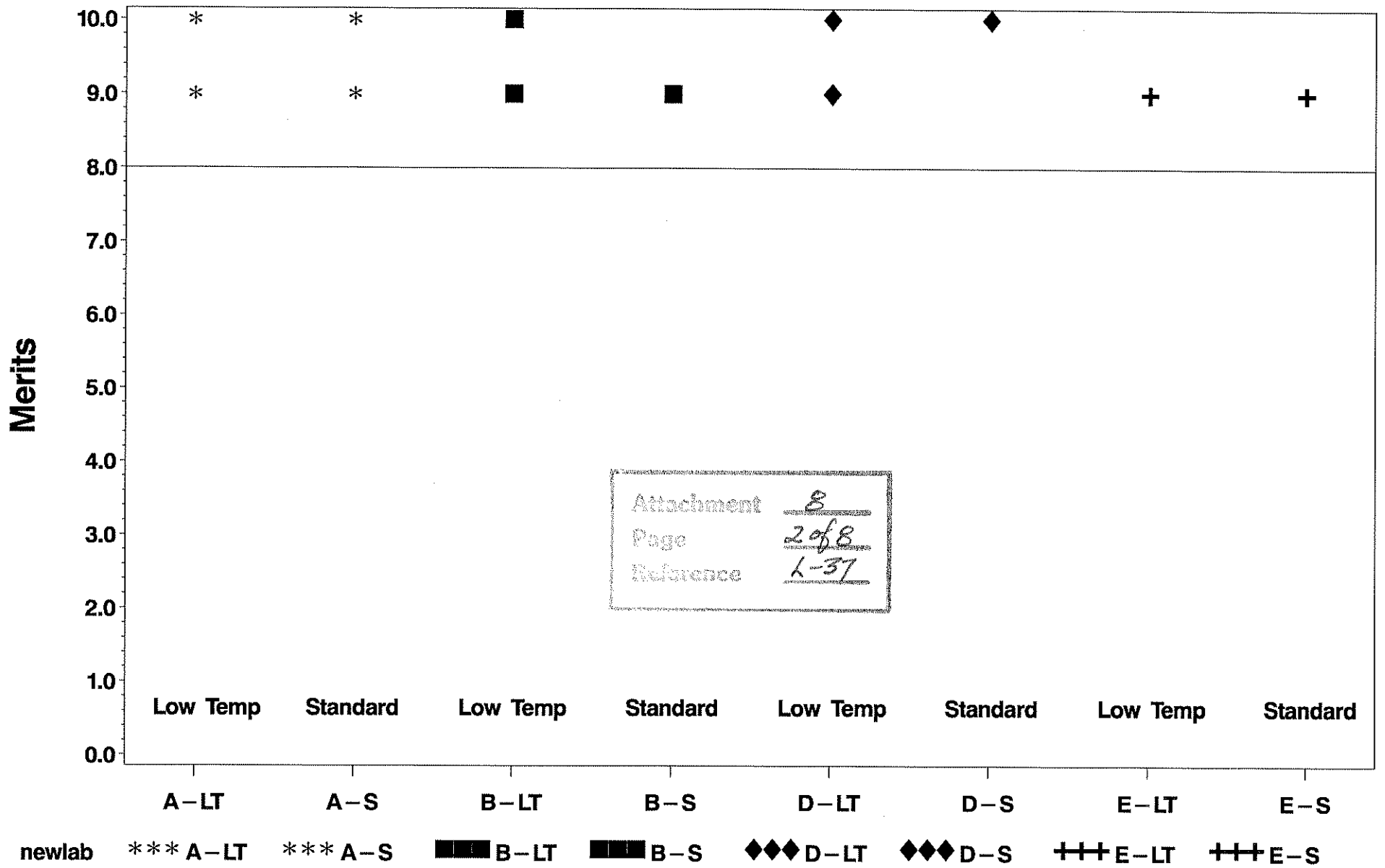
Attachment 8
Page 10 of 8
Reference L-37

L-37 Reference Oil Performance by LTMSLAB

PINION – Ridging – NONLUBRITED

Reference Oil 152

Pinion Batch V1L351



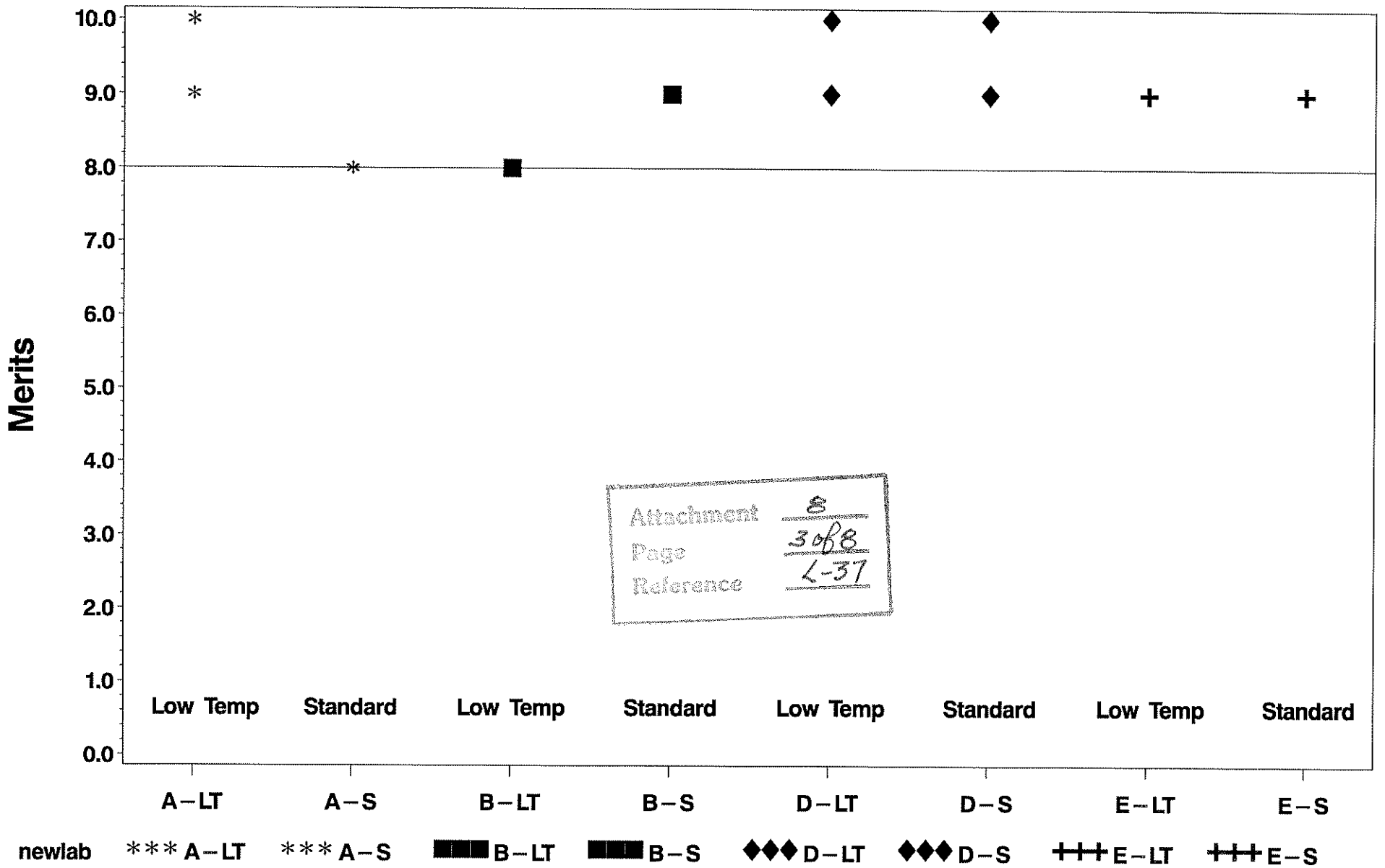
Attachment 8
Page 2 of 8
Reference L-37

L-37 Reference Oil Performance by LTMSLAB

PINION – Rippling – NONLUBRITED

Reference Oil 152

Pinion Batch V1L351



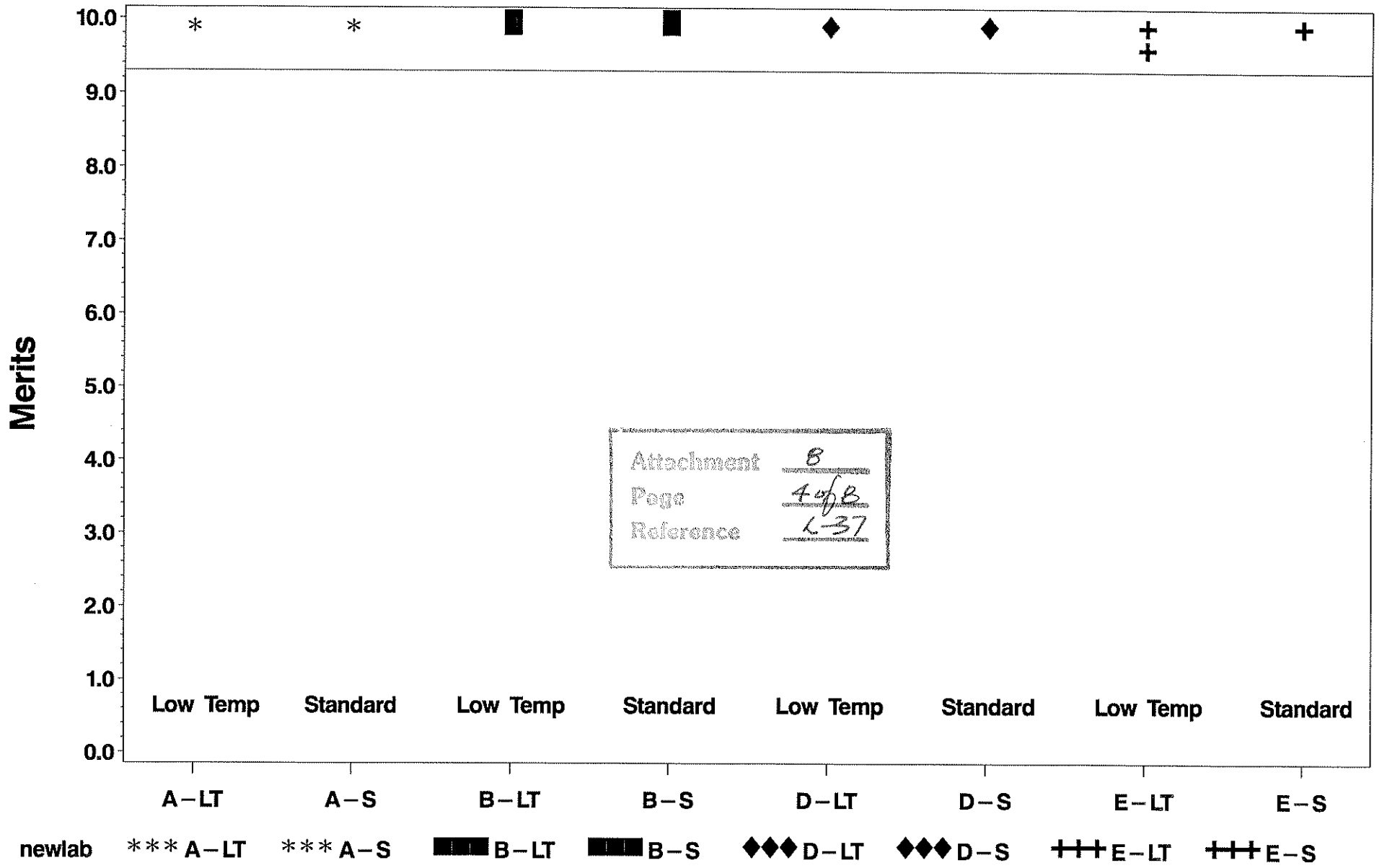
Attachment 8
Page 3 of 8
Reference L-37

L-37 Reference Oil Performance by LTMSLAB

PINION – Spitting – NONLUBRITED

Reference Oil 152

Pinion Batch V1L351



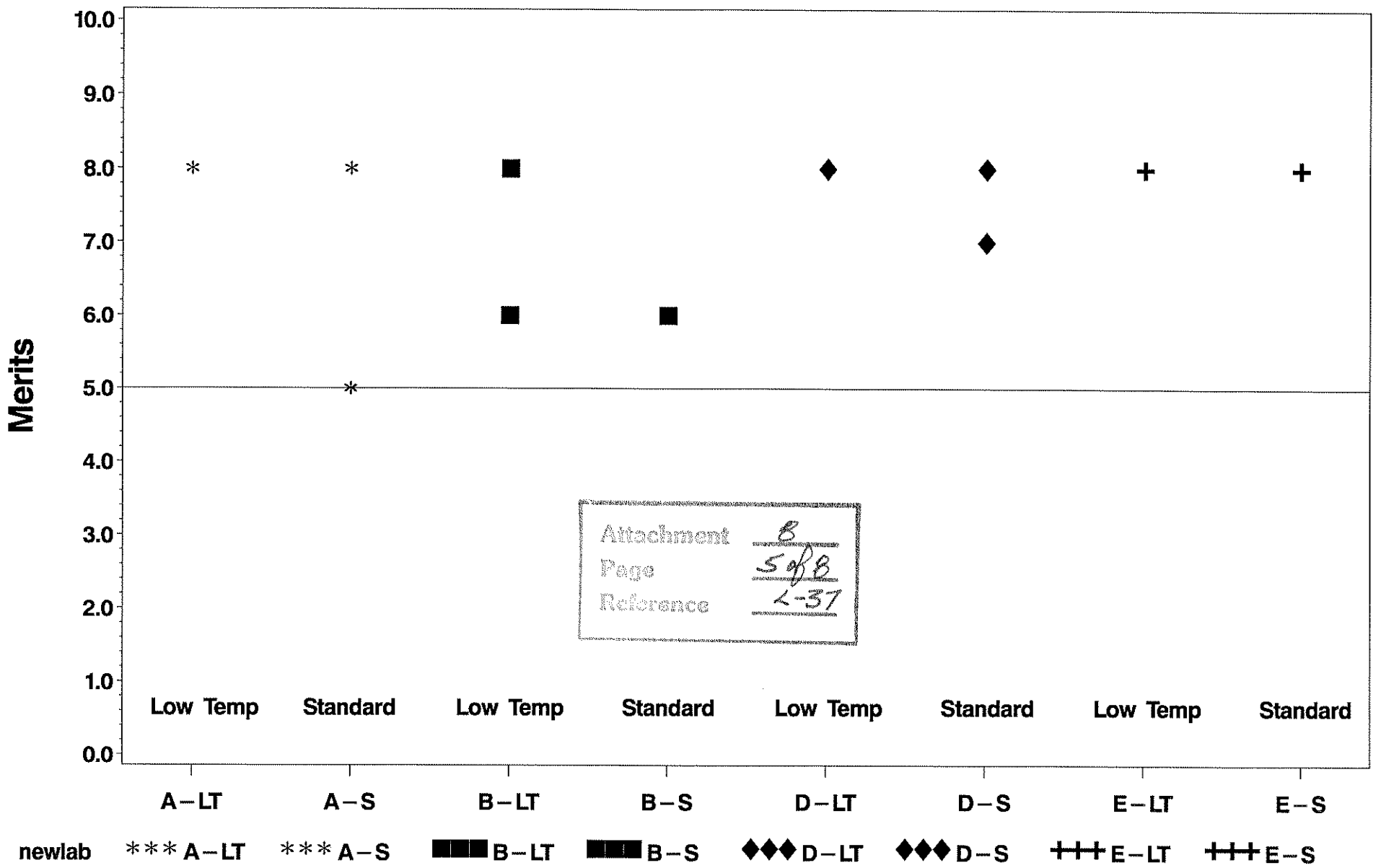
Attachment 8
Page 4 of 8
Reference L-37

L-37 Reference Oil Performance by LTMSLAB

PINION – Wear – NONLUBRITED

Reference Oil 153

Pinion Batch V1L351



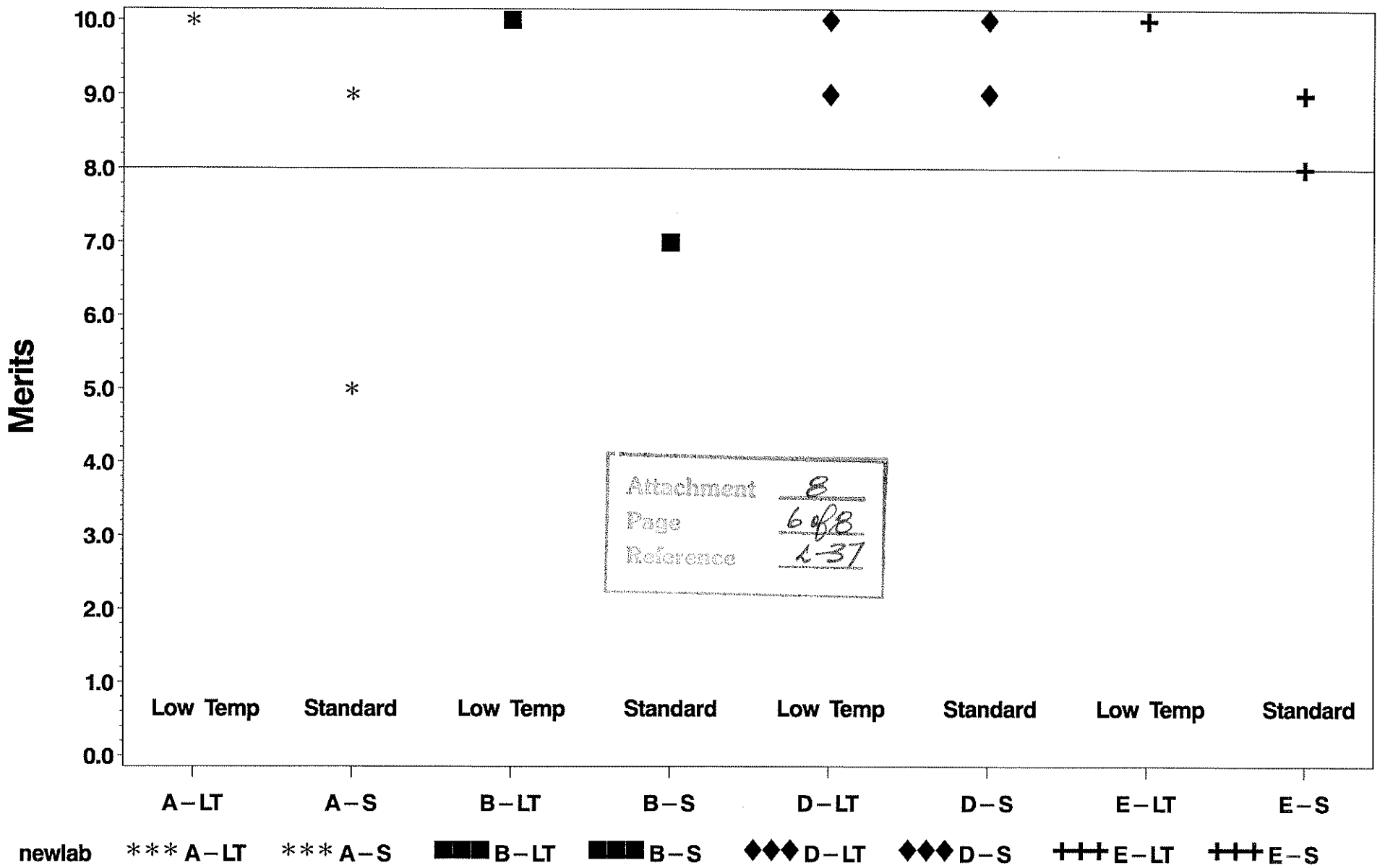
Attachment B
Page 5 of 8
Reference L-37

L-37 Reference Oil Performance by LTMSLAB

PINION – Ridging – NONLUBRITED

Reference Oil 153

Pinion Batch V1L351

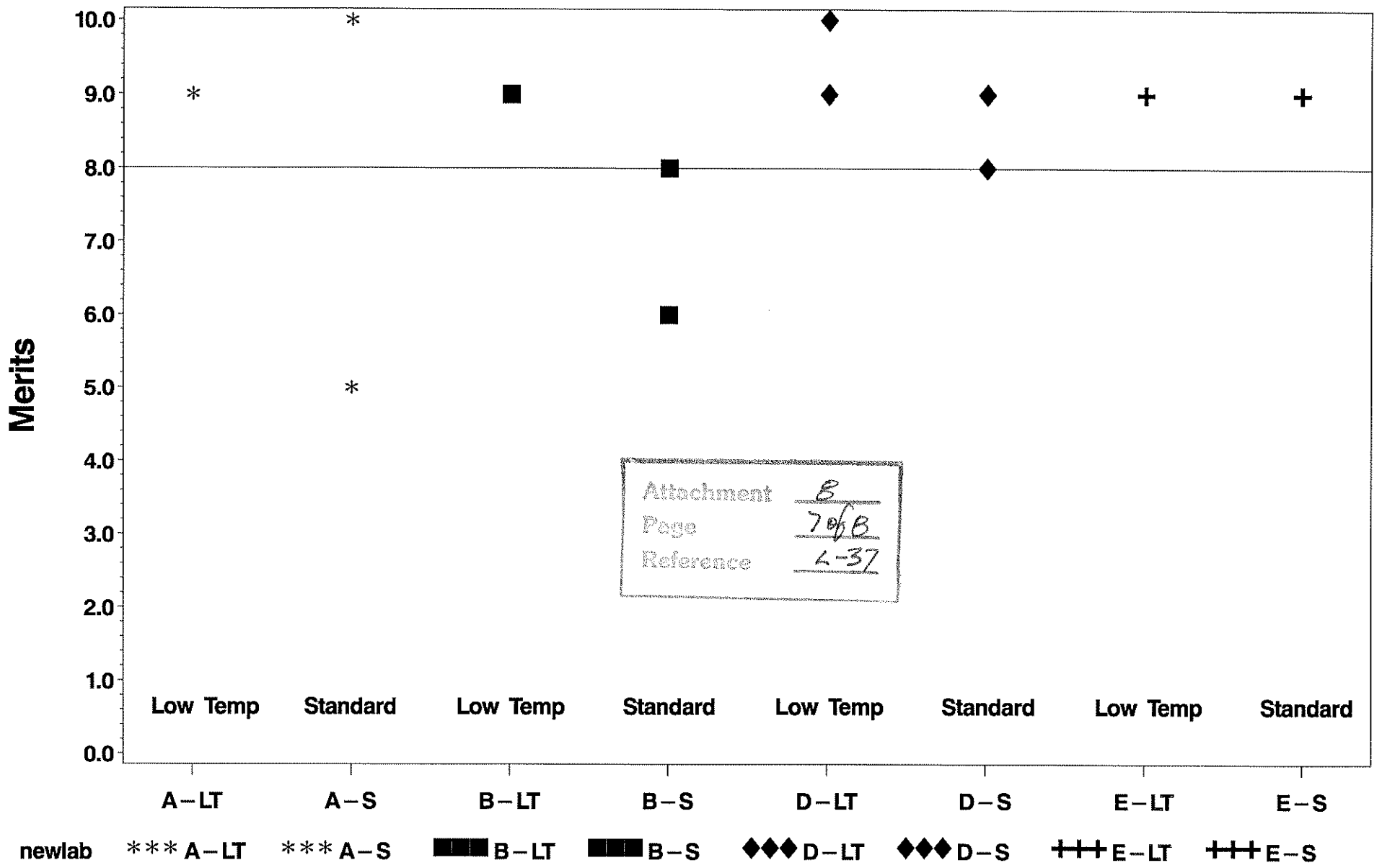


L-37 Reference Oil Performance by LTMSLAB

PINION – Rippling – NONLUBRITED

Reference Oil 153

Pinion Batch V1L351



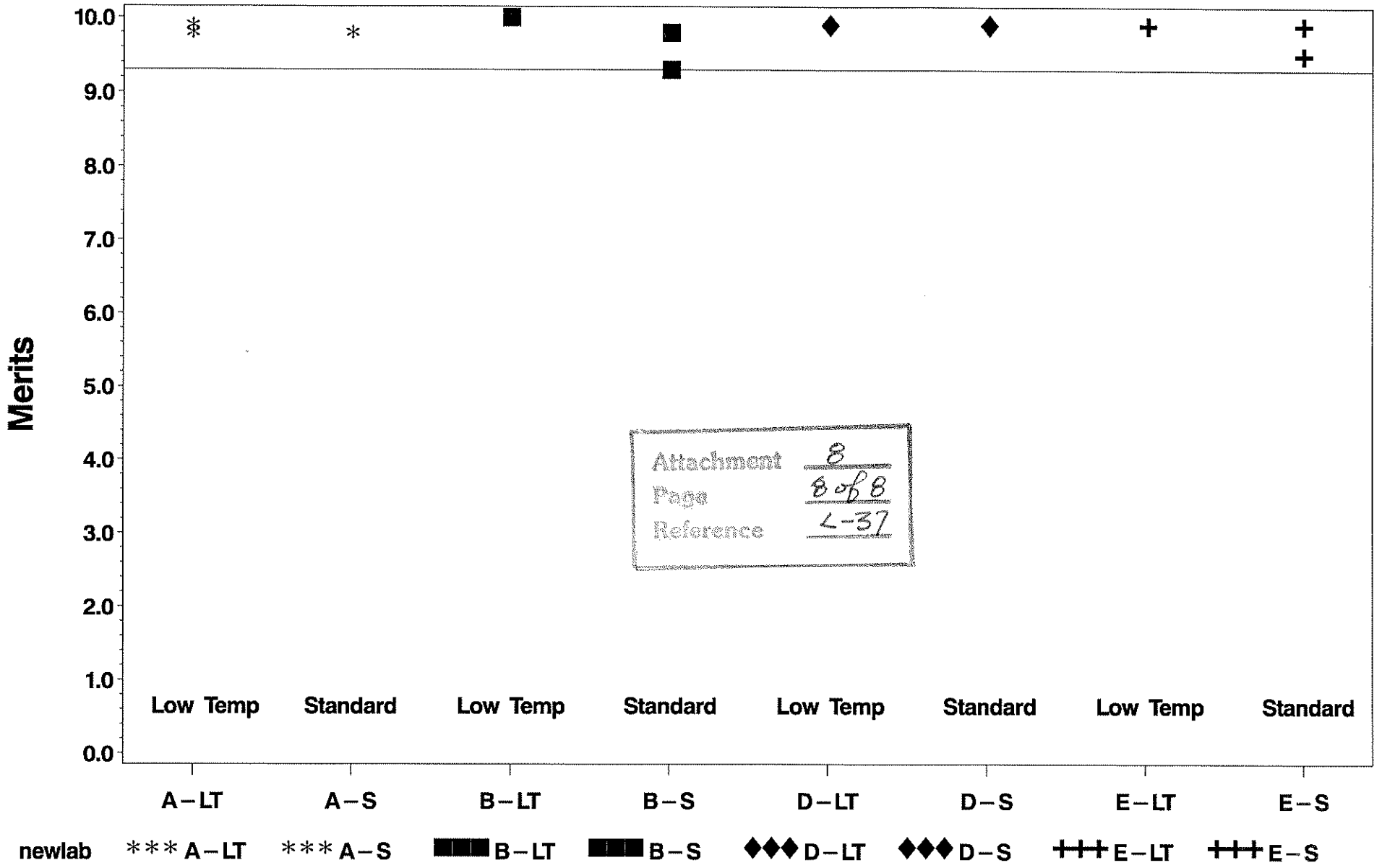
Attachment B
Page 7 of 8
Reference L-37

L-37 Reference Oil Performance by LTMSLAB

PINION – Spitting – NONLUBRITED

Reference Oil 153

Pinion Batch V1L351



Attachment 8

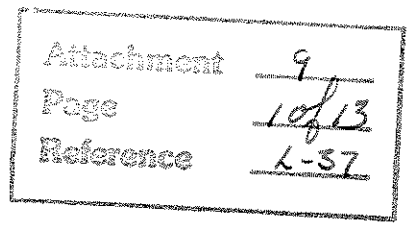
Page 8 of 8

Reference L-37

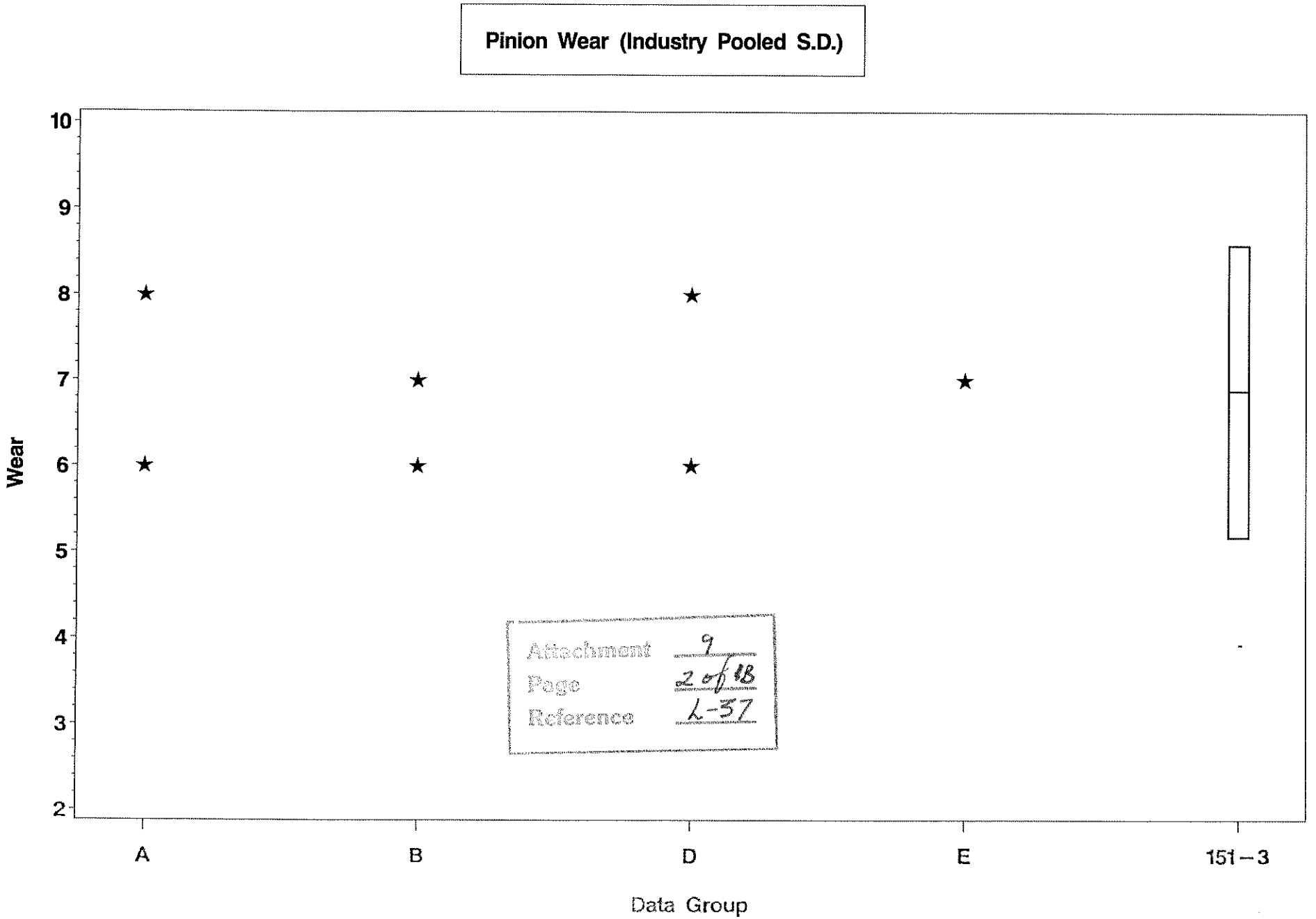
GEAR BATCH V1L351/P4T771								
REFERENCE OIL 151-3, 152, & 153 PINION TEST TARGETS								
Number of Tests = 8								
	Reference Oil 151-3			Reference Oil 152			Reference Oil 153	
	Mean	Standard Deviation		Mean	Standard Deviation		Mean	Standard Deviation
WEAR	6.88	0.948 (*)		7.50	0.948 (*)		7.00	0.948 (*)
RIDGING	0.007 (9.38)	0.6322 (*)		0.007 (9.38)	0.6322 (*)		-0.706 (8.00)	0.6322 (*)
RIPPLING	-0.469 (8.88)	0.5304 (*)		-0.396 (8.88)	0.5304 (*)		-0.696 (8.00)	0.5304 (*)
SPITTING	0.498 (9.89)	0.1703 (*)		0.534 (9.91)	0.1703 (*)		0.303 (9.74)	0.2700(**)

GEAR BATCH V1L351/P4T771								
REFERENCE OIL 151-3, 152, & 153 RING TEST TARGETS								
Number of Tests = 8								
	Reference Oil 151-3			Reference Oil 152			Reference Oil 153	
	Mean	Standard Deviation		Mean	Standard Deviation		Mean	Standard Deviation
WEAR	7.75	0.741 (*)		7.88	0.741 (*)		7.25	0.741 (*)
RIDGING	0.693 (10.0)	0.4821 (*)		0.693 (10.0)	0.4821 (*)		-0.195 (8.88)	0.4821 (*)
RIPPLING	0.007 (9.38)	0.5355 (*)		-0.131 (9.25)	0.5355 (*)		0.007 (9.38)	0.5355 (*)
SPITTING	0.537 (9.91)	0.1220 (*)		0.579 (9.94)	0.1220 (*)		0.493 (9.88)	0.1220 (*)

(*) Industry Pooled Standard Deviation
(**) Adjusted Industry Pooled Standard Deviation to Include Spitting Result of 9.3

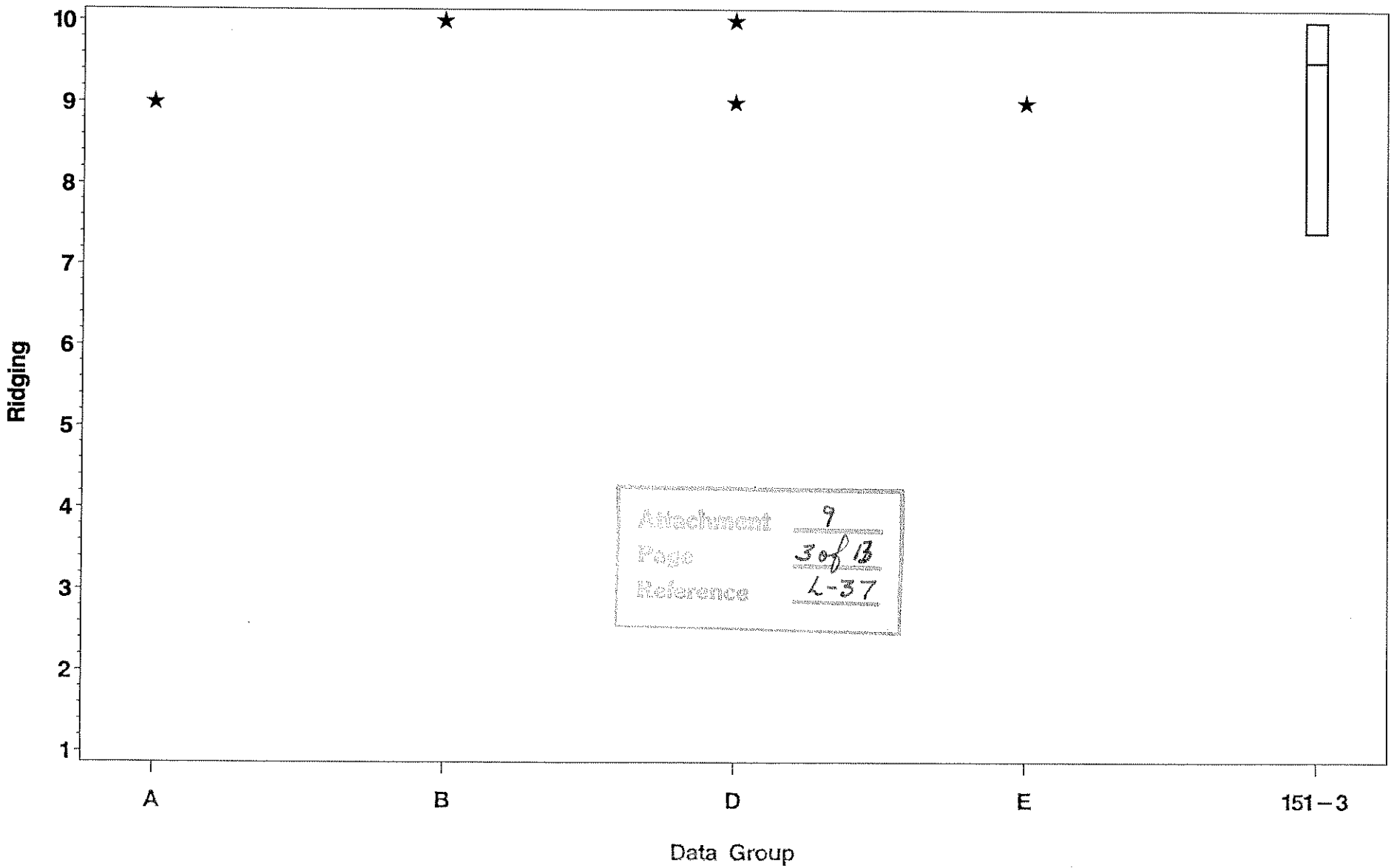


L-37 Non-lubrited Hardware (Pinion Batch V1L351/P4771)
Reference Oil 151-3
Test Target Data Set and Shewhart Severity Limits



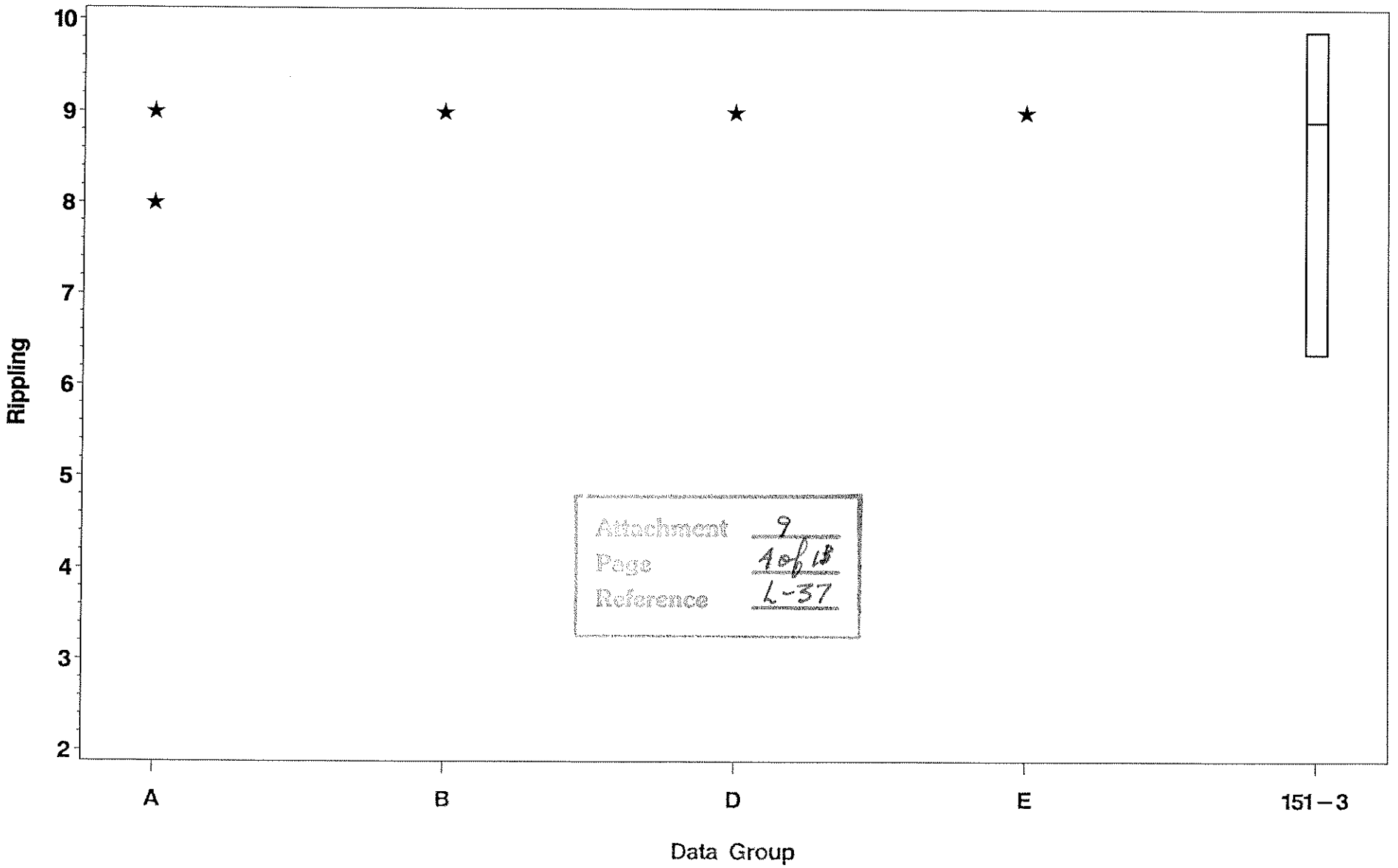
L-37 Non-lubrited Hardware, Pinion Batch V1L351/P4T771
Reference Oil 151-3
Test Target Data Set and Shewhart Severity Limits

Pinion Ridging, Industry Pooled S.D.



L-37 Non-lubrited Hardware, Pinion Batch V1L351/P4T771
Reference Oil 151-3
Test Target Data Set and Shewhart Severity Limits

Pinion Rippling, Industry Pooled S.D.



Attachment 9
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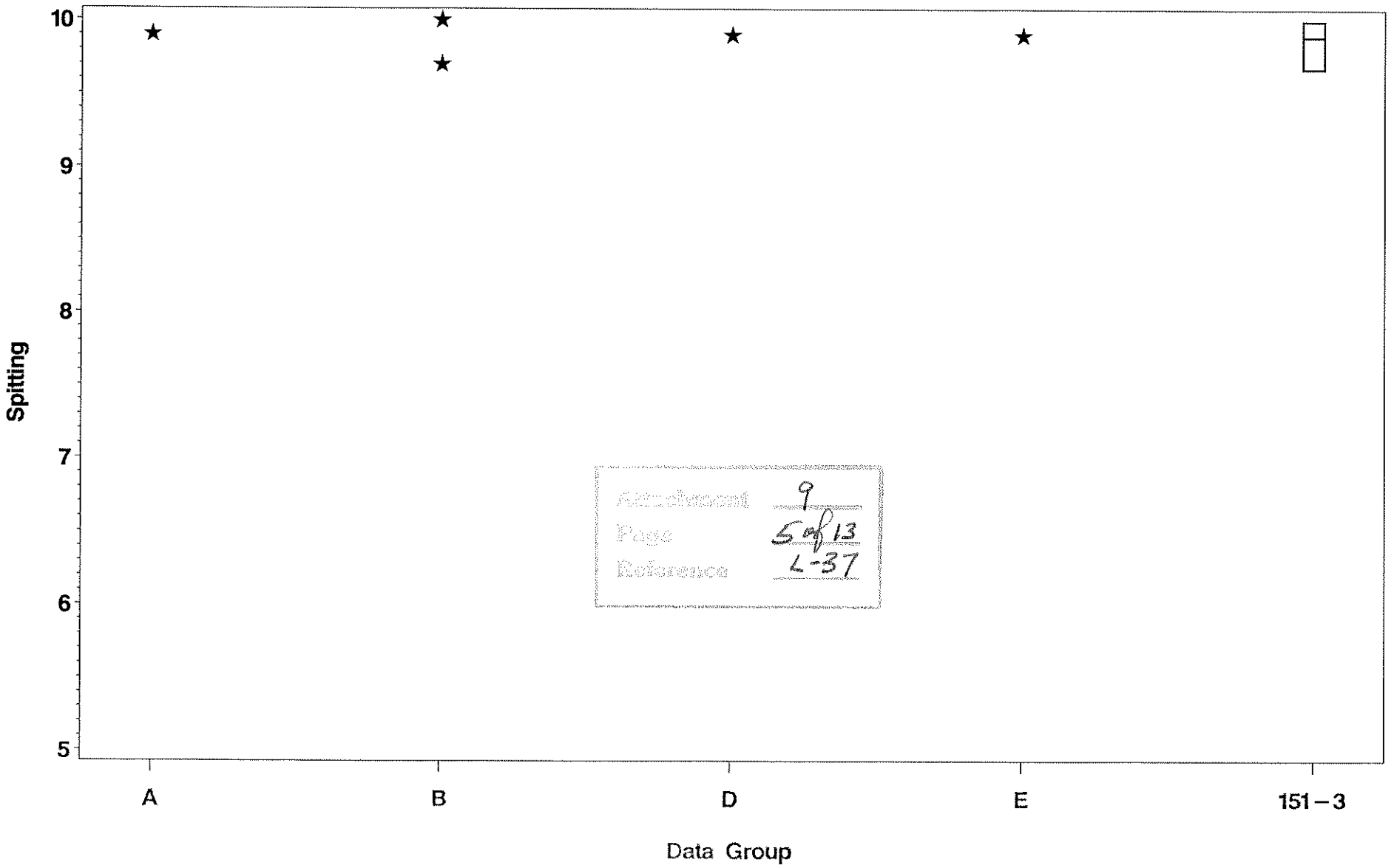
Reference L-37

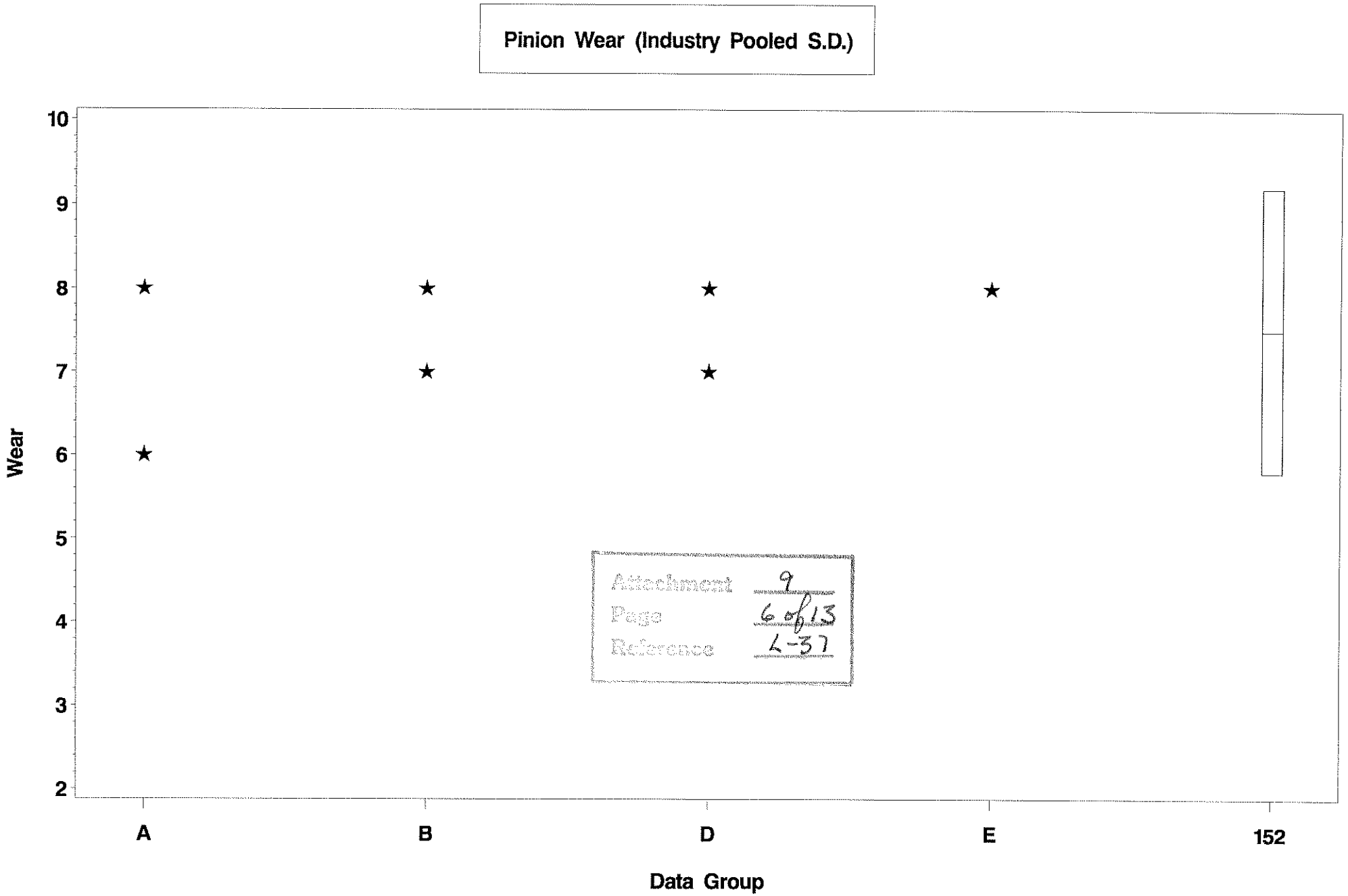
L-37 Non-lubrited Hardware, Pinion Batch V1L351/P4T771
Reference Oil 151-3
Test Target Data Set and Shewhart Severity Limits

Pinion Spitting, Industry Pooled S.D.



Attachment 9
Page 5 of 13
Reference L-37

L-37 Non-lubrited Hardware (Pinion Batch V1L351/P4771)
Reference Oil 152
Test Target Data Set and Shewhart Severity Limits



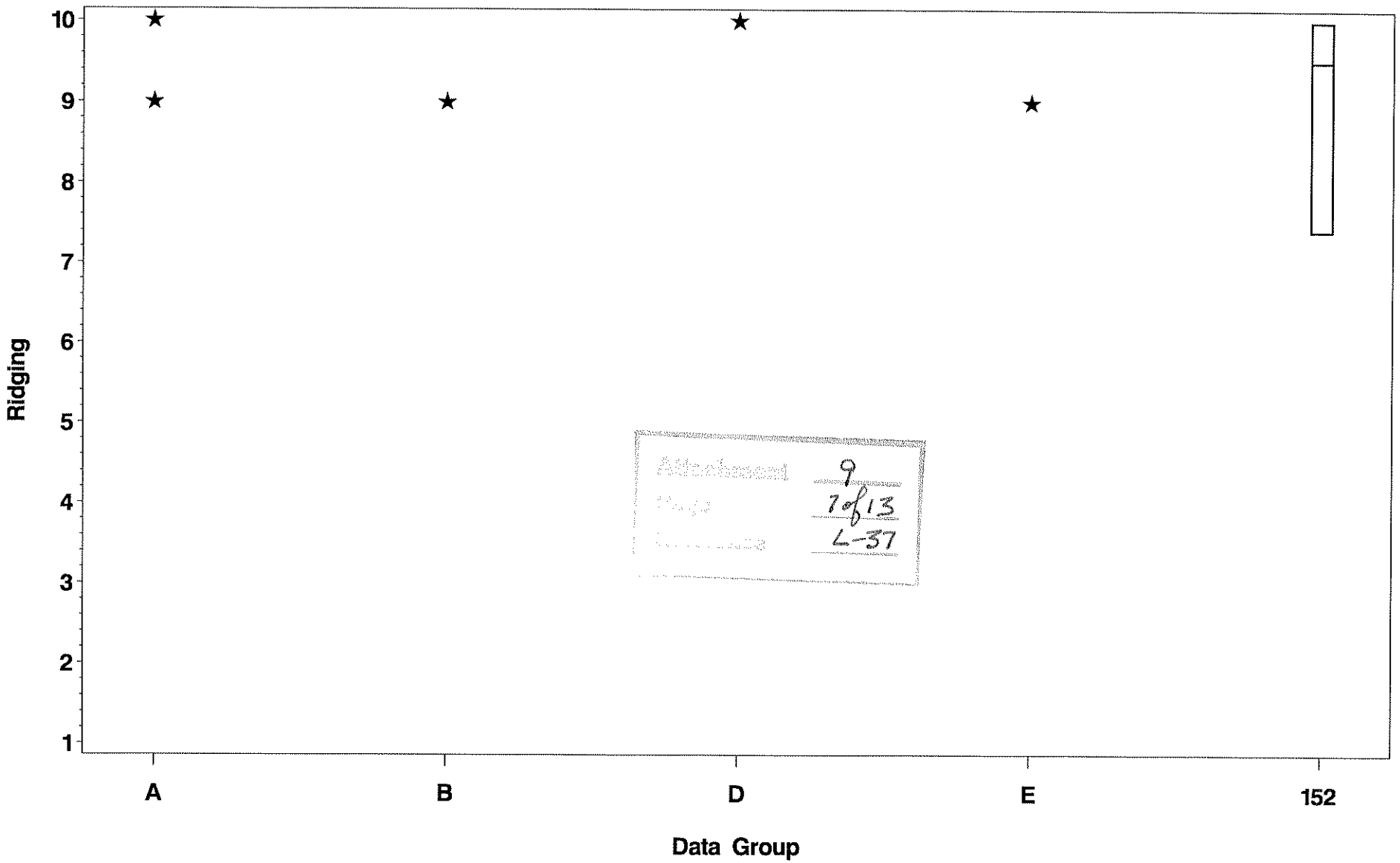
Attachment 9
Page 6 of 13
Reference L-37

L-37 Non-lubrited Hardware, Pinion Batch V1L351/P4T771

Reference Oil 152

Test Target Data Set and Shewhart Severity Limits

Pinion Ridging, Industry Pooled S.D.

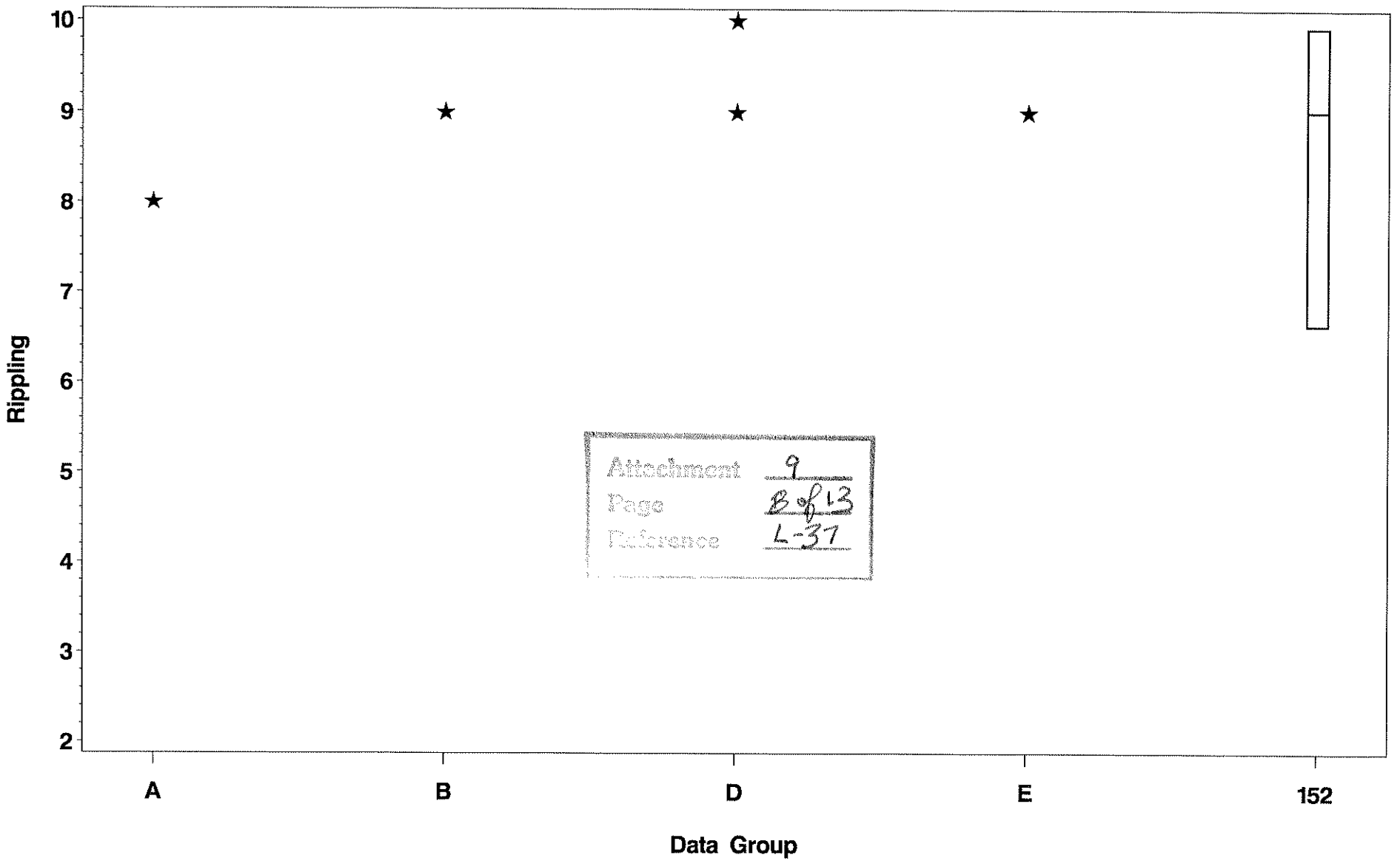


L-37 Non-lubrited Hardware, Pinion Batch V1L351/P4T771

Reference Oil 152

Test Target Data Set and Shewhart Severity Limits

Pinion Rippling, Industry Pooled S.D.

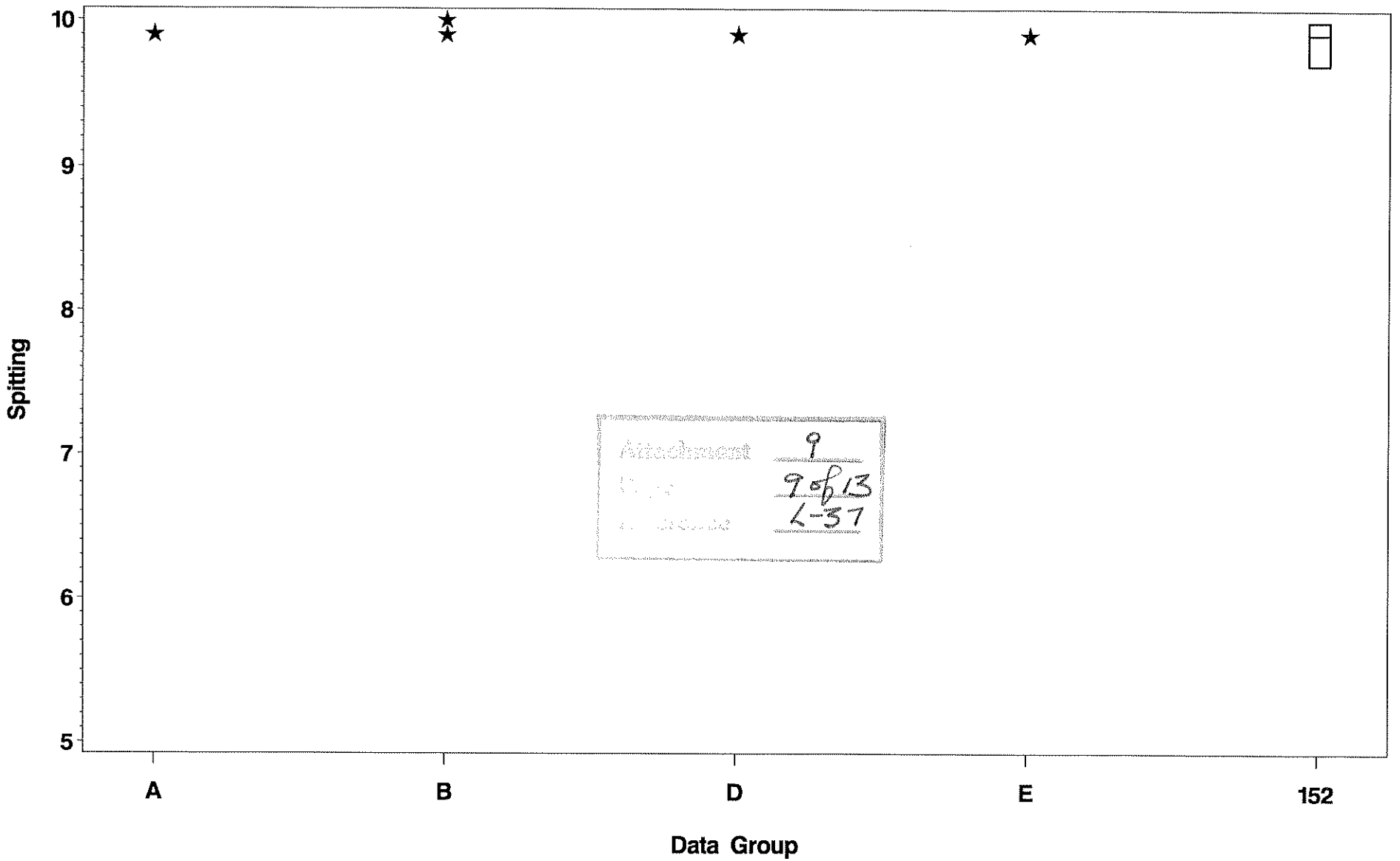


L-37 Non-lubrited Hardware, Pinion Batch V1L351/P4T771

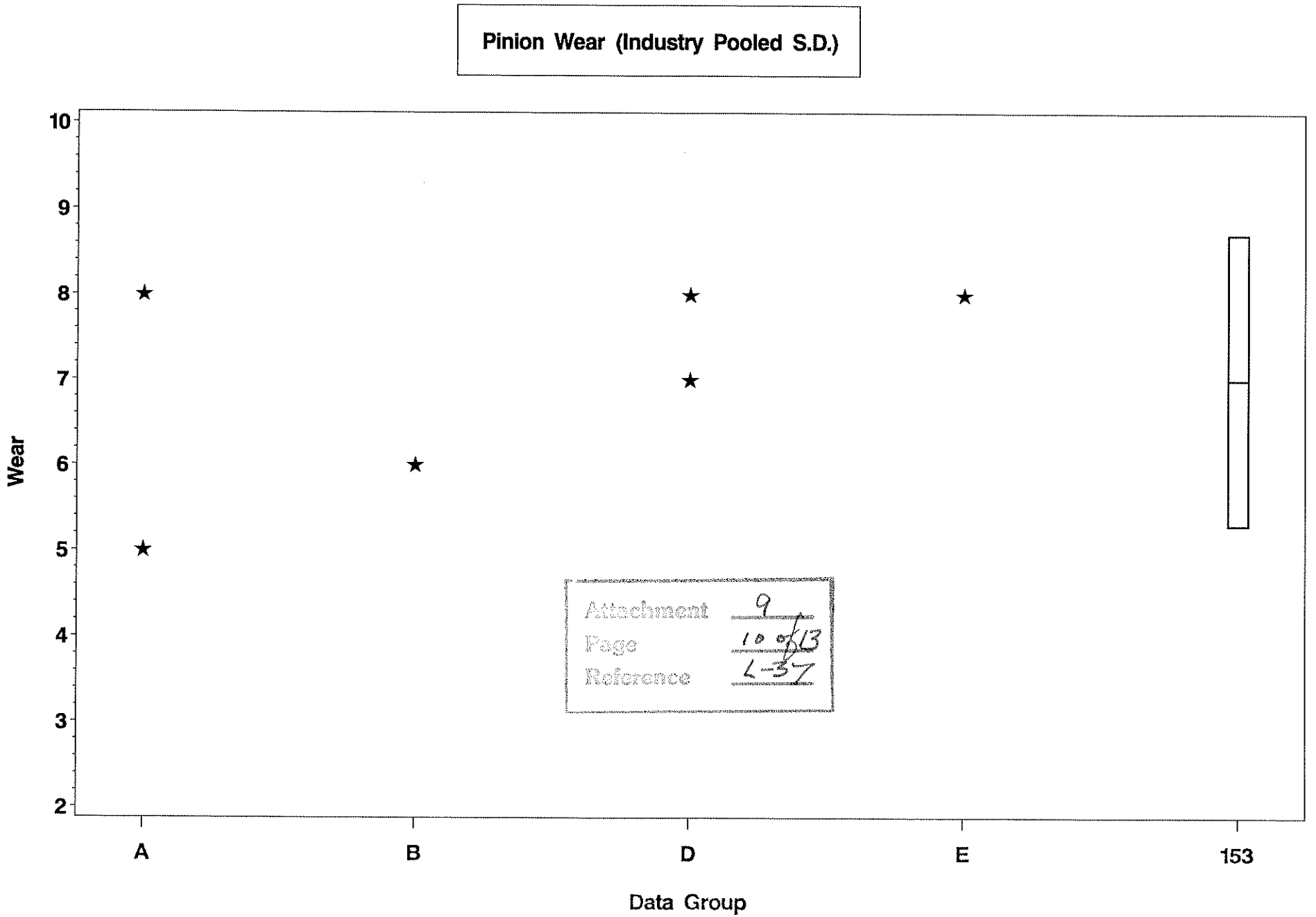
Reference Oil 152

Test Target Data Set and Shewhart Severity Limits

Pinion Spitting, Industry Pooled S.D.



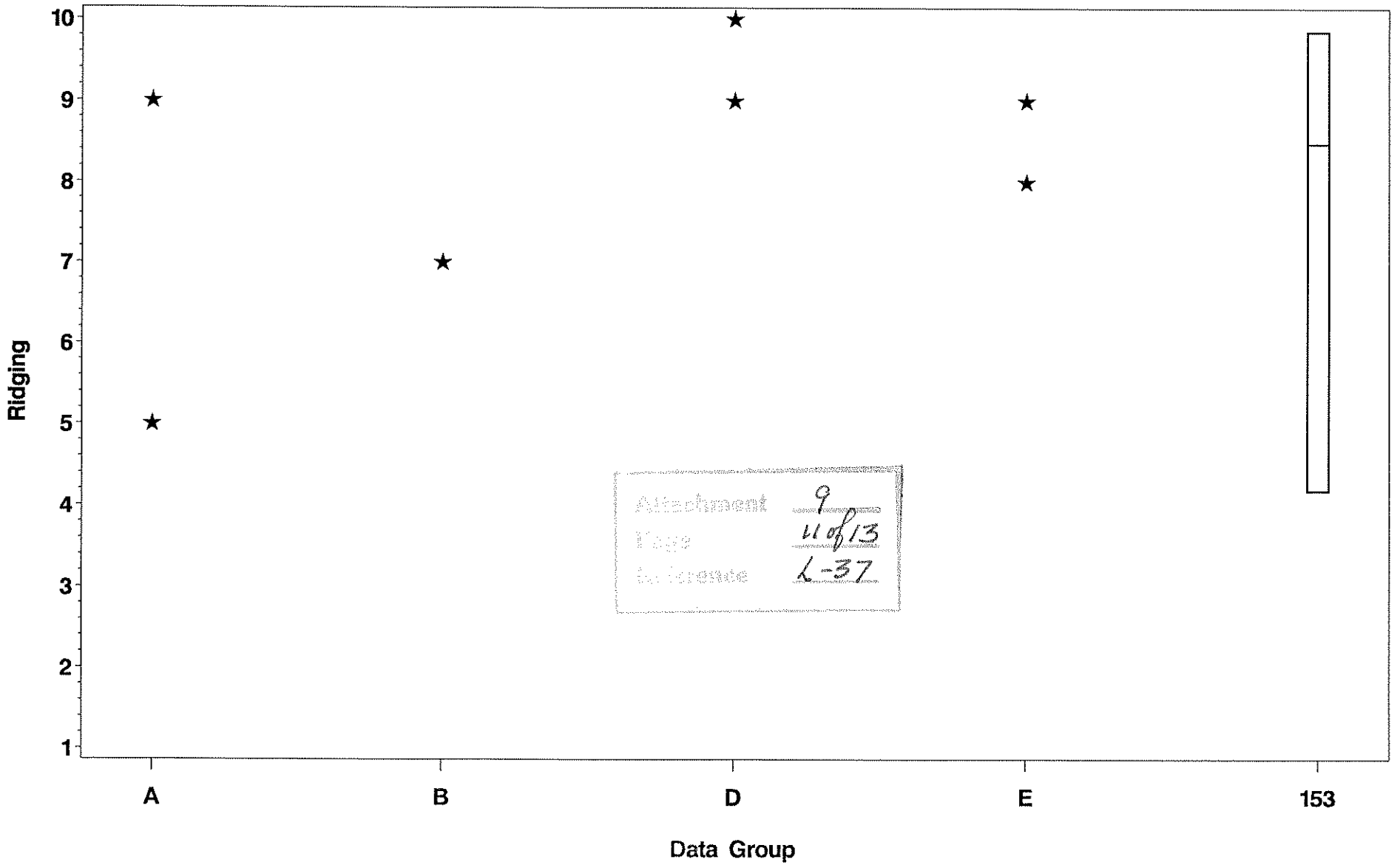
L-37 Non-lubrited Hardware (Pinion Batch V1L351/P4771)
Reference Oil 153
Test Target Data Set and Shewhart Severity Limits



Attachment 9
Page 10 of 13
Reference L-37

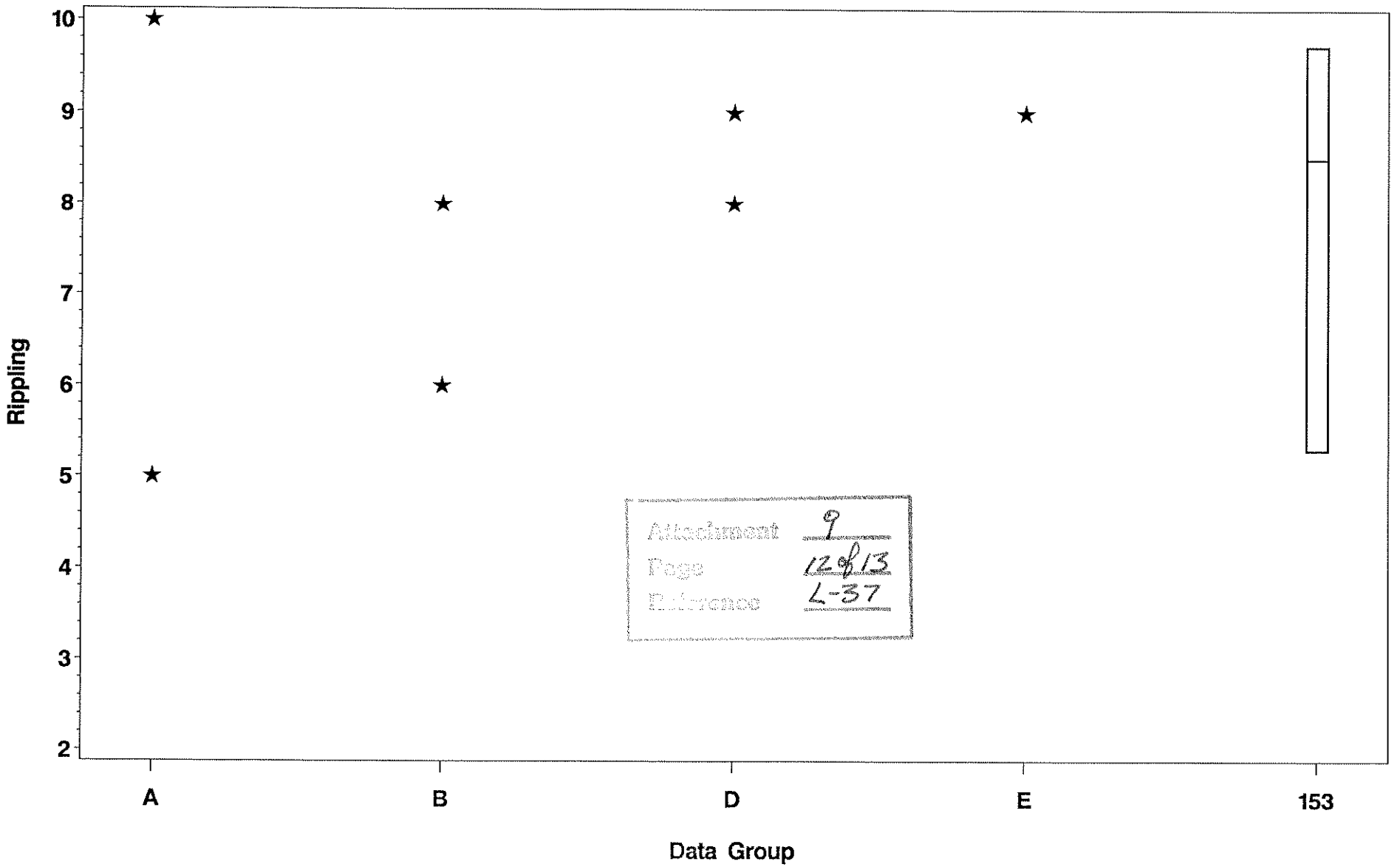
L-37 Non-lubrited Hardware, Pinion Batch V1L351/P4T771
Reference Oil 153
Test Target Data Set and Shewhart Severity Limits

Pinion Ridging, Industry Pooled S.D.



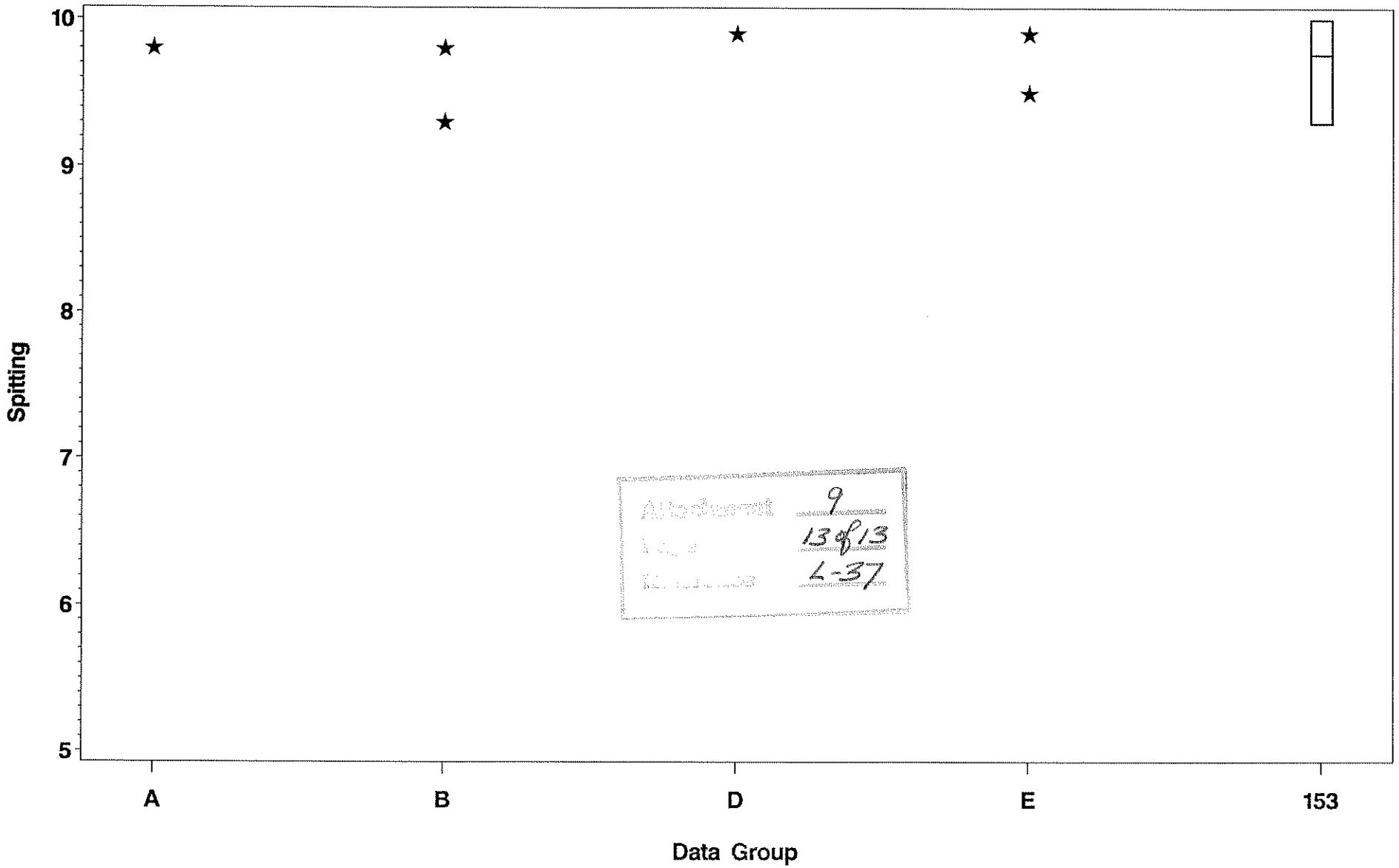
L-37 Non-lubrited Hardware, Pinion Batch V1L351/P4T771
Reference Oil 153
Test Target Data Set and Shewhart Severity Limits

Pinion Rippling, Industry Pooled S.D.



L-37 Non-lubrited Hardware, Pinion Batch V1L351/P4T771
Reference Oil 153
Test Target Data Set and Shewhart Severity Limits

Pinion Spitting, Industry Pooled S.D.



PERFORMANCE REVIEW INSTITUTE®

an affiliate of SAE

November 12, 2003

William T Sullivan
Associate Chemist
ExxonMobil Chemical Co
P.O. Box 3140
Edison, NJ 08818-3140

Dear Bill:

I am writing to you because you are the Chairman of the ASTM Section D2.B03 Gear Oils on behalf of the LRI Gear Lubricant Review Committee. As you know, the LRI reviews on a regular basis for SAE 75W lubricants "low temperature" or "Canadian" versions of the ASTM D6121 (L-37) Test Method and the L-42 Test method. Unfortunately, there seems to be discrepancy from lab to lab in the exact procedure to be followed for this version of the test. This variability is likely to affect the outcome of the test.

Based on this, the LRI Gear Lubricant Review Committee would like to request that the ASTM develop a reference process and standardized test procedures for the low-temperature version of the ASTM D6121 (L-37) and L-42 test procedures. The LRI will continue to review these test as they are being currently run by the laboratories until such time a new procedure is developed. If an ASTM consensus position that is different from this is presented to the LRI Gear Lubricant Review Committee, it will be considered at that time.

Should you have any questions, or would like to discuss this further please contact me. The LRI Gear Lubricant Review Committee appreciates your consideration of this request and looks forward to your response.

Sincerely,

David J. DuBois
Secretary / Acting Chairman
LRI Gear Lubricants Review Committee

Attachment 10
Page 1 of 1
Reference 2/2/05 L-37

Attachment 7
Page 1 of 1
Reference 1/28/04 L-37

Cc: LRI Gear Lubricant Review Committee Members

161 THORNHILL ROAD • WARRENDALE, PA 15086-7527
TELEPHONE: 724/772-1616 • FAX: 724/772-1699
E-mail pri@sae.org
Web Site: http://www.pri.sae.org

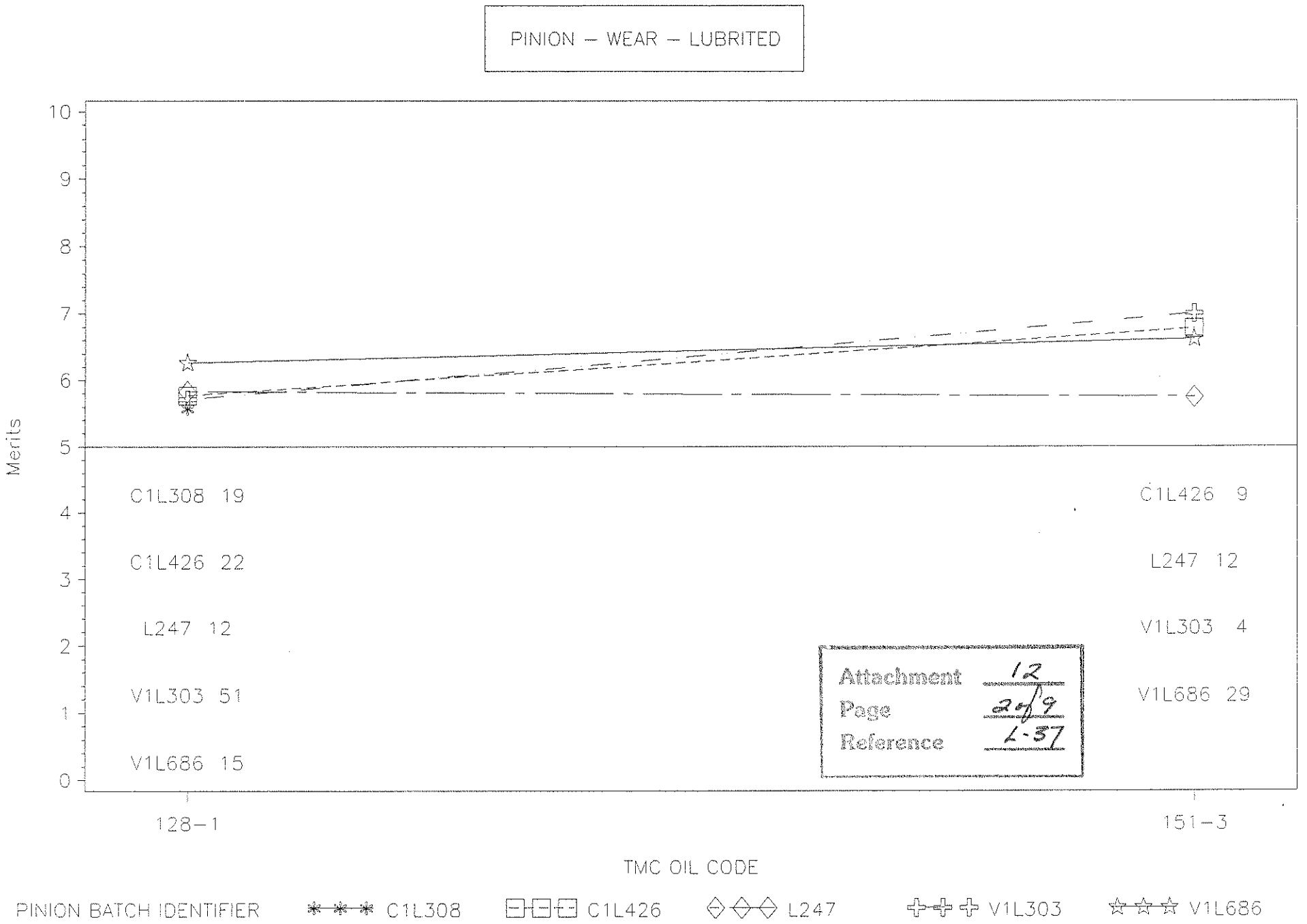
2003 L247/T758A Lubrited Hardware Discussion & Direction

- Axles ordered January 2003.
- Only 3 labs participated in ordering.
- Glasgow Facility Visit June 18th, 2003 by Hardware TF
- Changes recommended by Dana & approved/accepted by panel:
    - Ring & Pinion will have a new gear geometry development/finite analysis process.
    - Production moved from Statesville NC, to Glasgow KY facility.
    - Different lubriting process.
- Phase One and Two matrix testing completed last quarter 2003 – Variability and something change between Phase 1 and Phase 2.
    - Distress difference due to different pinion production temper. Lower vs. a low temperature temper required to keep pinion at 61-63 HRC.
- Phase Three testing 1st qtr 2004.
    - Anchor batch combined using the two batches – 303 & 426.
    - Statistically, Phase 2 and 3 results were similar.
    - With respect to Rippling, statistical analysis yielded lab differences on both oils.
    - With respect to wear, TMC 151 wear appears severe on new hardware. Remove lab D, there is no difference between new hardware and anchor batch.
    - With respect to Pitting/Spalling, new gear batch is milder than the combined anchor batch.
- Approval of batch and low temperature testing put on hold.
    - Addressing procedure enhancements and standardization.
    - Addressing low temperature issues and differences.
    - Urgent need to approve the 2004 non-lubrited new hardware.
- Review and decision time – TMC.

Lab	Std	Run	Ind	Pbat	Rbat	Date	Pwear	Pridg	Pripp	Pspit	Rwear	Rridg	Rripp	Rspit	Ipcrat	fpcrat	Phase
EV	3A	49	128-1	L247	T758A	20031118	5	7	7	9.3	7	9	9	10	2	1	2
EV	3A	51	128-1	L247	7758A	20031121	6	7	8	9.5	8	7	9	9.9	3	0	2
EV	3A	84	128-1	L247	T758A	20040207	5	7	7	9.6	8	10	10	10	2	-1	3
EV	3A	99	128-1	L247	T758A	20040228	6	8	7	9	8	10	10	10	2	0	3
LZ	191	1884	128-1	L247	T758A	20031107	6	7	8	9	7	8	9	9.8	2	-1	2
LZ	191	1885	128-1	L247	T758A	20031108	6	8	8	8	7	9	9	9.9	2	0	2
LZ	191	1906	128-1	L247	T758A	20040312	6	7	8	9	7	8	9	9.8	2	0	3
LZ	191	1908	128-1	L247	T758A	20040315	6	8	8	9	8	9	9	10	2	1	3
PK	1	787	128-1	L247	T758A	20031105	6	8	5	9	7	9	9	8	2	0	2
PK	1	788	128-1	L247	T758A	20031106	6	8	4	8	7	9	9	9.9	2	1	2
PK	1	807	128-1	L247	T758A	20040327	6	8	5	7	7	9	9	9.8	2	0	3
PK	1	808	128-1	L247	T758A	20040328	6	8	4	8	7	9	9	9.9	2	0	3
EV	3A	53	151-3	L247	T758A	20031125	6	8	9	9.9	9	10	10	10	1	3	2
EV	3A	55	151-3	L247	T758A	20031127	5	8	9	8	8	9	9	9.9	3	1	2
EV	3A	85	151-3	L247	T758A	20040208	6	9	9	9.8	10	10	10	9.9	2	0	3
EV	3A	95	151-3	L247	T758A	20040222	5	9	9	9.9	8	10	10	10	2	0	3
LZ	191	1883	151-3	L247	T758A	20031106	6	9	7	9.7	8	10	9	9.9	2	0	2
LZ	191	1886	151-3	L247	T758A	20031110	5	9	6	9.4	7	10	8	9.7	2	1	2
LZ	191	1910	151-3	L247	T758A	20040326	6	8	7	9.6	8	9	8	9.4	2	-1	3
LZ	191	1911	151-3	L247	T758A	20040329	6	9	7	9	8	9	8	9.9	2	0	3
PK	1	789	151-3	L247	T758A	20031107	6	9	9	9.7	7	9	9	9.9	2	0	2
PK	1	790	151-3	L247	T758A	20031111	6	9	9	9.8	7	9	9	9.9	2	0	2
PK	1	805	151-3	L247	T758A	20040325	6	7	9	9.5	7	9	9	9.9	2	0	3
PK	1	806	151-3	L247	T758A	20040326	6	9	9	9.4	7	9	9	9.8	2	0	3

Attachment 12
Page 10 of 9
Reference L-37

L-37 Reference Oil Performance by Pinion/Ring Batch

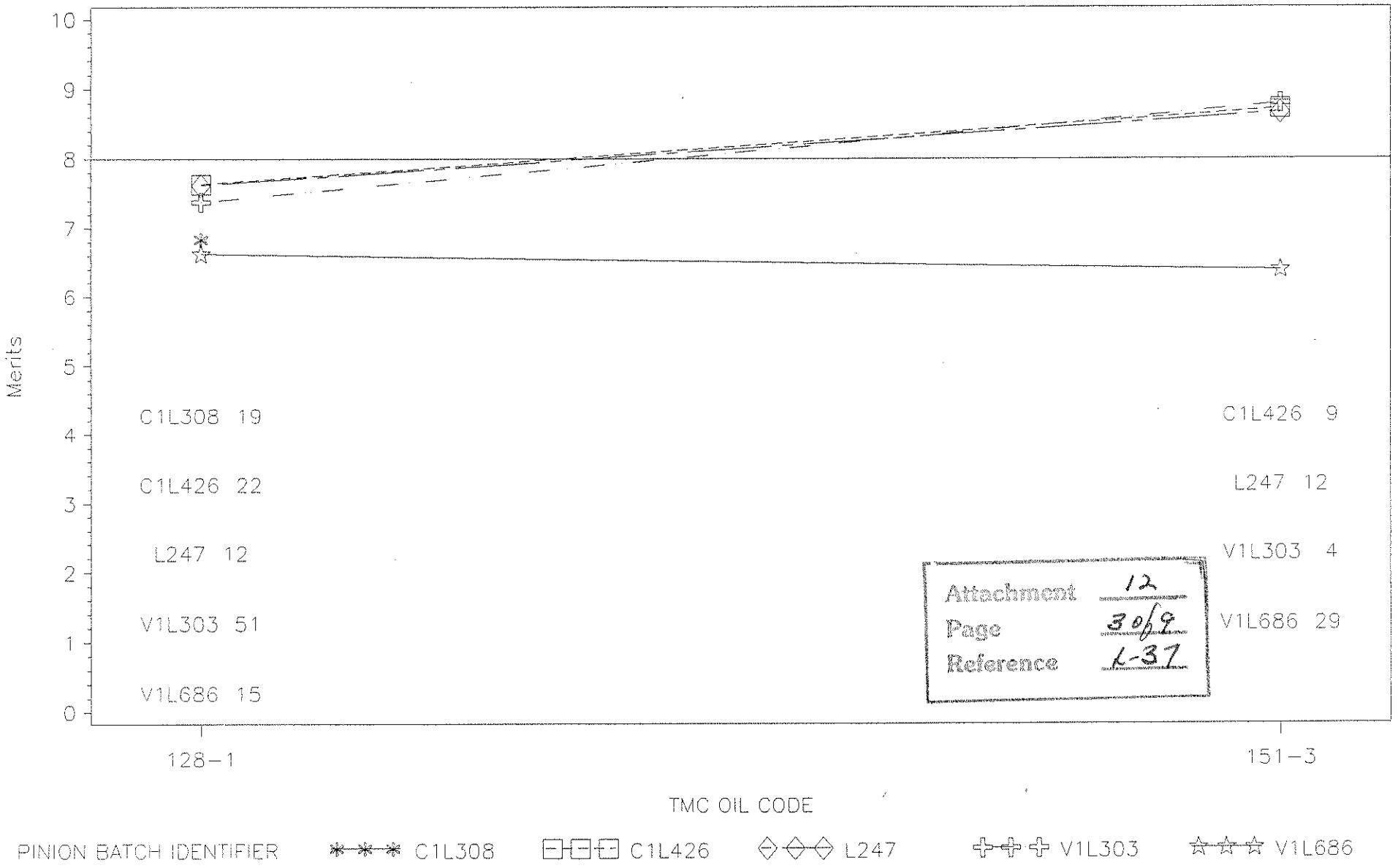


128 results included with 128–1 results and 151–2 results included with 151–3

L-37 Reference Oil Performance by Pinion/Ring Batch

PINION - RIDGING - LUBRITED

Back Transformed Averages



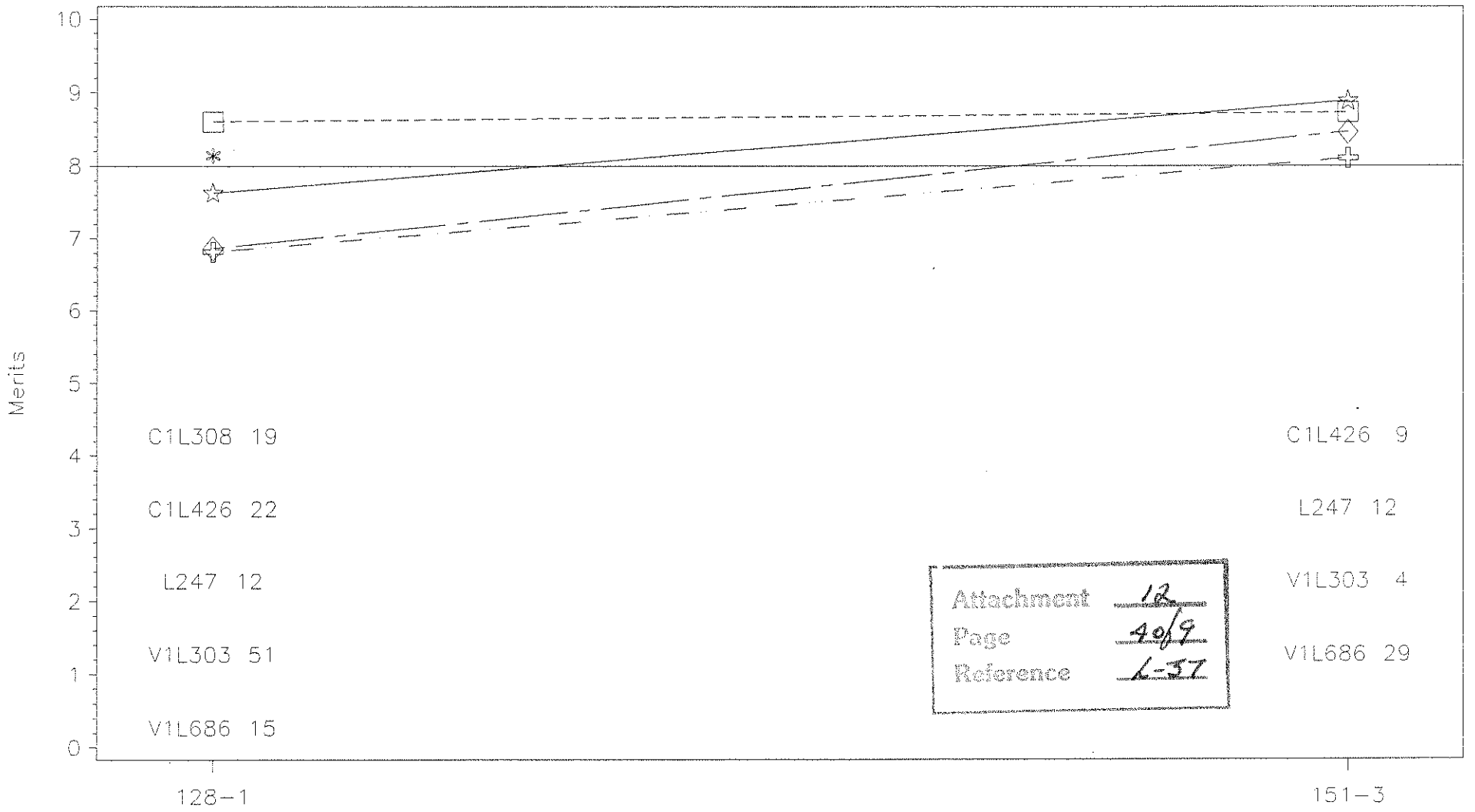
Attachment 12
Page 30f9
Reference L-37

128 results included with 128-1 results and 151-2 results included with 151-3

L-37 Reference Oil Performance by Pinion/Ring Batch

PINION - RIPPLING - LUBRITED

Back Transformed Averages



Attachment 12
Page 40/9
Reference L-37

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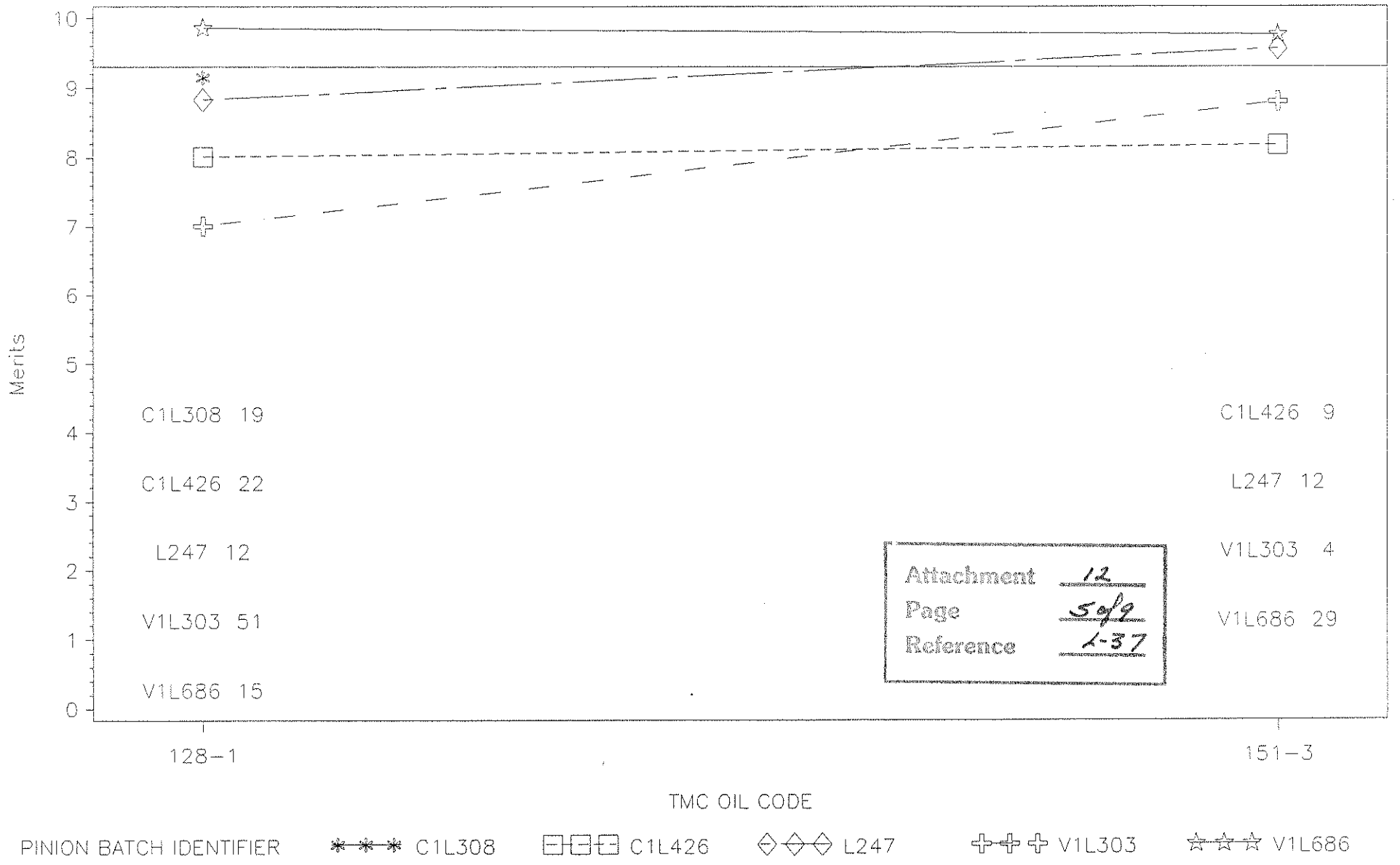
L-37 Reference Oil Performance by Pinion/Ring Batch

PINION - PITTING/SPALLING - LUBRITED

Back Transformed Averages

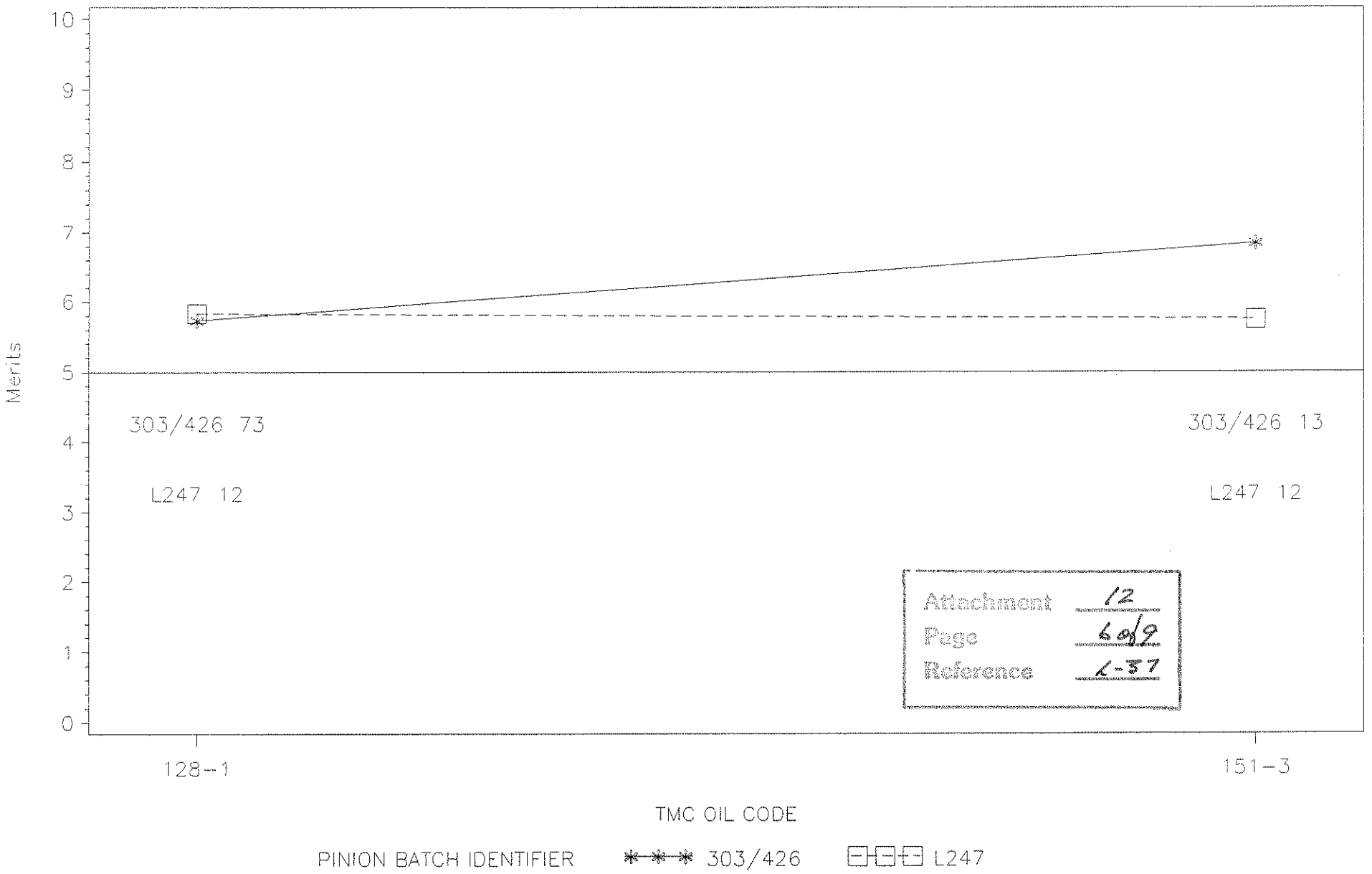


Attachment 12
Page 5 of 9
Reference L-37

128 results included with 128-1 results and 151-2 results included with 151-3

L-37 Reference Oil Performance by Pinion/Ring Batch

PINION - WEAR - LUBRITED

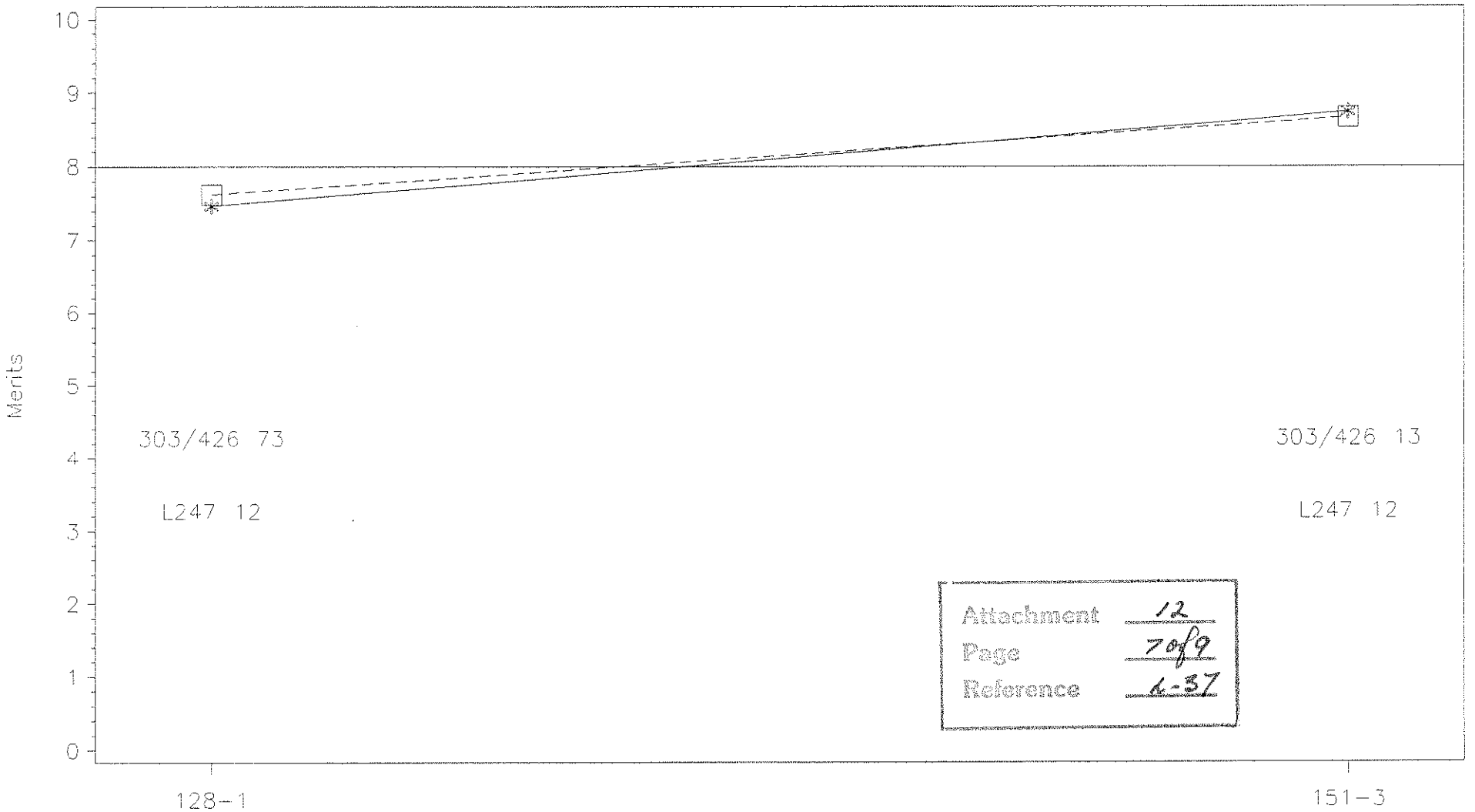


128 results included with 128-1 results and 151-2 results included with 151-3

L-37 Reference Oil Performance by Pinion/Ring Batch

PINION – RIDGING – LUBRITED

Back Transformed Averages



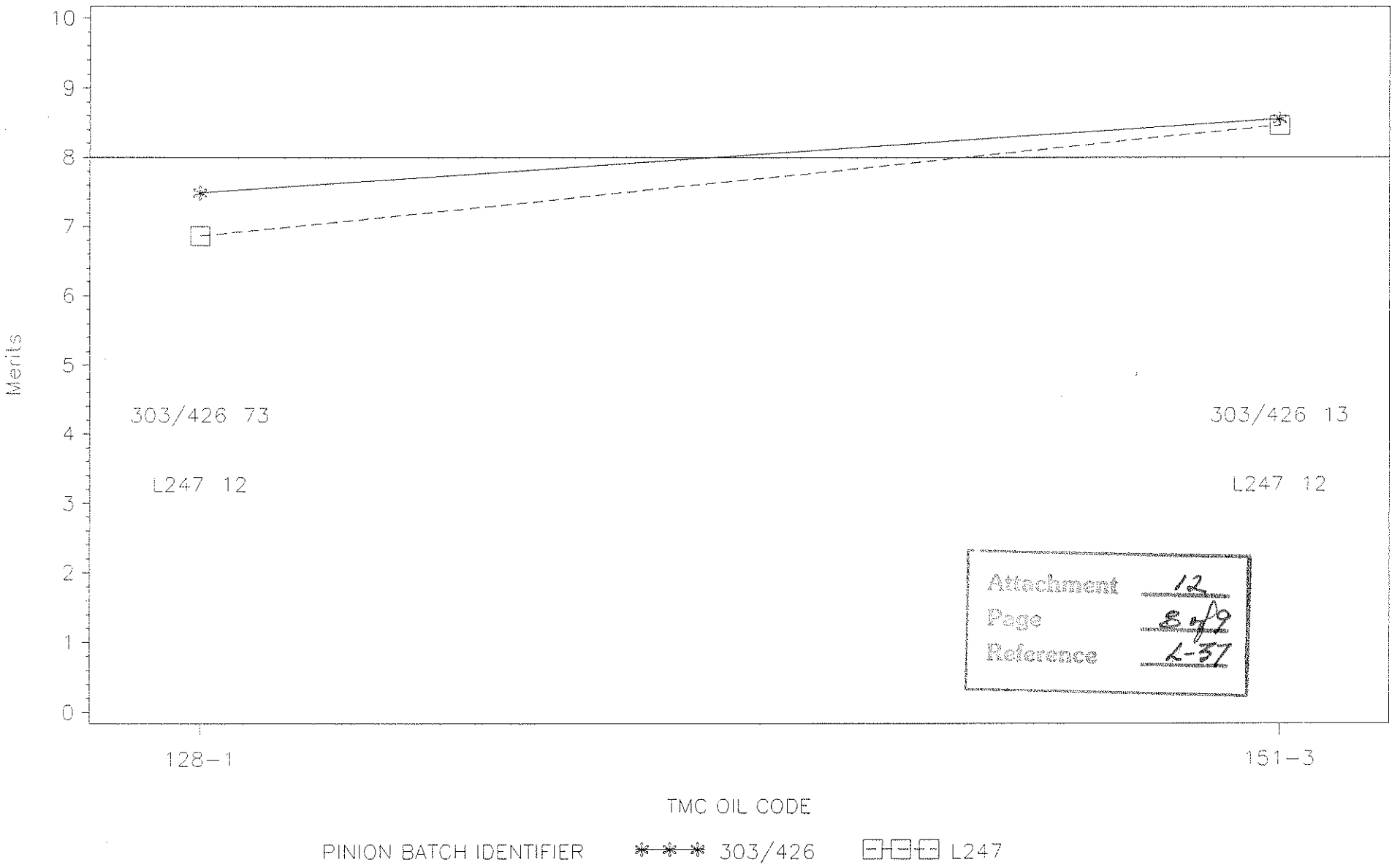
Attachment 12
Page 7 of 9
Reference L-37

128 results included with 128-1 results and 151-2 results included with 151-3

L-37 Reference Oil Performance by Pinion/Ring Batch

PINION – RIPPLING – LUBRITED

Back Transformed Averages



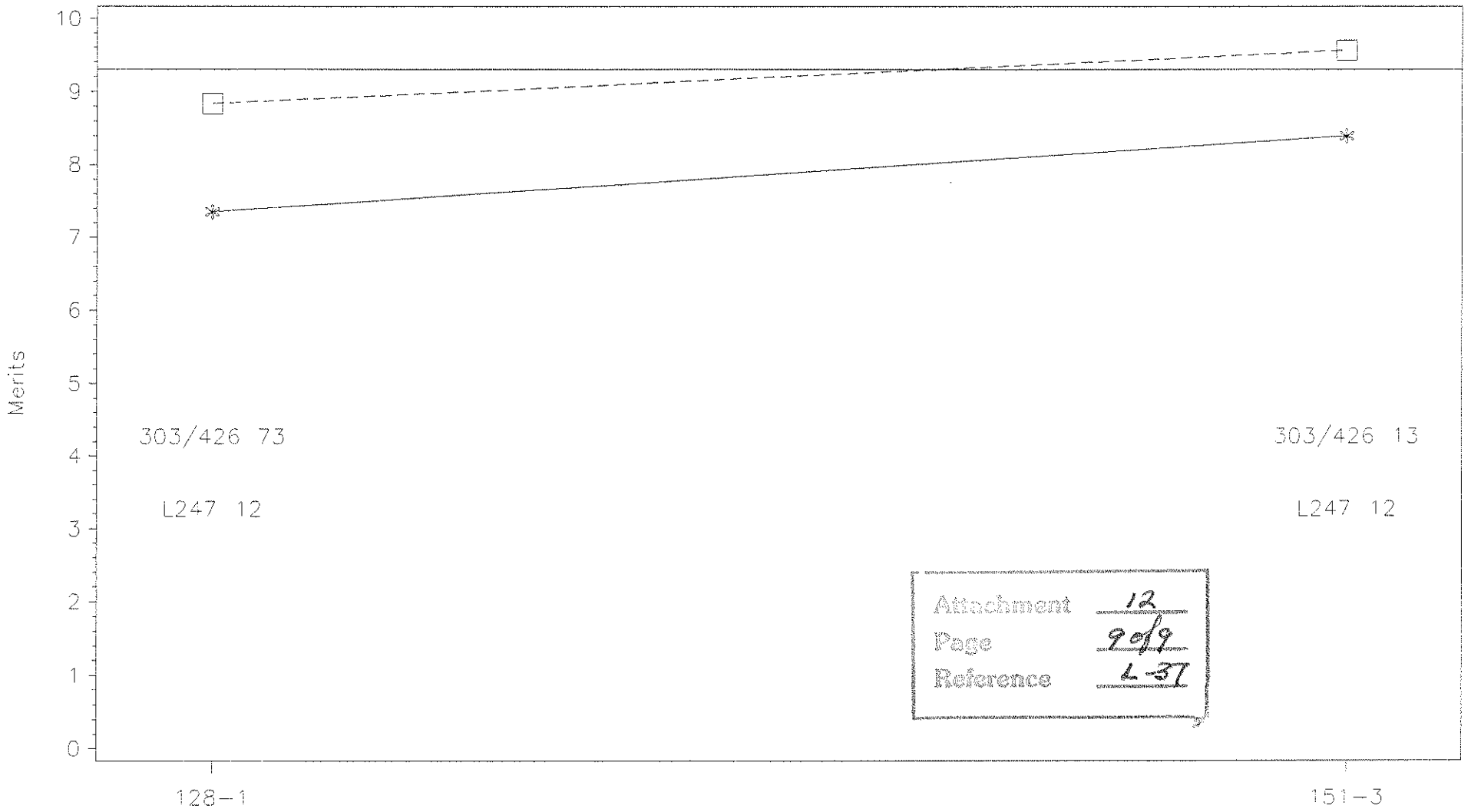
Attachment 12
Page 8 of 9
Reference L-37

128 results included with 128–1 results and 151–2 results included with 151–3

L-37 Reference Oil Performance by Pinion/Ring Batch

PINION – PITTING/SPALLING – LUBRITED

Back Transformed Averages



Attachment 12
Page 9 of 9
Reference L-37

128 results included with 128-1 results and 151-2 results included with 151-3

Attachment 13
Page 1 of 1
Reference L-37

ASTM Gear Calibration Workshop
Richmond, VA January 11, 12, & 13, 2005

L-37 PINION GEARS

		RATER			*	*		*	*			*						
SET #	DISTRESS	1	2	3	4	6	7	10	11	22	24	25	26		MAX	MIN	AVG	Std Dev
1C	Ridging	10.0			10.0	9.0	10.0	10.0	10.0	10.0		9.0			10.0	9.0	9.75	0.463
1C	Rippling	9.0			10.0	9.0	10.0	10.0	10.0	9.0		9.0			10.0	9.0	9.50	0.535
1C	Wear	6.0			6.0	6.0	6.0	6.0	6.0	8.0		7.0			8.0	6.0	6.38	0.744
1C	Spitting	9.9			9.8	9.9	10.0	9.9	9.9	9.9		9.9			10.0	9.9	9.90	0.053
1C	Scoring	10.0			10.0	10.0	10.0	10.0	10.0	10.0		10.0			10.0	10.0	10.00	0.000
2C	Ridging	9.0			10.0	9.0	9.0	9.0	10.0	9.0		9.0			10.0	9.0	9.25	0.463
2C	Rippling	9.0			10.0	9.0	9.0	8.0	9.0	9.0		9.0			10.0	8.0	9.00	0.535
2C	Wear	6.0			6.0	6.0	6.0	6.0	6.0	7.0		7.0			7.0	6.0	6.25	0.463
2C	Spitting	9.9			9.9	9.8	9.8	9.9	9.9	9.9		9.9			9.9	9.9	9.88	0.046
2C	Scoring	10.0			10.0	10.0	10.0	10.0	10.0	10.0		10.0			10.0	10.0	10.00	0.000
3C	Ridging	10.0			9.0	9.0	9.0	8.0	9.0	9.0		9.0			10.0	8.0	9.00	0.535
3C	Rippling	9.0			9.0	9.0	9.0	8.0	9.0	9.0		9.0			9.0	8.0	8.88	0.354
3C	Wear	7.0			7.0	7.0	8.0	6.0	7.0	7.0		7.0			8.0	6.0	7.00	0.535
3C	Spitting	10.0			9.9	9.9	9.8	9.9	9.9	10.0		9.9			10.0	9.8	9.91	0.064
3C	Scoring	10.0			10.0	10.0	10.0	10.0	10.0	10.0		10.0			10.0	10.0	10.00	0.000
4C	Ridging	9.0			9.0	9.0	8.0	8.0	8.0	9.0		7.0			9.0	7.0	8.38	0.744
4C	Rippling	6.0			6.0	6.0	6.0	5.0	7.0	6.0		6.0			7.0	5.0	6.00	0.535
4C	Wear	5.0			5.0	5.0	5.0	5.0	6.0	6.0		6.0			6.0	5.0	5.38	0.518
4C	Spitting	9.9			9.9	9.9	9.8	9.9	9.9	10.0		9.9			10.0	9.8	9.90	0.053
4C	Scoring	10.0			10.0	10.0	10.0	10.0	10.0	10.0		10.0			10.0	10.0	10.00	0.000
5	Ridging	6.0			7.0	6.0	6.0	6	6.0	7.0		5.0			7.0	5.0	6.13	0.641
5	Rippling	9.0			9.0	9.0	9.0	9	9.0	8.0		9.0			9.0	8.0	8.88	0.354
5	Wear	6.0			6.0	7.0	6.0	6	6.0	7.0		6.0			7.0	6.0	6.25	0.463
5	Spitting	9.9			9.9	9.9	9.9	9.9	9.9	9.9		9.9			9.9	9.9	9.90	0.000
5	Scoring	10.0			10.0	10.0	10.0	10	10.0	10.0		10.0			10.0	10.0	10.00	0.000
6	Ridging	9.0			9.0	9.0	10.0	9	10.0	9.0		9.0			10.0	9.0	9.25	0.463
6	Rippling	5.0			5.0	5.0	5.0	5	4.0	5.0		4.0			5.0	4.0	4.75	0.463
6	Wear	5.0			6.0	6.0	6.0	6	6.0	6.0		6.0			6.0	5.0	5.88	0.354
6	Spitting	9.9			9.9	9.9	9.9	9.9	9.9	9.9		9.9			9.9	9.9	9.90	0.000
6	Scoring	10.0			10.0	10.0	10.0	10	10.0	10.0		10.0			10.0	10.0	10.00	0.000
7	Ridging	9.0			9.0	8.0	9.0	8	8.0	8.0		7.0			9.0	7.0	8.25	0.707
7	Rippling	9.0			9.0	9.0	9.0	10	8.0	8.0		8.0			10.0	8.0	8.75	0.707
7	Wear	6.0			6.0	5.0	5.0	5	6.0	7.0		6.0			7.0	5.0	5.75	0.707
7	Spitting	6.0			6.0	5.0	6.0	6	6.0	6.0		6.0			6.0	5.0	5.88	0.354
7	Scoring	10.0			10.0	10.0	10.0	10	10.0	10.0		10.0			10.0	10.0	10.00	0.000
8	Ridging	10.0			10.0	10.0	10.0	9	10.0	10.0		9.0			10.0	9.0	9.75	0.463
8	Rippling	9.0			9.0	9.0	9.0	9	8.0	9.0		9.0			9.0	8.0	8.88	0.354
8	Wear	7.0			8.0	7.0	7.0	7	7.0	8.0		7.0			8.0	7.0	7.25	0.463
8	Spitting	9.9			9.9	9.9	9.8	9.9	9.9	9.9		9.9			9.9	9.8	9.89	0.035
8	Scoring	10.0			10.0	10.0	10.0	10	10.0	10.0		10.0			10.0	10.0	10.00	0.000

* High Volume Rater

* Calibration Set

ASTM Rating Workshop & Task Force Meeting

Richmond, VA
January 11, 12, & 13, 2005

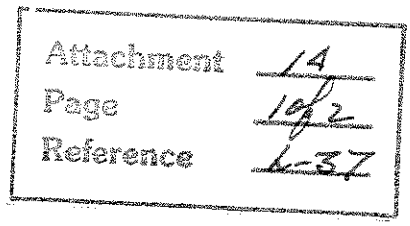
An ASTM Gear Rating Task Force meeting was attended by Art Sanchez, Garland Tschirhart, Jesse Rodriguez, Don Lind, Pete Radonich, Paul Yanchar, Ralph kozlowski, Pat Adams, Marty Rose and Kevin Layton

Report of L-37 RTMS by Don Lind of TMC

Semi annual report is out and available on TMC website.
ftp://ftp.astmtmc.cmu.edu/refdata/gear/rating_workshop_data/

The majority of failures are coming from one lab. Other labs are doing well. Several raters asked Don Lind if it was possible for the ASTM Surveillance Panel to review and expand the EWMA limits. Several raters are concerned EWMA limits are to tight. Don Lind mentioned that a formal request would have to be presented to the ASTM Surveillance Panel.

Don Lind mentioned individual rater EWMA rating plots are available upon request by Email to him.



L-37

A Discussion of Light to Medium and Medium wear definition and photos were evaluated and discussed. Concerns were raised of Light to Medium wear has broadened to include some parts normally considered Medium.

A Discussion regarding possible replacement of several distress level photos in the CRC L-37 Photo Rating Aid. Some raters find it hard to rate several distress levels of the CRC L-37 Photos vs. severity distress levels in the ASTM Rating Procedure. One suggestion was to earmark or outline specific areas of each photo for each distress. Some photos have different level of distress on the contact area of the tooth.

A special task force was formed to review all pinion photos to decide which photos may need updating. Marty Rose from Afton Chemical volunteered to head the task force along with one rater from each lab. This information and hardware examples of distress levels will be brought to the next workshop in San Antonio, TX for further discussion and evaluation.

Distress levels noted for evaluation are.
6 Wear
5 and 7 Ripple
9 Ridging
All levels of Ring wear.

January 13, 2005

After review of workshop data a discussion regarding ring wear took place.
Ring wear data showed a variation among raters. One thought that may have been a primary contributor was the pinion and rings were not matched sets.

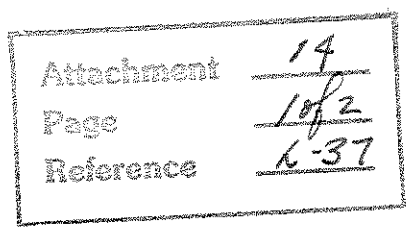
Another discussion pertained to one particular ring gear with wear distress at the heel top land corner of the gear tooth caused by tooth breakage were one or more pinion and or ring gear teeth may have broken during the test and the extra space between teeth caused the ring gear teeth at the heel top land corner to mushroom or to be pushed back due to the slamming of ring and pinion teeth against one another.

The suggestion for this issue was to rate the severity no matter what may have cased the distress, which in this case would be heavy wear. Some rater disregarded the distress at the heel top land corner and only rated the wear by considering tool marks and root wear.

After much discussion raters agreed that a need for ring photos for wear was needed and ring wear definitions need to be added to the current wear definitions specifically for wear location.

Hardware examples for ring wear will also be brought to the next gear rating workshop by the Special L-37 Photo Aid Review Task Force for evaluation by all raters attending.

All data was reviewed and discussed, any variations found were brought to the attention of the raters and evaluated.



Rater Calibration Alarms

Lab	Shewhart Severity (Mi)	EWMA Severity (Zi)	Shewhart Precision (Ri)	EWMA Precision (Qi)	Total Alarms
A	2	0	0	0	2
B	1	0	0	0	1
D	3	8	0	1	12
E	0	0	0	0	0

Total Tests = 43
Total Alarms = 15

Attachment 15
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Reference L-37