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## Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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May 2, 2005

Reply to:

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ASTM D02.B0.03 L-37 Surveillance Panel

Members and Guests:

Attached for your review and comment are the unconfirmed minutes of the April 21, 2005 L-37 Surveillance Panel teleconference call minutes. Please direct any corrections or comments to my attention.

Sincerely,

Donald T. Bartlett,

Chairman, L-37 Surveillance Panel

Attachments

**Report of Conference Call  
L-37 Surveillance Panel  
April 21, 2005, 2:00 p.m. EDT**

The teleconference meeting was brought to order at 2:04 p.m. EDT.

**I. Attendees:**

ASTM TMC:	Don Lind	Lubrizol Corp:	Jerry Gropp
Ethyl Corp:	Cory Koglin	Lubrizol Corp:	Don Bartlett
Dana Corp:	Ken Okamoto	PARC:	Dale Smith
Exxon/Mobil	Bill Sullivan	SwRI:	Hector De La Fuente

**II. Agenda:**

- o 2005/2006 Non-lubricated axle order/ clarification for May 1<sup>st</sup> binding PO's, Dana update.
- o General overview and discussion of action items assigned from the March 9th, 2005 SP telecom meeting.
  - Phase 5 testing update/review on lubricated hardware L247/T758A testing exchange between Parc, Lubrizol, and Afton on TMC 128-1.
  - Review proposed targets on TMC 151-3 (on TMC website).
  - Review proposed targets on TMC 128-1 (should be on TMC website by Tuesday, April 19<sup>th</sup>).
  - Sanity check for low temperature testing on TMC 152 and 153 and options for hardware approval.

**III. Summary of Panel Discussion, Consensus Actions, and Motions:**

**2005 Non-lubricated Axle Order, May 1<sup>st</sup> binding PO's, Panel Discussions and Motion.**

The group reviewed the April 12, 005 quote from Dana for the axle order. The axles are going to cost \$ 883.00 each and have taken into account steel prices as of the April 12th date. Dana is anticipating that global steel prices will remain steady. Dana did leave room in the quote language that a steel surcharge cost could be recovered should it be warranted.

A question was asked by Mr. Koglin, "should we ask for the same steel (8820/8822) that was used in the V1L351/P4T771 non-lubricated batch"? Mr. Okamoto commented that the drawing specification primary call out is for 8620/8625 steel. If/when an insufficient quantity of the primary steel is not available; other 'similar' steel choices can be used.

The few alternate choices are based on 'harden ability' which is not coming into play with the ring and pinion sets. There are no core harden ability issues, no surface spalling issues. The need is to produce the proper case depth quench. The 8620/8625 steel is more carbon manganese while the 8820/8822 has more molly.

*Chairman's Note: If I may take the liberty, while not discussed in detail on this call, the below information had been shared with the panel when the steel change was made on the non-lubrited V11351/P4T771 batch. It is shared again for clarity.*

	<u>C</u>	<u>Mn</u>	<u>Cr</u>	<u>Ni</u>	<u>Mo</u>
Primary 8620/8625	.17/.23	.60/.95	35/.65	35/.75	15/.25
P4T771 (8820/8822)	.23	.84	.50	.47	.20

*The ring gear is specified to be made from 8620, and has always been:*

After discussion and clarification, the panel consensus was that we felt comfortable with the 8620 primary steel. The panel will be advised if the primary steel cannot be obtained.

The chairman reminded the panel that one laboratory previously requested a delay from April 15 to May 1<sup>st</sup>, 2005 for submitting binding PO's due to internal issues. One lab has already submitted their purchase order. After May 1<sup>st</sup>, Dana will move forward to secure the steel necessary to fill the orders. A review of the tentative industry axle order at this time was as follows:

PARC:	220
Afton	450
Lubrizol	400
SRI	<u>300</u>
Total Gears Ordered:	<b>1370</b>

Mr. Okamuro indicated that the Ft. Wayne production facility literally 'cut their teeth' on the modified industry production process with the last non-lubrited batch and should be able to repeat the process with a minimum number of lost pieces. We anticipate that the hardware should be received by the end of the year 2005.

Chairman Bartlett proposed that the hardware approval matrix be the same hat was used for the 2005 non-lubrited hardware batch approval.

**Motion 1** After discussion, Mr. Sullivan motioned, second by Mr. Koglin, that the 2005 non-lubrited gear batch matrix be used for hardware and target approvals:

- o Each of the 4 labs will equally participate in a 44-test matrix to evaluate the 2005 non-lubrited hardware batch.
- o 4-test on TMC 127 (standard)
  - TMC will assign each lab one test on TMC 127 and stop to review results (to insure that this oil has performed as expected). Targeted completion date is TBD.

**Motion 1** After discussion, Mr. Sullivan motioned, second by Mr. Koglin, that the 2005 non-lubricated gear batch matrix be used for hardware and target approvals:

- Each of the 4 labs will equally participate in a 44-test matrix to evaluate the 2005 non-lubricated hardware batch.
- 8-tests on TMC 151-3 (standard)
- 8-tests on TMC 152 (standard)
- 8-tests on TMC 153 (standard)
- 4-test on TMC 127 (standard)
- 8-tests on TMC 152 (Canadian)
- 8-tests on TMC 153 (Canadian)
- TMC will assign each lab one test on TMC 127 and stop to review results (to insure that this oil has performed as expected). Targeted completion date is TBD.
- TMC will assign each lab one test on TMC 151 and stop to review results (to insure that this oil has performed as expected). Targeted completion date is TBD.

The motion passed unanimously, 7 votes in favor, 0 negatives, and 0 abstentions.

Mr. Okamuro commented that the instructions for assembly line build out of the contact pattern on the last non-lubricated gear batch were for the assembly line to target L2F0. If the line was not able to achieve L2F0, they were to move to L2F+1. The goal was for no L2F-1 contact patterns. The panel agreed that this would be the desired goal for this batch too.

### **Update & Review on Lubricated Hardware Gear Batch L247/T758A**

The chairman provided a summary recap on Lubricated L247/T758A hardware batch testing to date:

- **Attachment # 1:** is a summary of all testing (Phases 2, through 5) to date. Also, lab B recently conducted two donated low temperature tests, one on TMC 152 and TMC 153.

- Today's discussion was to start with a focus on phase testing 5 and the motion that was made during the 03/09/05 SP teleconference meeting:
  - To better look at stand or hardware differences, Mr. Koglin motioned, second by Mr. Smith that:
    - We conduct 4 more standard L-37 tests on TMC 128-1 and use the following hardware exchange. This would be identified as Phase 5:
    - Lab E to conduct 2 more runs on TMC 128-1. Hardware use and exchange is: 1 on lab B hardware, 1 on lab D hardware. Lab E is not able to use the same stand that Phases 2 and 3 runs were conducted in (stand 1). Instead, lab E will use their other qualified stand (stand 2, was used for Phase 4 also).
    - Lab E to send 1 axle each to labs D and B with Labs D & B running 1 standard test each on TMC 128-1. Labs D and B confirmed that they will be using the same stands (3A and 191, respectively) as was used in Phases 2, 3, and 4 testing.
    - Tests to be completed by the end of March.
    - Phase 5 should confirm if there is a lab, hardware, or oil interaction.

**Attachment # 2 and # 3:** The TMC proposed targets and bands for the Standard test procedure on TMC 128-1 (17 tests) and TMC 151-3 (16 tests). Mr. Lind made the following comments:

- TMC 128-1, the wear standard deviation had to be tweaked slightly (from 5.01) to allow a rating value of 5 to be included. Pitting Spalling standard deviation was slightly tweaked to allow a 9.8 to be accepted. TMC did not recommend a further tweak to allow a 9.9 in because it would have allowed a 5 rating to be included, opening the bands too far. Only one test in 17 would not be acceptable, the one pitting/spalling result of 9.9 from lab E.

It was at this point that Mr. Okamuro had to leave the call for another meeting.

- TMC 151-3, the wear standard deviation had to be tweaked slightly (from 5.03) to allow a rating value of 5 to be included. Two tests in 16 would not be acceptable, one ridging result of 7 from lab E and one rippling result of 7 from lab B.

**Motion 2** After discussion, Mr. Sullivan motioned, second by Mr. Smith, that we accept the gear batch for reference and candidate Standard testing only effective for all tests completing on or after April 21, 2005.

**Motion 3** Mr. Smith motioned, second by Mr. Koglin that we accept the TMC 128-1 and TMC 151-3 targets and bands as presented by the TMC and implement with the next reference on or after April 21st, 2005.

The motion passed unanimously, 5 votes in favor, 0 negatives, and 0 abstentions.

- Lubrited Low Temperature Testing: There were over 500 axles were ordered for this gear batch. Currently, the V1L303/P4L514A and V1L686/P4L626A are the only approved & available hardware for low temperature testing approvals. General consensus was that we should perform a sanity check on this batch. The proposal was to conduct a total of three tests on each oil to help one determine if we need a correction factor, not the magnitude of the correction factor. Sort of a "go-no go gage" for approving the hardware for candidate low temperature testing.

**Motion 4** The labs that participated in the hardware batch order are to run 1 test each on TMC 152 and 153, to be completed and reported to the TMC by June 8<sup>th</sup> to allow the surveillance panel to review the data at the June meeting.

The teleconference was adjourned motion by Mr. Koglin/second by Mr. Smith at 3:14 p.m.

Respectfully submitted,



Donald T. Bartlett,

L-37 Surveillance Panel Chairman

CMIR	LAB	STD.	Run	OIL	pinbat	ringbat	DTCOMP	Pwear	Pridg	Prpp	Pspit	Rwear	Rridg	Rripp	Rspit	Ipccrat	fpccrat	PHASE4	GEAR
49494	D	3A	49	128-1	L247	T758A	20031118	5	7	7	9.3	7	9	9	10	2	1	PHASE2	GEAR
49495	D	3A	51	128-1	L247	T758A	20031121	6	7	8	9.5	8	7	9	9.9	3	0	PHASE2	
49496	D	3A	84	128-1	L247	T758A	20040207	5	7	7	9.6	8	10	10	10	2	-1	PHASE3	
49497	D	3A	99	128-1	L247	T758A	20040228	6	8	7	9	8	10	10	10	2	0	PHASE3	
55172	D	3A	321	128-1	L247	T758A	20050407	5	8	5	9	8	9	9	10	2	1	PHASE5	PKGEAR
46776	B	191	1884	128-1	L247	T758A	20031107	6	7	8	9	7	8	9	9.8	2	-1	PHASE2	
46777	B	191	1885	128-1	L247	T758A	20031108	6	8	8	8	7	9	9	9.9	2	0	PHASE2	
46933	B	191	1906	128-1	L247	T758A	20040312	6	7	8	9	7	8	9	9.8	2	0	PHASE3	
46934	B	191	1908	128-1	L247	T758A	20040315	6	8	8	9	8	9	9	10	2	1	PHASE3	
54417	B	191	2112	128-1	L247	T758A	20050323	6	8	8	8	7	8	9	9.8	2	1	PHASE5	PKGEAR
49195	E	1	787	128-1	L247	T758A	20031105	6	8	5	9	7	9	9	8	2	0	PHASE2	
49196	E	1	788	128-1	L247	T758A	20031106	6	8	4	8	7	9	9	9.9	2	1	PHASE2	
50078	E	1	807	128-1	L247	T758A	20040327	6	8	5	7	7	9	9	9.8	2	0	PHASE3	
50079	E	1	808	128-1	L247	T758A	20040328	6	8	4	8	7	9	9	9.9	2	0	PHASE3	
54422	E	2	103	128-1	L247	T758A	20050405	6	8	7	9.9	7	9	9	9.9	2	0	PHASE5	PKGEAR
54423	E	2	104	128-1	L247	T758A	20050406	6	8	7	9	7	9	9	9	2	0	PHASE5	LZGEAR
54424	E	2	105	128-1	L247	T758A	20050407	6	8	7	7	7	9	9	9.9	2	1	PHASE5	EVGEAR
49500	D	3A	53	151-3	L247	T758A	20031125	6	8	9	9.9	9	10	10	10	1	3	PHASE2	
49501	D	3A	55	151-3	L247	T758A	20031127	5	8	9	8	8	9	9	9.9	3	1	PHASE2	
50178	D	3A	85	151-3	L247	T758A	20040208	6	9	9	9.8	10	10	10	9.9	2	0	PHASE3	
50179	D	3A	95	151-3	L247	T758A	20040222	5	9	9	9.9	8	10	10	10	2	0	PHASE3	
50338	D	3A	285	151-3	L247	T758A	20050220	6	9	9	9.7	9	10	9	10	2	1	PHASE4	LZGEAR
49044	B	191	1886	151-3	L247	T758A	20031110	5	9	8	9.4	7	10	8	9.7	2	1	PHASE2	
49044	B	191	1910	151-3	L247	T758A	20040326	6	8	8	9.6	8	9	8	9.4	2	-1	PHASE3	
50345	B	191	1911	151-3	L247	T758A	20040329	6	9	8	9	8	9	8	9.9	2	0	PHASE3	
50345	B	191	2087	151-3	L247	T758A	20050208	6	9	8	8	7	10	8	9.5	2	0	PHASE4	LZGEAR
53451	B	191	2088	151-3	L247	T758A	20050210	6	9	9	9.8	8	10	9	10	2	0	PHASE4	PKGEAR
51850	B	191	2090	151-3	L247	T758A	20050212	6	9	7	8	7	10	7	9.5	2	0	PHASE4	EVGEAR
46789	E	1	789	151-3	L247	T758A	20031107	6	9	9	9.7	7	9	9	9.9	2	0	PHASE2	
49199	E	1	790	151-3	L247	T758A	20031111	6	9	9	9.8	7	9	9	9.9	2	0	PHASE2	
49200	E	1	805	151-3	L247	T758A	20040325	6	9	9	9.5	7	9	9	9.9	2	0	PHASE3	
49201	E	1	806	151-3	L247	T758A	20040326	6	9	9	9.4	7	9	9	9.8	2	0	PHASE3	
50085	E	2	84	151-3	L247	T758A	20050224	6	9	8	9.5	7	9	9	9.9	2	0	PHASE4	LZGEAR
53541	B	191	2107	152	L247	T758A	20050317	5	6	8	8	7	7	9	9.4	2			
53544	B	191	2109	153	L247	T758A	20050319	6	8	7	8	8	9	10	9.9	2			

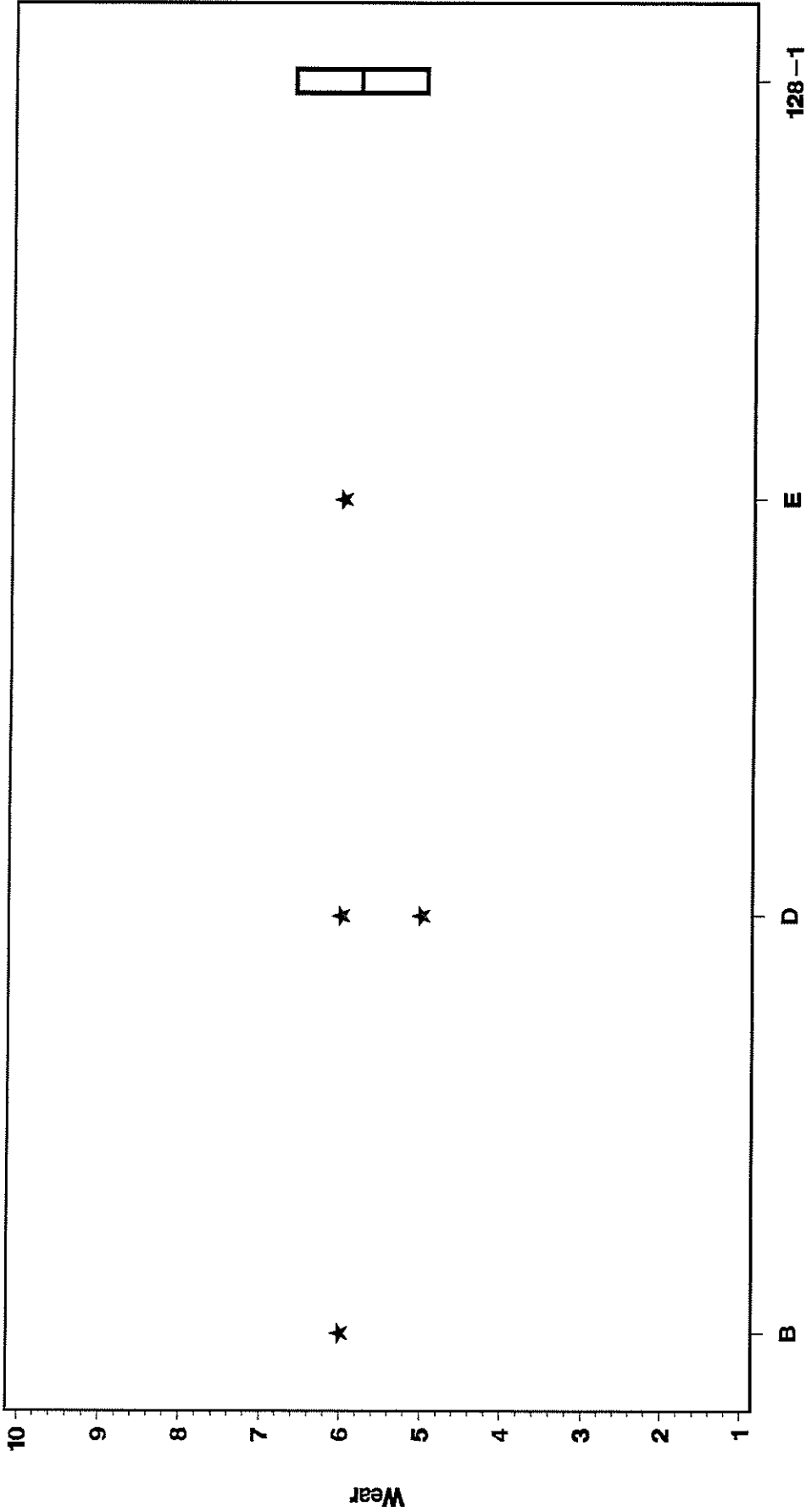
Attachment /  
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 Reference L-37

☐ = FAILS OUTSIDE OF TARGET

# L-37 Lubricated Hardware, Pinion Batch L247/T758A Test Target Data Set and Shewhart Severity Limits

Reference Oil 128--1 (Bands Include Merit Ratings of 5 & 6)

Pinion Wear



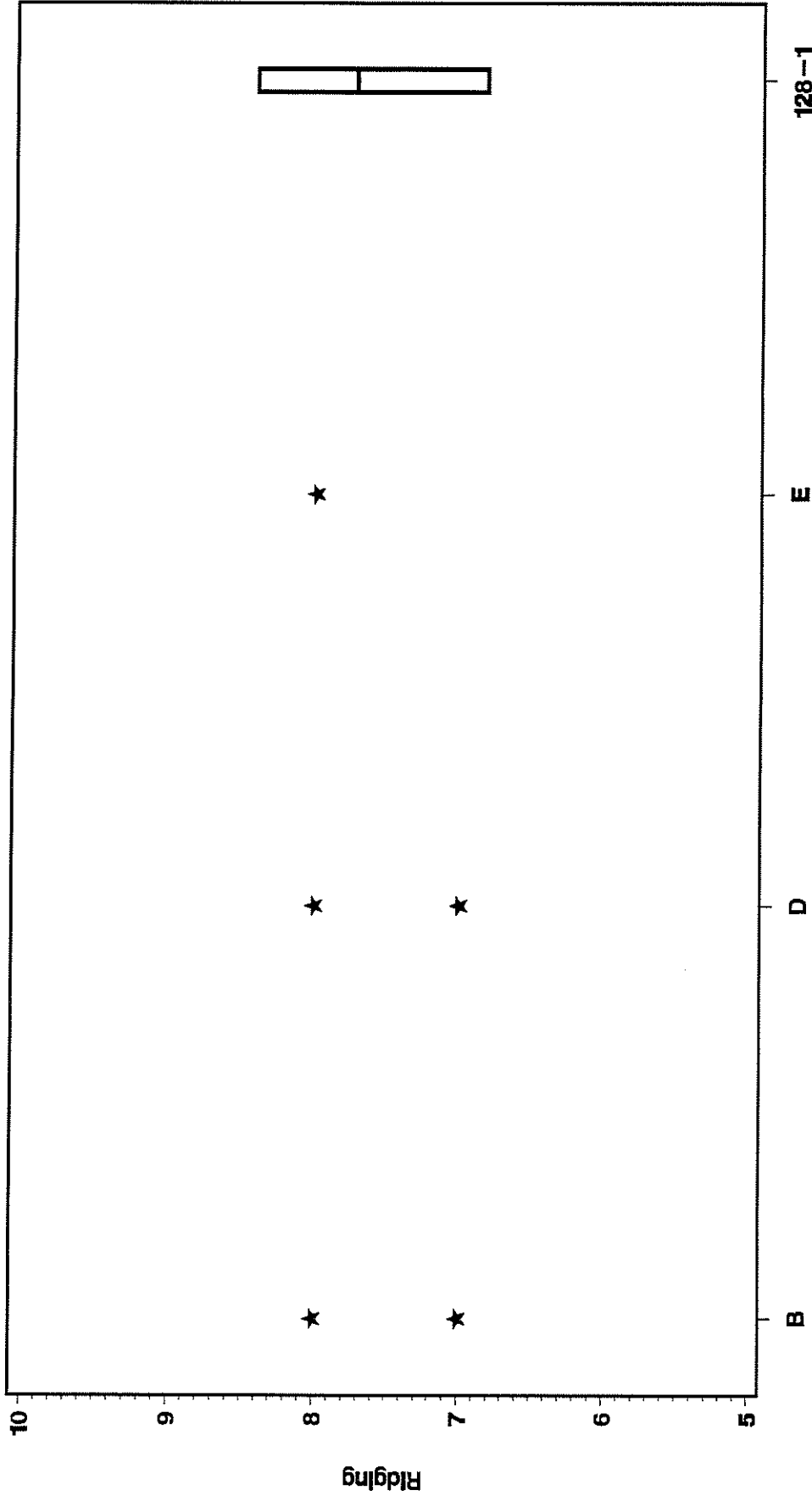
Attachment 2  
Page 1 of 4  
Reference L-37



# L-37 Lubrified Hardware, Pinion Batch L247/T758A Test Target Data Set and Shewhart Severity Limits

Reference Oil 128-1 (Bands Include Merit Ratings of 7 & 8)

Pinion Rldgng



Data Group

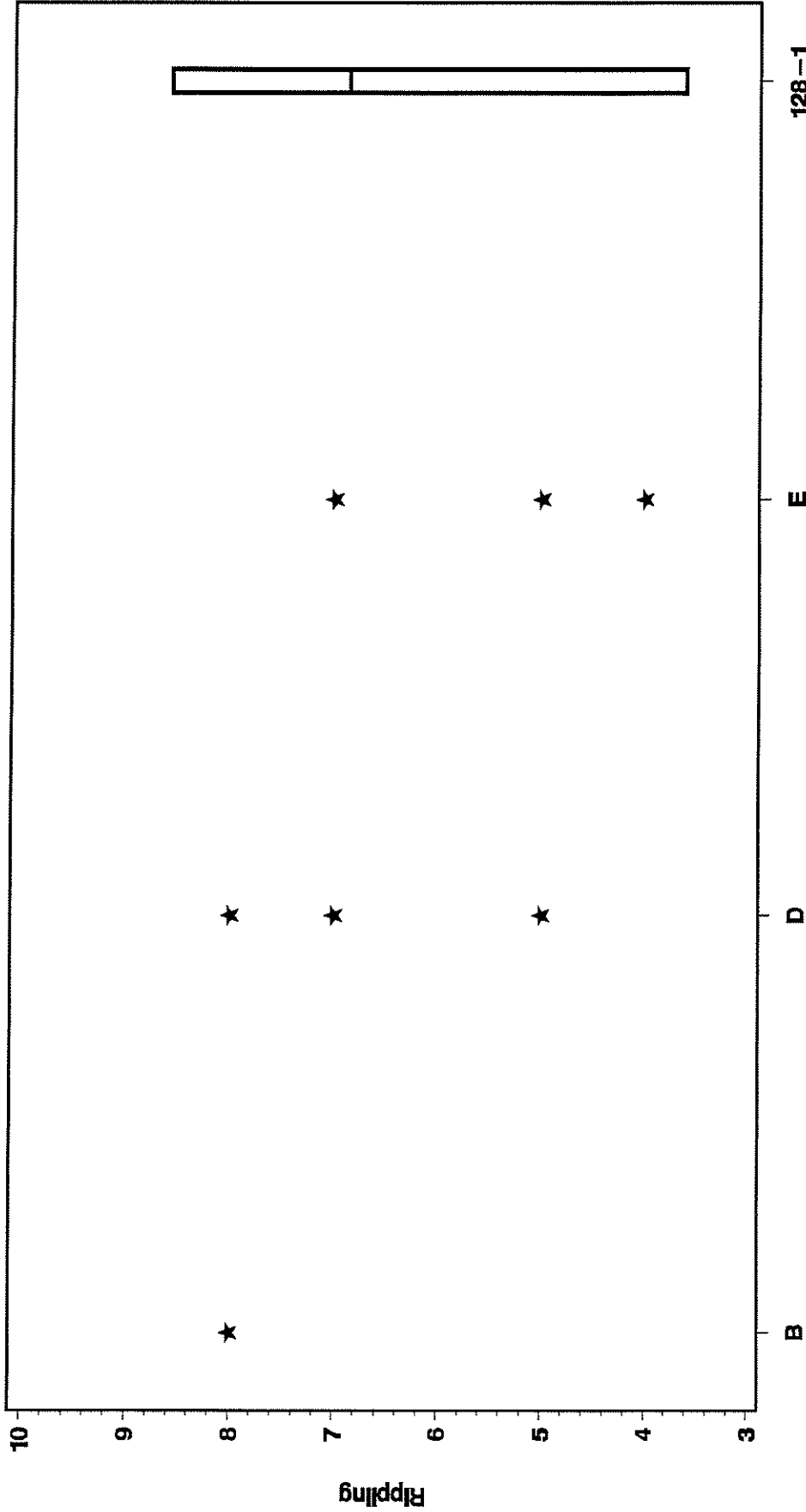
128-1

Attachment 2  
Page 2 of 4  
Reference L-37

# L-37 Lubrified Hardware, Pinion Batch L247/T758A Test Target Data Set and Shewhart Severity Limits

Reference Oil 128--1 (Bands Include Merit Ratings of 4 thru 8)

Pinion Rippling



B D E 128--1

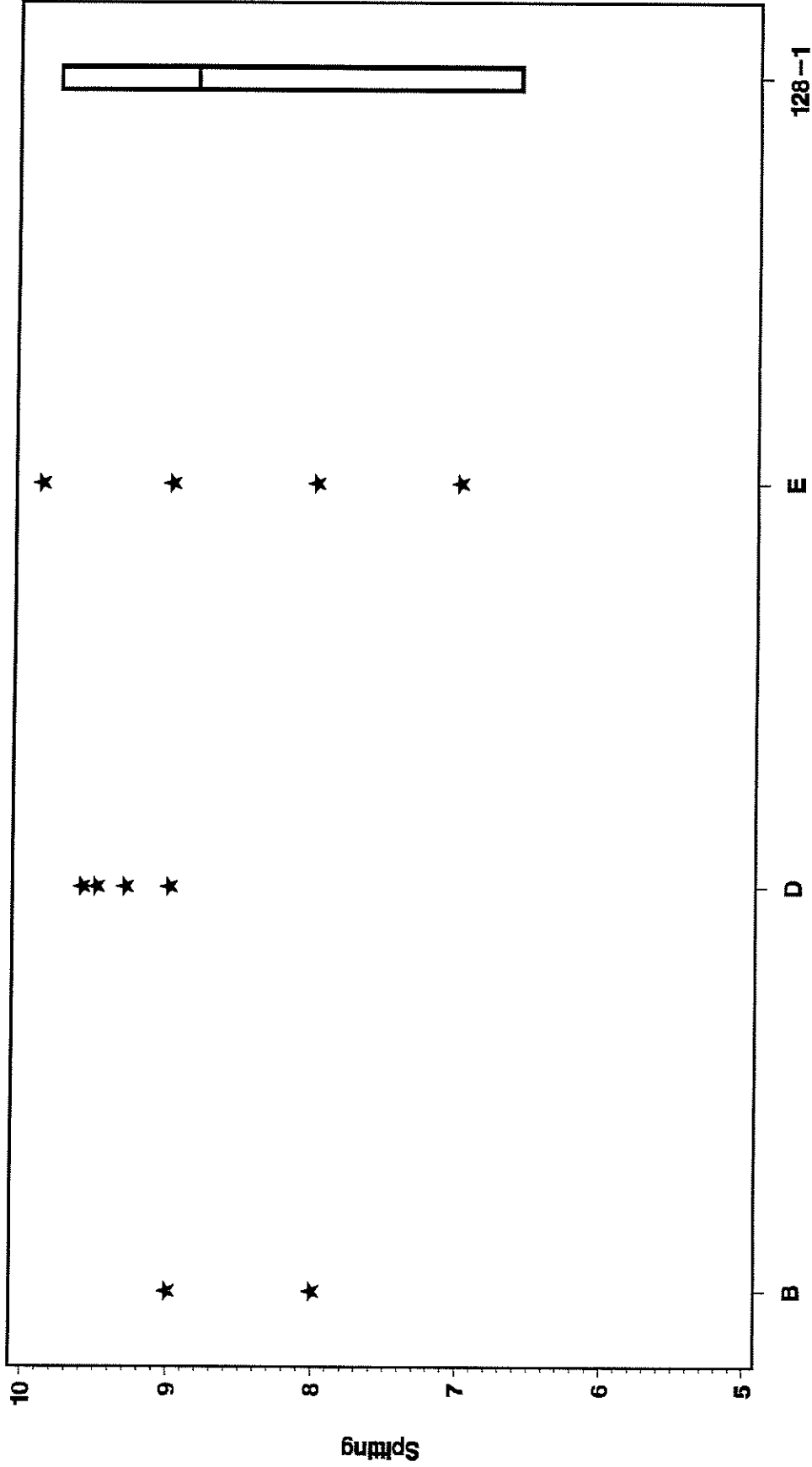
Data Group

Attachment	2
Page	394
Reference	L-37

# L-37 Lubricated Hardware, Pinion Batch L247/T758A Test Target Data Set and Shewhart Severity Limits

Reference Oil 128-1 (Bands Include Merit Ratings of 7 Thru 9.8)

Pinion Spitting



128-1

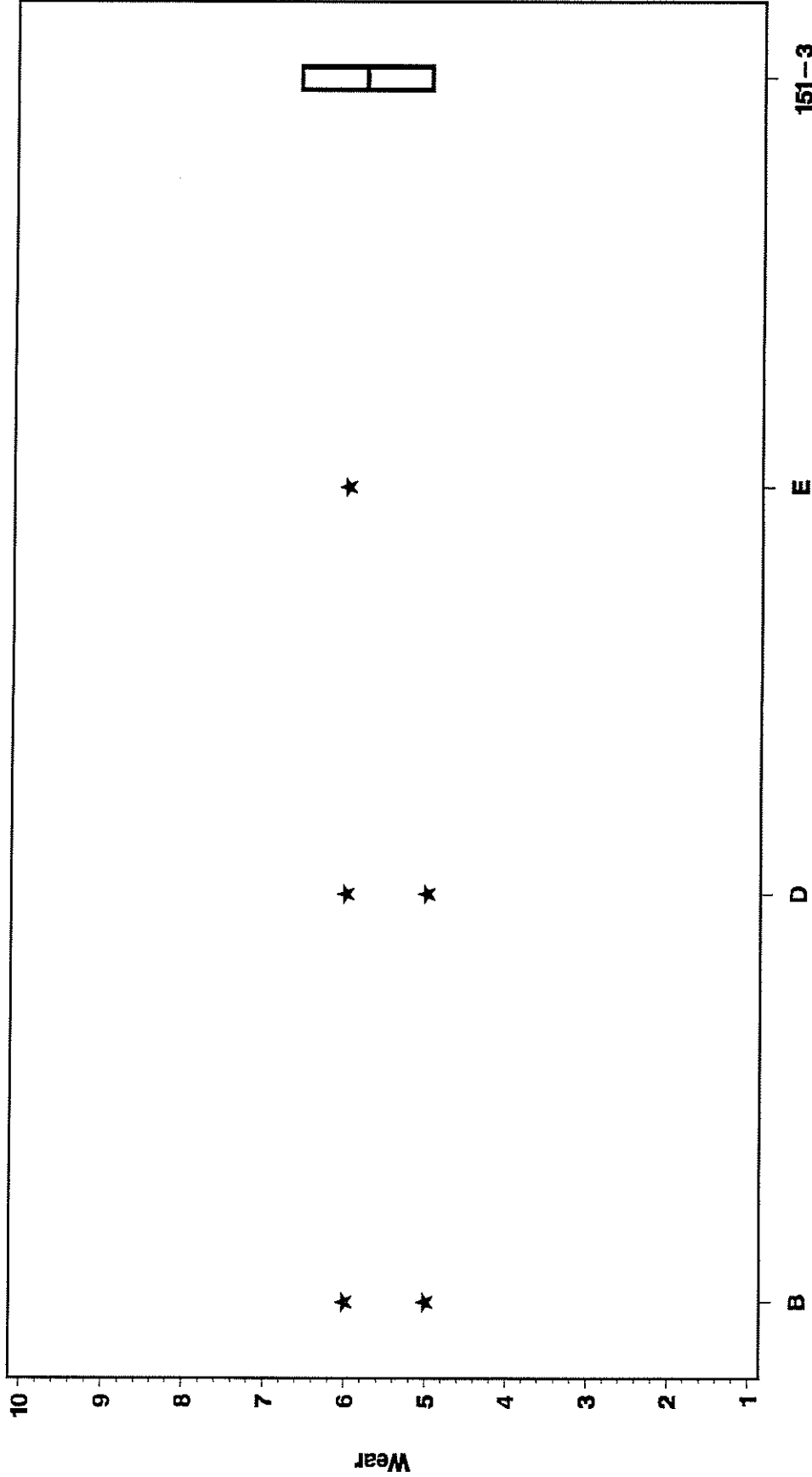
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Attachment	2
Page	4 of 4
Reference	L-37

# L-37 Lubricated Hardware, Pinion Batch L247/T758A Test Target Data Set and Shewhart Severity Limits

Reference Oil 151--3 (Bands Include Merft Ratings of 5 & 6)

Pinion Wear



151-3

E

D

B

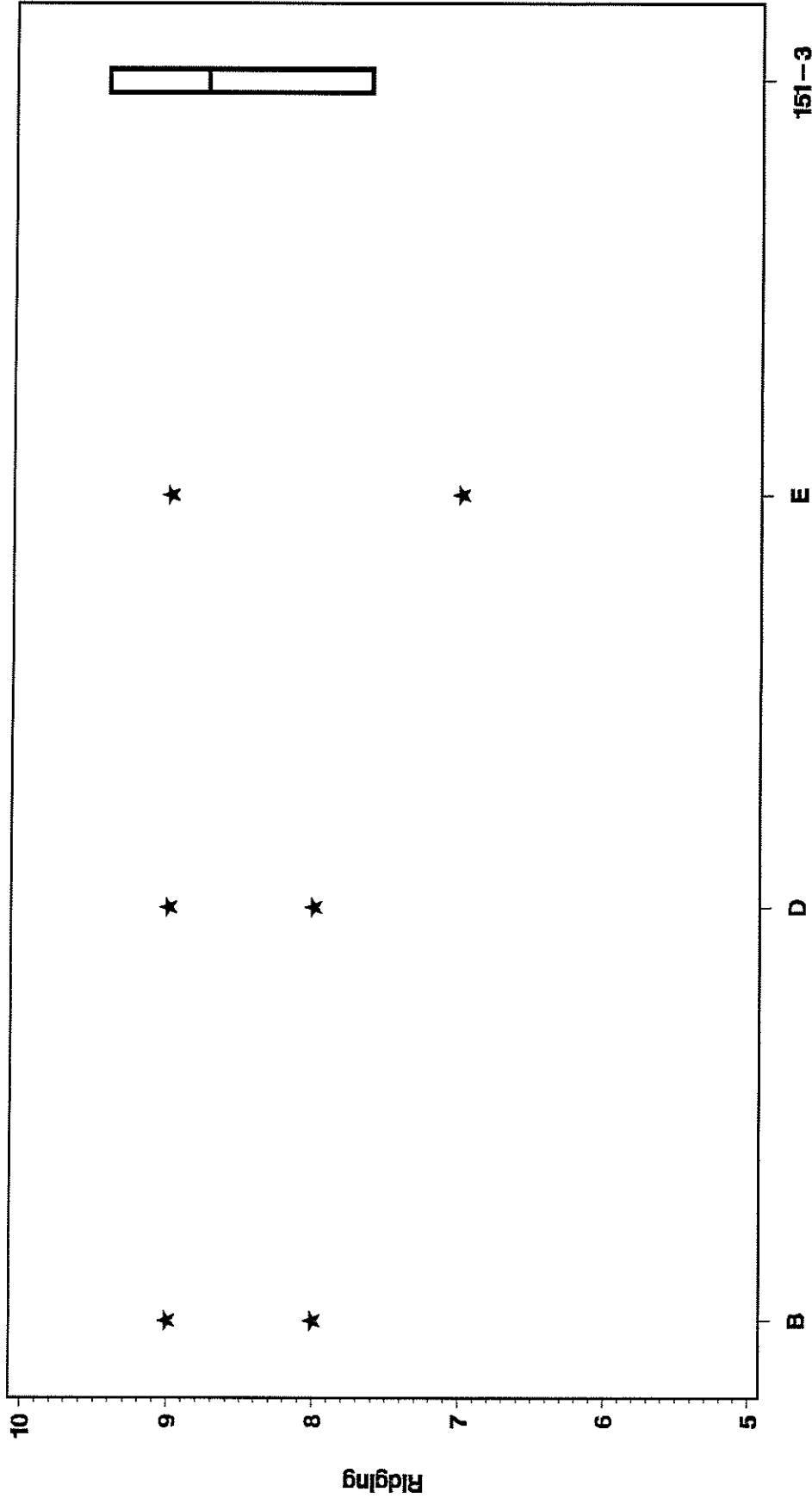
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Attachment 3  
Page 184  
Reference L-37

# L-37 Lubrified Hardware, Pinion Batch L247/T758A Test Target Data Set and Shewhart Limits

Reference Oil 151-3 (Bands Include Merit Ratings of 8 & 9)

Pinion Ridging



151-3

Data Group

Attachment 3

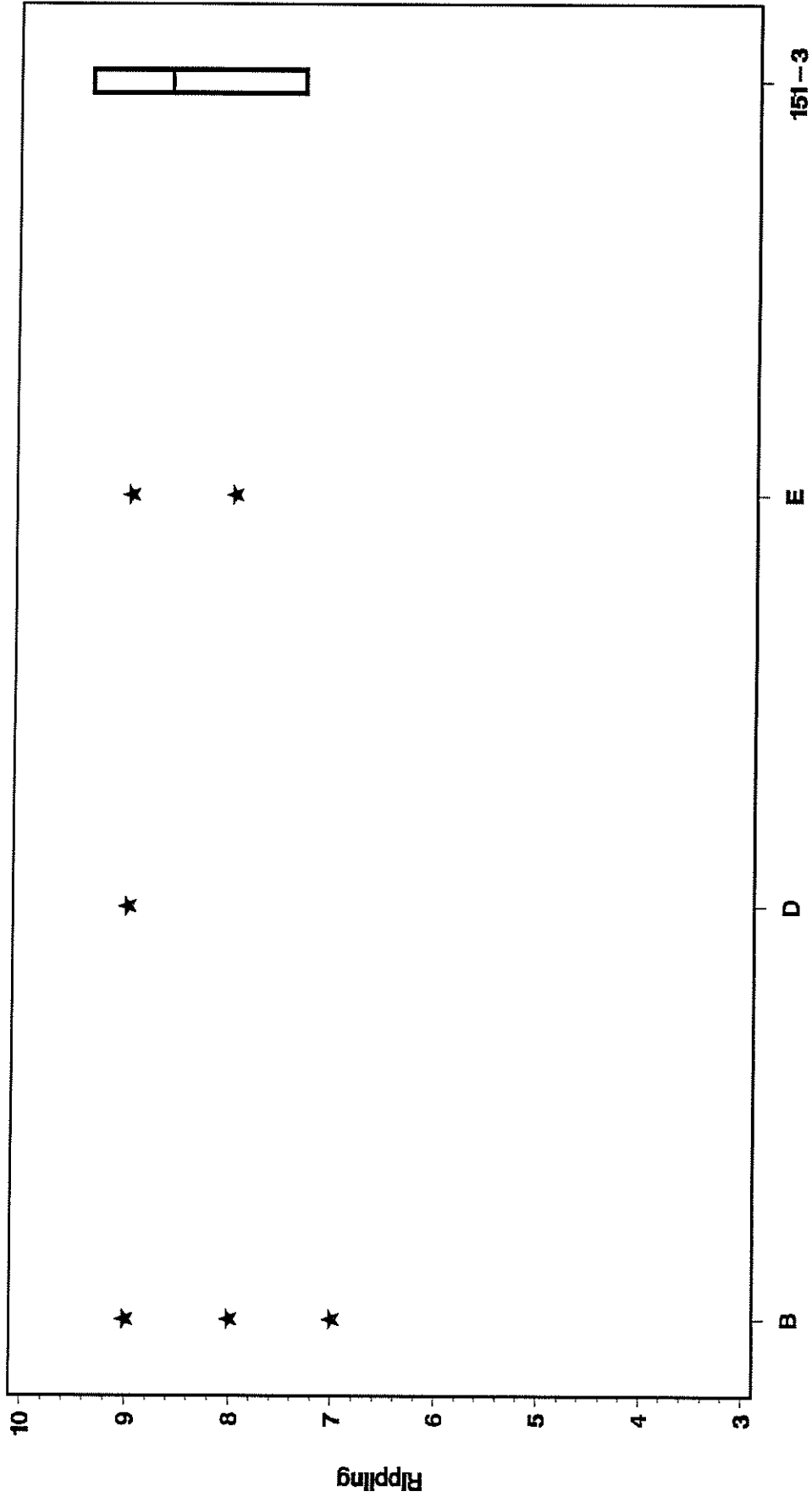
Page 2 of 4

Reference L-37

# L-37 Lubrified Hardware, Pinion Batch L247/T758A Test Target Data Set and Shewhart Severity Limits

Reference OII 151-3 (Bands Include Merit Ratings of 8 & 9)

Pinion Rippling



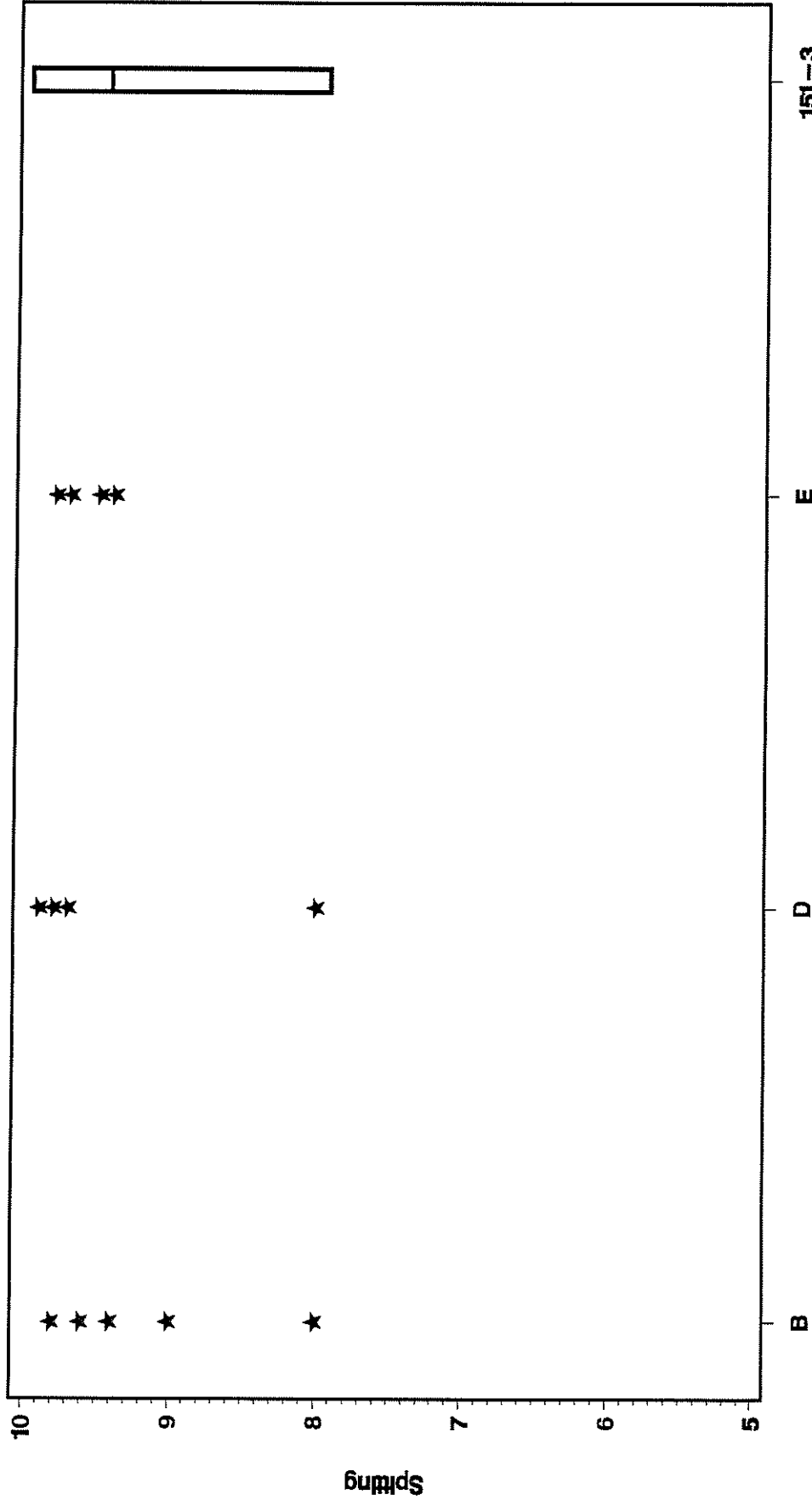
Data Group

# L-37 Lubrified Hardware, Pinion Batch L247/T758A

## Test Target Data Set and Shewhart Severity Limits

Reference Oil 151-3 (Bands Include Merit Ratings of 8 Thru 10)

Pinion Splitting



151-3

Data Group

Attachment	3
Page	4 of 4
Reference	L-37