Report of Meeting L-37-1 Surveillance Panel Conference Call <u>November 13th, 2019</u>

Attendees:

SwRI -	Warden, Louis			
Lubrizol -	Venhoff, Slocum, Drjla			
Afton -	Sangpeal, Horvath, Bell, Kearney			
Intertek -	Smith, Lange			
TMC -	Beck, Clark			
ExxonMobil -	Banas, Kanga			
BASF -	Goyal, Mosher			
Dana -	Zyski			
Meritor -	Rabinowitz, LaBond			
Army -	Comfort, Sattler			
AAM -	Muransky			
Linamar -	Cabaj			

Voting Members in **BOLD** The meeting was called to order at 15:05 pm EST.

1.0 Meeting minutes Approval

- August 7th, 2019 (Meeting #194)
- August 21st, 2019 (Conf Call)

Motion $\#1 \rightarrow W$. Venhoff 1st /2nd M. Sangpeal to approve the meeting minutes from the August 7th, 2019 (Meeting #194) and the August 21st, 2019 (Conf Call). Motion passed unanimously, 12-0-0 (Yes-No-Abstain).

2.0 TMC Discussion on Info Letter 18-01

Info Letter 18-01 changed section (12.5) of the test procedure to state that only "**non-reference oil tests**" exhibiting broken teeth should be reported as non-interpretable. My question is how are reference oil tests exhibiting broken teeth supposed to be handled?

- I will work with TMC on the rewording and to include verbiage around the 134-reference oil.
- Will submit email ballot with purposed change

3.0 Undefined Stress (Modified Conditioning Phase)

- Labs have provided data on running modified conditioning and have not seen evidence of the undefined distress
 - Canadian Conditions
 - o Oil 152-2
 - o 60 minutes regular load of 535 Nm
 - 40 minutes double load at 1070 Nm

		Ring		
Wear	Rippling	Ridging	Pit/Spal	Scoring
7	9	8	9.9	10
9	10	7	9.9	10
8	9	9	9.9	10

Pinion						
Wear	Rippling	Ridging	Pit/Spal	Scoring		
7	9	8	9.9	10		
8	9	9	9.9	10		
8	9	9	9.7	10		

Other Action Items

- Lab B to run modified conditions when able
- Find out quantity of on hand unprocessed gear sets at Gleason
- Will set up teleconference 1st week of December to discuss current data on experimental Gleason gears and desired process on next batch

4.0 Adjournment

Meeting Adjourned at 16:00 pm EST

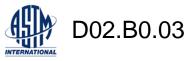
Motion #2 \rightarrow W. Venhoff 1st /2nd D. Smith to adjourn. Motion passed unanimously, 12-0-0 (Yes-No-Abstain).

Respectfully submitted,

Robert Slocum L-37-1 Surveillance Panel Chairman

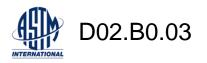


11/13/2019 3:00 pm – 5:00 pm Ann Arbor, MI Robert Slocum



Agenda

- Call to Order/Agenda review
- Membership review
- Meeting Minute Approvals
 - August 7th , 2019 (Meeting #194)
 - August 21st, 2019 (Conf Call)
- TMC Discussion Info Letter 18-01
- Undefined Distress
 - Modified Conditions
- New business
- Adjournment

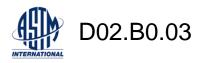


Membership Review

Rob Banas Allen Comfort Troy Muransky Matt Sangpeal Arjun Goyal Amy Zyski **Dylan Beck** Daniel Rabinowitz Dale Smith Robert Slocum Rebecca Warden Kaled Zreik Mike Cabaj

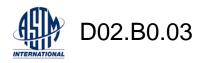
ExxonMobil US Army AAM Afton BASF Dana TMC Meritor Intertek Lubrizol SwRL GM Linamar

Total Voting Members = 13



Meeting Minutes Approval

- August 7th, 2019 (Meeting #194)
- August 21st, 2019 (Conf Call)

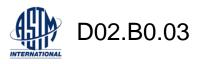


TMC Discussion Info Letter 18-01

- Info Letter 18-01 changed section 12.5 of the test procedure to state that only "non-reference oil tests" exhibiting broken teeth should be reported as non-interpretable. I couldn't find any history of why this change was made, it seems like it was a result of a discussion during the August 9th 2017 meeting.
- My question is how are reference oil tests exhibiting broken teeth supposed to be handled? This change was never made to the L-37 procedure so reference oil tests with broken teeth are still to be reported as non-interpretable for that test. If the wording is to be kept the same for L-371 then the panel should discuss how reference oil test are to be rated and reported."



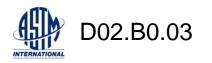
- It was decided the next step will be to use the regular grit and deeper case depth from the experimental hardware and run a modified L-37-1 Conditioning Phase.
 - Canadian Conditions
 - Oil 152-2
 - 60 minutes regular load of 535 Nm
 - 40 minutes double load at 1070 Nm



- SWRI
- Note: We used the Strange housing with the Forged spool....my lab and builders are in love!
- No Undefined Stress

	Ring Gear Results					
	Wear	Rippling	Ridging	Pitting/Spalling	Scoring	
Original Merit ^C	7	9	8	9.9	10	
Transformed Results	7.0000	-0.4055	-0.9163	0.5108	10.0000	
Correction Factor	0.0000	0.0000	0.0000	0.0000	0.0000	
Corrected Transformed	7.0000	-0.4055	-0.9163	0.5108	10.0000	
Severity Adjustment ^A	0.0000	0.0000	0.0000	0.0000	0.0000	
Final Transformed Results	7.0000	-0.4055	-0.9163	0.5108	10.0000	
Final Merit Results	7.0	9.0	8.0	9.9	10.0	

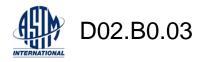
	Pinion Gear Results					
	Wear	Rippling	Ridging	Pitting/Spalling	Scoring	
Original Merit B,C	7	9	8	9.9	10	
Transformed Results	7.0000	-0.4055	-0.9163	0.5108	10.0000	
Correction Factor	0.0000	0.0000	0.0000	0.0000	0.0000	
Corrected Transformed	7.0000	-0.4055	-0.9163	0.5108	10.0000	
Severity Adjustment ^A	0.0000	0.0000	0.0000	0.0000	0.0000	
Final Transformed Results	7.0000	-0.4055	-0.9163	0.5108	10.0000	
Final Merit Results	7.0	9.0	8.0	9.9	10.0	



- Afton
- Used an open differential and the Strange housing:
- No Undefined Stress

	Ring Gear Results						
	Wear	Rippling	Ridging	Pitting/Spalling	Scoring		
Original Merit Results C	9	10	7	9.9	10		
Transformed Results	9.0000	0.6931	-1.2528	0.5108	10.0000		
Correction Factor	0.0000	0.0000	0.0000	0.0000	0.0000		
Corrected Transformed Results	9.0000	0.6931	-1.2528	0.5108	10.0000		
Severity Adjustment A	0.0000	0.0000	0.0000	0.0000	0.0000		
Final Transformed Results	9.0000	0.6931	-1.2528	0.5108	10.0000		
Final Merit Results	9.0	10.0	7.0	9.9	10.0		

	Pinion Gear Results						
[Wear	Rippling	Ridging	Pitting/Spalling	Scoring		
Original Merit Results B.C	8	9	9	9.9	10		
Transformed Results	8.0000	-0.4055	-0.4055	0.5108	10.0000		
Correction Factor	0.0000	0.0000	0.0000	0.0000	0.0000		
Corrected Transformed Results	8.0000	-0.4055	-0.4055	0.5108	10.0000		
Severity Adjustment A	0.0000	0.0000	0.0000	0.0000	0.0000		
Final Transformed Results	8.0000	-0.4055	-0.4055	0.5108	10.0000		
Final Merit Results	8.0	9.0	9.0	9.9	10.0		



- Intertek
- First test was run with the dana housing as the question on the TMC 152, no apparent unknown distress

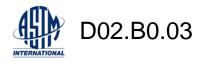
|Test Method D6121 L37 Form 2 - Gear Tooth Surface Conditions

Lab: EG	Motoring Stand: TB3		Storage Box:	torage Box:		ox Run:
Start Date: 20190820 EOT Date:			EOT Time:		Test Length: 24	
Oil Code: EG-0077/CMIR-146124						
TMC Oil Cod	le:	Lab Oil code: JN91111A		N	Viscosity Grade: N/A	

Test No: L371-009-00-0179 Rater's Initials: **Original Ring Rating** Original Pinion Rating Gear Condition Burnish Med-Bright Dull 9.00000 8.00000 Discoloration 10.00000 Corrosion 10.00000 Deposits 9.00000 9.00000 Pinion Rating With Original Pinion Rating **Original Ring Rating** Exclusion Wear 8.00000 8.00000 8.00000 9.00000 9.00000 9.00000 Rippling Ridging 9.00000 9.00000 9.00000 Pitting/Spalling 9,90000 9,70000 9,70000 10.00000 10.00000 10.00000 Scoring Original Individual Tooth Ratings 2 3 5 6 1 4 9.90000 9.70000 9.90000 9.90000 Pitting/Spalling 9.90000 9.90000 9.90000 Remarks 10-2018-246

10-2018-246 Pinion - HT# L9224 2736808 P/N 1826587 Ring - HT# 227T378 2736811 1826588

Pinion gear - One broken tooth and polishing on coast side of gear.



- Intertek
- The second was declared invalid due to running the wrong conditioning temp and torque on the fail oil with the Strange housing

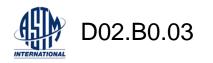
Test Method D6121 L37 Form 2 - Gear Tooth Surface Conditions

Lab: EG	Motoring Stand: TB3		Storage Box:		Storage B	ox Run:	
Start Date: 20191101 EOT Date: 2019		91102	EOT Time: 14:2	9	Test Length: 24		
Oil Code: E	Oil Code: EG-0082/CMIR-146129						
TMC Oil Coo	le:	Lab Oil code: JN91116A		Viscosity Grade:		ade:	

Test No: L371-010-07-0187

Gear Condition	(Original Ring	y Rating			Original Pinion Rating			
Burnish	_	Bright	t		[Bright	
Discoloration		9.0000	0				6	.00000	
Corrosion	_	10.0000	00				10	0.00000.0	
Deposits	_	6.0000	0				7	.00000	
	Original	Ring Rating	1	Origi	inal Pinion I	Rating		Pinion Ratir Exclusi	
Wear	7.	.00000		7.00000		7.00000			
Rippling	9.	.00000		7.00000		7.00000			
Ridging	- 6	.00000			7.00000	00000 7.00000			
Pitting/Spalling	9.	.90000			9.90000			9.9000	0
Scoring	10	0.00000		10.00				10.000	00
		Original In	dividua	l Toot	h Ratings				
	1	2	3		4	5		6	7
Pitting/Spalling	9.90000	9.90000	9.900	000	9.90000	9.9000	0	9.90000	9.90000

10-2018-245

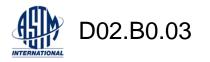


- Summary 152-2
- Fail Oil 123?

S			Ring		
	Wear	Rippling	Ridging	Pit/Spal	Scoring
	7	9	8	9.9	10
	9	10	7	9.9	10
	8	9	9	9.9	10
	7	9	6	9.9	10

	Wear				
	Mean	Std Dev			
152-2	7.8	0.9			
	Rippling				
	Mean	Std Dev			
152-2	8.9	1.6			
	Ridging				
	Mean	Std Dev			
152-2	9.3	0.7			
	Pit/S	Spall			
	Mean	Std Dev			
152-2	9.9	0			

		Pinion		
Wear	Rippling	Ridging	Pit/Spal	Scoring
7	9	8	9.9	10
/		0	5.5	10
8	9	9	9.9	10
		_		
8	9	9	9.7	10
7	7	7	9.9	10



New Business

- ?



Adjourn

* Initial to indicate attendance at subject meeting

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
R	Banas, Rob	Voting	ExxonMobil Fuels, Lubricants & Specialties 114 Arcadia Park Dr. Canton, GA 30114	Phone: 678-493-3930 Fax: E-Mail: rob.a.banas@exxonmobil.com
4CD	Beck, Dylan	Voting	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pennsylvania 15206	
	Belay, Mesfin	Non Vating	Detroit Diesel 13400 Outer Drive W. Detroit, MI 48239	Fax: 313-592-5970 E-Mail: mesfin.belav@daimler.com
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he	Cabaj, Mike	Voting	Linamar	_ 1
	Clark, Jeff	Non Voting	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pennsylvania 15206	
D.C.	Comfort, Allen	Voting	US Army Ground Vehicle Systems Center 6501 East 11 Mile road Warren, MI 48397-5000	
	Decapite, Vanessa	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347- 2134 Fax: E-Mail:
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+ 2 	Donovan, Eric	Non-Voting	Afton Chemical 500 Spring Street Richmond, VA 23219	Phone: 804-788-5097 Fax: E-Mail: Eric.Donovan@affonchemical.com
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Page 1 of 5

ASTM L-37/L-37-1 Surveillance Panel Membership / Sign In List Meeting Date: 11/3/3019

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	Joy, Tisha	Non Voting	BASF 500 White Plaines Rd Tarrytown NY	
Pierto	Kanga, Percy	Non Voting	ExxonMobil Research & Engineering 1545 Route 22 East Clinton, NJ 08801	Phone: 908-335-3780 Fax: E-Mail: percy.r.kanga@exxonmobil.com
EN	Kearney, Bill	Non Voting	Afton Chemical Southfield, MI	Phone: Fax: E-Mail:
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	Sanchez, Art	Non Voting	Southwest Research Institute PO Drawer 28510 San Antonio, Texas 78228-0510	Phone: 210-522-3445 Fax: 210-680-1777 E-Mail: asanchez@swritorn
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Ì	Smith, Dale	Voting	Intertek Automotive Research 5404 Bandera Rd San Antonio, Texas	_

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Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
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Æ	Jessica Labord	NK	Meritor, Inc. 2135 W. Maple Rol, Try, MI 48084	From: 248-872-3055- Fran: F-Mail: Jessica - Japon de Monterana
				Phone: Fax: F-Mail

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