



## Certificate of Analysis

Mr. Mike Phelps  
Advanced Lubrication Technology, Inc.  
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Suite 350  
Encino, CA 91316

Lab No. 713930C (CHEV)  
Report Date: 03/23/2000  
Email: mphelps@altboron.com

Sample Description: #2 LubriSilk GREASE SAMPLE 18-F  
Test Series: Multiple ASTM Grease Tests Including Timken EP – Grease (ASTM D2509)

Dear Mike:

Thank you for your confidence in Herguth Laboratories, Inc. Please accept this report and attachments as our conclusion to the above numbered project/sample descriptions.

Summary and Conclusions:

All tests other than the Timken EP test were performed at our lab and the results are attached hereto. The Timken ASTM D2509 was referred to the local Chevron laboratory for evaluation on their equipment. We provided them your requested protocol specifying for grease packing and initial testing at a load wt. of 40, increasing the load wt. by 10 lbs. after five days and increasing the wt. by 10 lbs. each day thereafter until weld failure.

Chevron's verbal and written report indicated that they accelerated the protocol due to the unexpectedly good performance of the grease and their not wanting to tie up the machine for more the five days where they incremented the weights. In short, the grease performance exceeded the load capacity of their equipment, yielding a default Timken Load of 90 and a default score load of +90. Ninety is the maximum capacity of their equipment. They further reported that at a load of 90 the grease did not exhibit any smoking, vibration or other indication of degradation. A weld failure was not reported up to the load limit of their equipment. Their laboratory report is attached hereto.

Respectfully submitted,

William R. Herguth  
STLE - CLS, OMA-II



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06/13/2000  
16:39:32  
ALTEMP

Laboratory : 713930C                      Date: 03/23/2000  
Description: ID: GREASE SAMPLE 18-F

Test Performed	Proc-Rev	Result
Cone Penetration, ASTM D1403-96	1403-1.3b	
Unworked @ 25 deg. C .....		287
Worked 60 Strokes @ 25 deg. C .....		315
Penetration 10,000 strokes, ASTM D217-97	0217-1.2b	335
Penetration 100,000 strokes, ASTM D217-97		389
Dropping Point, ASTM D2265-94a.....	2265-1.2	>330 Deg. C
Separation from Grease, ASTM D1742-94 mod	1742-1.1	4.1 %
Corrosion Properties, ASTM D1743-94.....	1743-1.2	PASS
Water Washout of Grease, ASTM D1264-96..	1264-1.2	
Test Temperature .....		175 Deg. F
Drying Temperature .....		200 Deg. F
Percent Washed Out .....		10.9 % Wt
Fourier-Trans. Infrared Scan HL-1141.....	1141-2.0	ENCLOSED
Metals by I.C.P. Spectro., HL-1158	1158-3.2	



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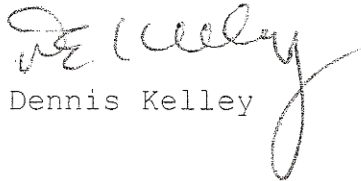
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Laboratory : 713930C      Date: 03/23/2000  
Description: ID: GREASE SAMPLE 18-F

Test Performed	Proc-Rev	Result
Load-Wear Index.....		77 kgf
Weld Point.....		250 kgf
Oxidation Stab. of Grease, ASTM D942-90.	0942-1.0	
Mean Pressure Drop after 100 hours ....		12 psi
Four Ball Wear of Grease, ASTM D2266-91	2266-1.0	
Average Wear Scar after 60 min. @ 40 kg		1.3060 mm
Wear by Pin-On-Disc, ASTM G99-95.....	0099-1.0	
Coefficient of friction value.....		0.03 c(f)
Scar value.....		0.69 mm
Special Analysis Project	SP01-1.7	ENCLOSED

Revised report supersedes Laboratory No. 713930B and includes Timken results.

Respectfully Submitted,  
Herguth Laboratories, Inc.

  
by Dennis Kelley

cc: Herguth File Copy  
Charles Foscue



**TIMKEN EP - GREASE (ASTM D2509)**  
LPTL TEST 0708F

Technician: ARM Sample ID: 18-F  
Date: 5/30/2000 Machine No.: 4  
Request No.: \_\_\_\_\_ Test Cup Lot No.: \_\_\_\_\_

Rating Code	
NS =	No Score
S =	Score
Q =	Questionable

Run Number	Load, Lb.	Rating
1	40	NS
2	50	NS
3	60	NS
4	70	NS
5	80	NS
6	90	NS
7		
8		
9		
10		
OK Load, Lb.	90	
Score Load, Lb.	+90	

5/30  
6/6  
6/8  
6/8  
6/8  
6/9

<p align="center"><b>Contact Pressure (C), psi (OK Load)</b></p> <p>X = weight placed on the weight pan, Lb.</p> <p>G = Load-lever constant</p> <p>Z = Average width of test scar, in.</p> <p><b>Scar Width, in = Scar Width, mm / 25.4</b></p> <p align="center"><math>C, \text{ psi} = (20(X + G))/Z</math></p> <p align="center">X = 90</p> <p align="center">G = 1.58</p> <p align="center">Z = 0.1005</p> <p align="center"><math>C, \text{ psi} = 18,223</math></p>
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Scar Readings			Avg. Scar Reading	Mic. Power Factor	Scar, mm (scar/factor)	Scar, in. (scar, mm/25.4)
1	2	3				
594	573	518	562	220	2.95	0.1005

Haz Code: W1

200001215 1A

HERGUTH LAB GREASE TIMKEN D2509 P0207817

0708F TIMKEN EP-GREASE D 2509

CHARGE CODE DWD9000059

1A 0708F

WRITTEN 06/13/00

DUE DATE

HERGUTH LABORATORIES

RM PH

SAMPLE SIZE 3 POUND

LOCATION

FAX RESULTS TO HERGUTH LABS  
707-554-0109  
ATTN: LINDA PERRY  
MODIFIED GREASE TIMKEN

CONDITION	VALUE
TIME, MIN	10
SPEED, RPM	800
TEST TEMPERATURE, C	27
SAMPLE NO: 713930C	

COMPOSITION	BATCH	VALUE
EXPTL GRS	W	100.00

OK LOAD, LBS  
121 SCORE LOAD, LBS  
1701 MACHINE #  
2350 CONTACT PRESSURE, PSI

90  
+ 90  
4  
18223

TECH: ARM DATE: 6/13/00 HOURS: 3