



LIEBHERR

OIL ANALYSIS REPORT

WEAR	NORMAL
CONTAMINATION	NORMAL
FLUID CONDITION	NORMAL



Machine Id
LIEBHERR LH110 155976-1227
Component
Diesel Engine
Fluid
DIESEL ENGINE OIL SAE 15W40 (--- GAL)

RECOMMENDATION

Resample at the next service interval to monitor. Please specify the brand, type, and viscosity of the oil on your next sample.

Test	UOM	Method	Limit/Abn	Current	History1	History2
Sample Number		Client Info		LH0267559	LH0267531	LH0258471
Sample Date		Client Info		26 Apr 2024	18 Apr 2024	27 Mar 2024
Machine Age	hrs	Client Info		1769	1623	1266
Oil Age	hrs	Client Info		146	628	271
Filter Age	hrs	Client Info		146	628	271
Oil Changed		Client Info		Not Changd	Changed	Not Changd
Filter Changed		Client Info		Not Changd	Changed	Not Changd
Sample Status				NORMAL	NORMAL	NORMAL

WEAR

All component wear rates are normal.

Iron	ppm	ASTM D5185m	>100	4	6	4
Chromium	ppm	ASTM D5185m	>5	<1	<1	<1
Nickel	ppm	ASTM D5185m	>5	<1	<1	<1
Titanium	ppm	ASTM D5185m		<1	<1	<1
Silver	ppm	ASTM D5185m	>3	1	0	0
Aluminum	ppm	ASTM D5185m	>15	3	3	4
Lead	ppm	ASTM D5185m	>30	<1	1	<1
Copper	ppm	ASTM D5185m	>125	12	72	6
Tin	ppm	ASTM D5185m	>5	<1	<1	<1
Vanadium	ppm	ASTM D5185m		<1	<1	<1
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE

CONTAMINATION

There is no indication of any contamination in the oil.

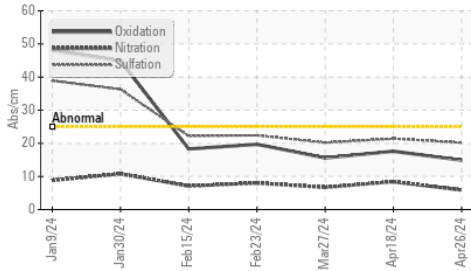
Silicon	ppm	ASTM D5185m	>60	10	10	10
Potassium	ppm	ASTM D5185m	>20	3	3	1
Fuel		WC Method	>5	<1.0	<1.0	<1.0
Water		WC Method	>0.2	NEG	NEG	NEG
Glycol		WC Method		NEG	NEG	NEG
Soot %	%	*ASTM D7844	>3	0.1	0.2	0.1
Nitration	Abs/cm	*ASTM D7624	>20	5.9	8.4	6.7
Sulfation	Abs/.1mm	*ASTM D7415	>30	20.2	21.4	20.2
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.2	NEG	NEG	NEG

FLUID CONDITION

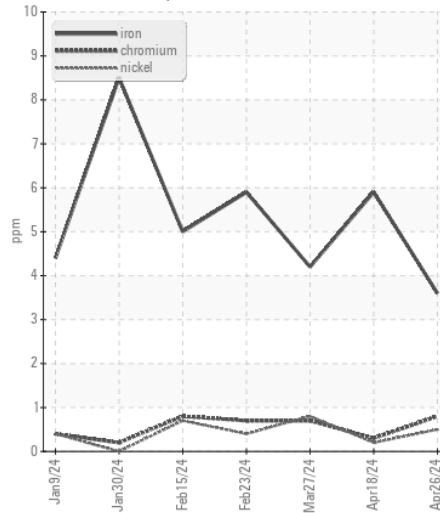
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

Sodium	ppm	ASTM D5185m	>158	3	<1	3
Boron	ppm	ASTM D5185m	250	394	391	427
Barium	ppm	ASTM D5185m	10	1	1	0
Molybdenum	ppm	ASTM D5185m	100	80	86	87
Manganese	ppm	ASTM D5185m		<1	<1	<1
Magnesium	ppm	ASTM D5185m	450	384	403	431
Calcium	ppm	ASTM D5185m	3000	1243	1348	1348
Phosphorus	ppm	ASTM D5185m	1150	895	1080	1096
Zinc	ppm	ASTM D5185m	1350	1067	1179	1204
Sulfur	ppm	ASTM D5185m	4250	3004	3370	3913
Oxidation	Abs/.1mm	*ASTM D7414	>25	14.9	17.6	15.6
Base Number (BN)	mg KOH/g	ASTM D2896	8.5	7.2	6.6	7.5
Visc @ 100°C	cSt	ASTM D445	14.4	13.0	12.5	12.8

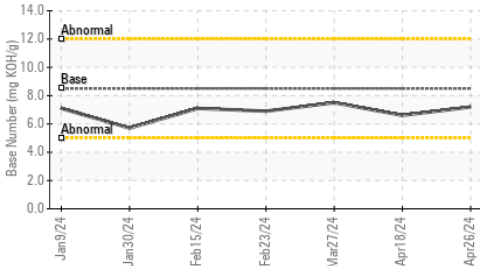
FT-IR (Direct Trend)



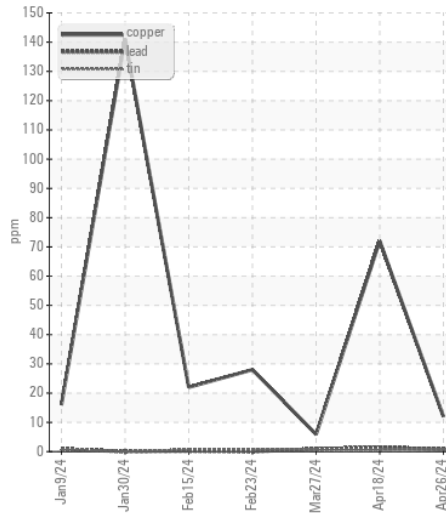
Ferrous Alloys



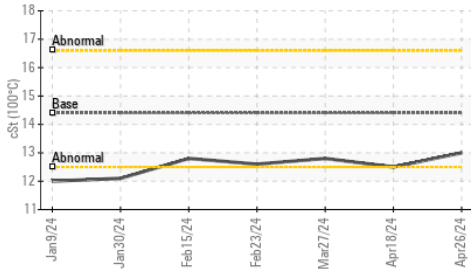
Base Number



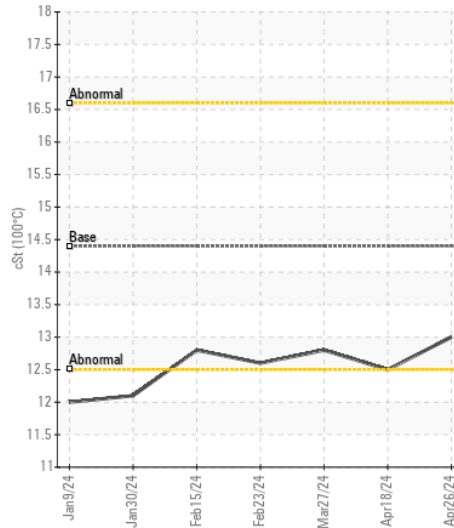
Non-ferrous Metals



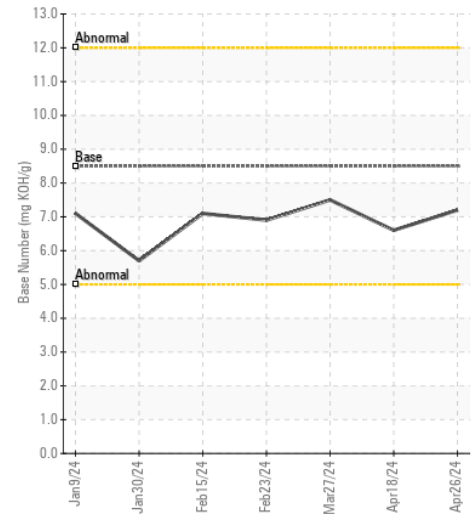
Viscosity @ 100°C



Viscosity @ 100°C



Base Number



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : LH0267559 **Received** : 28 May 2024
Lab Number : 06192008 **Tested** : 29 May 2024
Unique Number : 11048760 **Diagnosed** : 29 May 2024 - Wes Davis
Test Package : CONST (Additional Tests: TBN)

KINDER MORGAN
 4301 IVERSON
 TRINITY, AL
 US 35601

Contact: RICKY JOHNSON
 ricky_johnson@kindermorgan.com

To discuss this sample report, contact Customer Service at 1-800-237-1369.

* - Denotes test methods that are outside of the ISO 17025 scope of accreditation.

Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

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