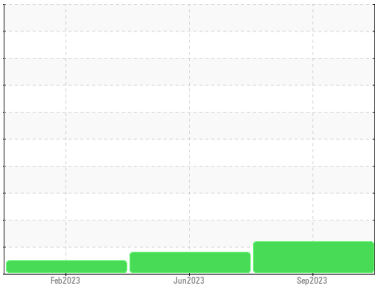
OIL DIAGNOSTICS

# OIL ANALYSIS REPORT

Sample Rating Trend




**FUEL**

Machine Id
## LIEBHERR L546 L-148 (S/N 1755-62277)
Component
**Diesel Engine**
Fluid
**DIESEL ENGINE OIL SAE 15W40 (--- GAL)**

## DIAGNOSIS

**Recommendation**
We advise that you check the fuel injection system. Resample at the next service interval to monitor.

**Wear**
All component wear rates are normal.

**Contamination**
There is a moderate amount of fuel present in the oil.

**Fluid Condition**
Fuel is present in the oil and is lowering the viscosity. The BN result indicates that there is suitable alkalinity remaining in the oil.

| SAMPLE INFORMATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Sample Number | | Client Info | | **PCA0105655** | PCA0097275 | PCA0080649 |
| Sample Date | | Client Info | | **29 Sep 2023** | 02 Jun 2023 | 28 Feb 2023 |
| Machine Age | hrs | Client Info | | **4898** | 4067 | 3310 |
| Oil Age | hrs | Client Info | | **250** | 500 | 0 |
| Oil Changed | | Client Info | | **N/A** | Changed | Changed |
| Sample Status | | | | **ABNORMAL** | MARGINAL | NORMAL |

| CONTAMINATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Water | | WC Method | >0.2 | **NEG** | NEG | NEG |
| Glycol | | WC Method | | **NEG** | NEG | NEG |

| WEAR METALS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Iron | ppm | ASTM D5185m | >100 | **5** | 25 | 36 |
| Chromium | ppm | ASTM D5185m | >20 | **<1** | 1 | <1 |
| Nickel | ppm | ASTM D5185m | >4 | **<1** | 1 | <1 |
| Titanium | ppm | ASTM D5185m | | **<1** | 1 | <1 |
| Silver | ppm | ASTM D5185m | >3 | **0** | 0 | 0 |
| Aluminum | ppm | ASTM D5185m | >20 | **1** | 2 | 2 |
| Lead | ppm | ASTM D5185m | >40 | **1** | 2 | <1 |
| Copper | ppm | ASTM D5185m | >330 | **<1** | 2 | 2 |
| Tin | ppm | ASTM D5185m | >15 | **<1** | <1 | <1 |
| Vanadium | ppm | ASTM D5185m | | **<1** | <1 | 0 |
| Cadmium | ppm | ASTM D5185m | | **0** | <1 | 0 |

| ADDITIVES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Boron | ppm | ASTM D5185m | 250 | **3** | 4 | 3 |
| Barium | ppm | ASTM D5185m | 10 | **0** | 0 | 0 |
| Molybdenum | ppm | ASTM D5185m | 100 | **46** | 47 | 59 |
| Manganese | ppm | ASTM D5185m | | **<1** | <1 | 1 |
| Magnesium | ppm | ASTM D5185m | 450 | **778** | 755 | 1001 |
| Calcium | ppm | ASTM D5185m | 3000 | **893** | 1475 | 1244 |
| Phosphorus | ppm | ASTM D5185m | 1150 | **884** | 991 | 1017 |
| Zinc | ppm | ASTM D5185m | 1350 | **1047** | 1279 | 1338 |
| Sulfur | ppm | ASTM D5185m | 4250 | **2564** | 3472 | 3182 |

| CONTAMINANTS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Silicon | ppm | ASTM D5185m | >25 | **2** | 4 | 5 |
| Sodium | ppm | ASTM D5185m | >158 | **2** | 4 | 3 |
| Potassium | ppm | ASTM D5185m | >20 | **<1** | 2 | 1 |
| Fuel | % | ASTM D3524 | >5 | ▲ **7.9** | ▲ 3.9 | <1.0 |

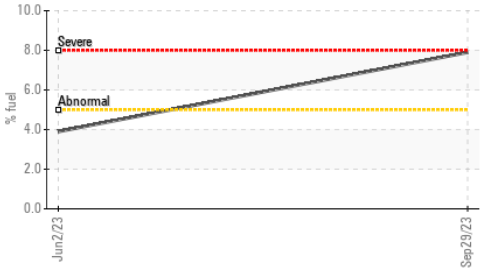
| INFRA-RED | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Soot % | % | *ASTM D7844 | >3 | **0.2** | 0.5 | 0.7 |
| Nitration | Abs/cm | *ASTM D7624 | >20 | **7.7** | 10.4 | 11.8 |
| Sulfation | Abs/.1mm | *ASTM D7415 | >30 | **18.7** | 22.1 | 22.9 |

| FLUID DEGRADATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Oxidation | Abs/.1mm | *ASTM D7414 | >25 | **15.1** | 18.1 | 20.3 |
| Base Number (BN) | mg KOH/g | ASTM D2896 | 8.5 | **8.6** | 6.9 | 7.0 |

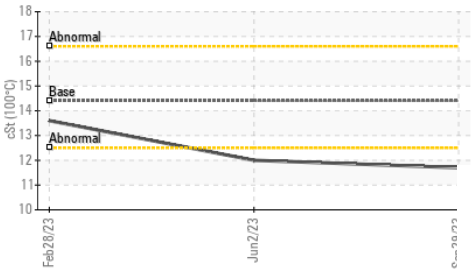
OIL DIAGNOSTICS

# OIL ANALYSIS REPORT

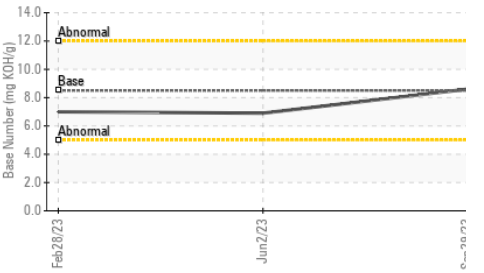
Fuel Dilution




Viscosity @ 100°C




Base Number

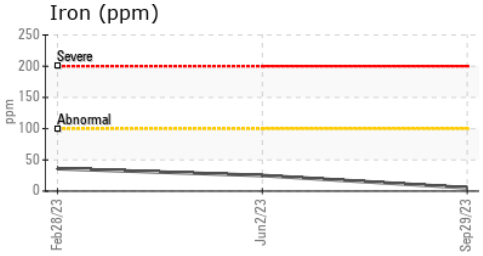



| VISUAL | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| White Metal | scalar | *Visual | NONE | **NONE** | NONE | NONE |
| Yellow Metal | scalar | *Visual | NONE | **NONE** | NONE | NONE |
| Precipitate | scalar | *Visual | NONE | **NONE** | NONE | NONE |
| 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 |
| Free Water | scalar | *Visual | | **NEG** | NEG | NEG |

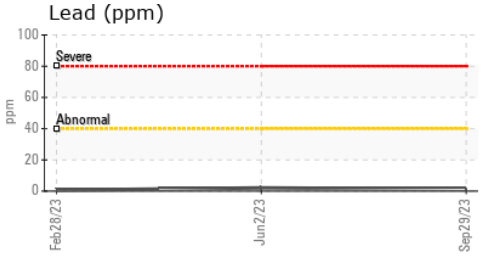
| FLUID PROPERTIES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Visc @ 100°C | cSt | ASTM D445 | 14.4 | ▲ **11.7** | 12.0 | 13.6 |

## GRAPHS

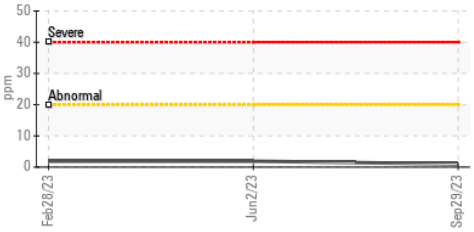
Iron (ppm)



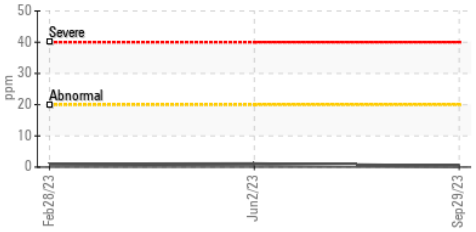

Lead (ppm)



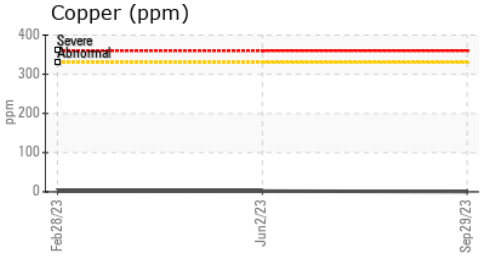

Aluminum (ppm)



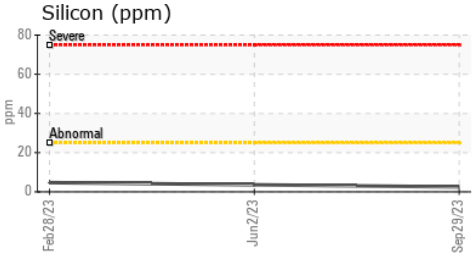

Chromium (ppm)



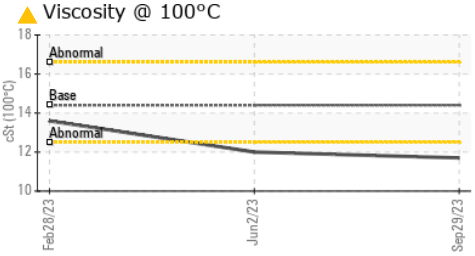

Copper (ppm)



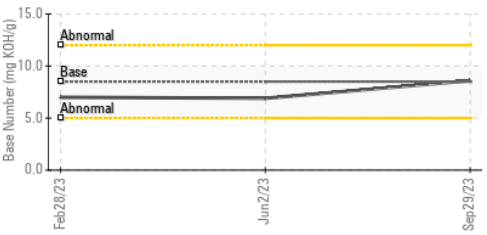

Silicon (ppm)




Viscosity @ 100°C




Base Number




Certificate L2367

**Laboratory** : WearCheck USA - 501 Madison Ave., Cary, NC 27513
**Sample No.** : PCA0105655
**Lab Number** : 06076493
**Unique Number** : 10858584
**Test Package** : MOB 1 ( Additional Tests: FuelDilution, PercentFuel, TBN )

**Received** : 01 Feb 2024
**Tested** : 05 Feb 2024
**Diagnosed** : 05 Feb 2024 - Jonathan Hester

*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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