

# **OIL ANALYSIS REPORT**

Sample Rating Trend

### NORMAL

# INTERNATIONAL 5919028 Component

**Diesel Engine** 

## VALVOLINE 15W40 (--- GAL)

#### Recommendation

Resample at the next service interval to monitor.

#### Wear

All component wear rates are normal.

#### Contamination

There is no indication of any contamination in the oil.

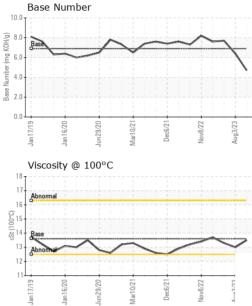
#### Fluid Condition

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

| mt2019 Jant2020 Jant2020 Mar2021 Dec2021 New2002 Aug2023  |   |   |   |   |   |   |  |  |  |
|---|---|---|---|---|---|---|--|--|--|
| SAMPLE INFORM   | IATION  | method  | limit/base  | current   | history1  | history2  |  |  |  |
| Sample Number   |   | Client Info   |   | IL0033226   | IL05934658  | IL05853004  |  |  |  |
| Sample Date   |   | Client Info   |   | 31 Oct 2023   | 03 Aug 2023   | 08 May 2023   |  |  |  |
| Machine Age   | mls   | Client Info   |   | 0   | 294816  | 283352  |  |  |  |
| Oil Age   | mls   | Client Info   |   | 308371  | 0   | 0   |  |  |  |
| Oil Changed   |   | Client Info   |   | Changed   | N/A   | N/A   |  |  |  |
| Sample Status   |   |   |   | NORMAL  | ABNORMAL  | ABNORMAL  |  |  |  |
| CONTAMINATION   | I   | method  | limit/base  | current   | history1  | history2  |  |  |  |
| Fuel  |   | WC Method   | >5  | <1.0  | <1.0  | <1.0  |  |  |  |
| 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  | 4   | 15  | 12  |  |  |  |
| Chromium  | ppm   | ASTM D5185m   | >20   | <1  | 0   | <1  |  |  |  |
| Nickel  | ppm   | ASTM D5185m   | >4  | 0   | 0   | <1  |  |  |  |
| Titanium  | ppm   | ASTM D5185m   |   | <1  | <1  | <1  |  |  |  |
| Silver  | ppm   | ASTM D5185m   | >3  | 0   | 0   | 0   |  |  |  |
| Aluminum  | ppm   | ASTM D5185m   | >20   | 2   | 2   | 3   |  |  |  |
| Lead  | ppm   | ASTM D5185m   | >40   | 0   | 0   | 0   |  |  |  |
| Copper  | ppm   | ASTM D5185m   | >330  | <1  | <1  | 0   |  |  |  |
| Tin   | ppm   | ASTM D5185m   | >15   | <1  | 0   | <1  |  |  |  |
| Vanadium  | ppm   | ASTM D5185m   |   | <1  | <1  | <1  |  |  |  |
| Cadmium   | ppm   | ASTM D5185m   |   | 0   | 0   | 0   |  |  |  |
| ADDITIVES   |   | method  | limit/base  | current   | history1  | history2  |  |  |  |
| Boron   | ppm   | ASTM D5185m   | 39  | 6   | 175   | 74  |  |  |  |
| Barium  | ppm   | ASTM D5185m   | 1   | 0   | 0   | 0   |  |  |  |
| Molybdenum  | ppm   | ASTM D5185m   | 49  | 59  | 88  | 67  |  |  |  |
| Manganese   | ppm   | ASTM D5185m   | 1   | <1  | <1  | <1  |  |  |  |
| Magnesium   | ppm   | ASTM D5185m   | 616   | 904   | 559   | 792   |  |  |  |
| Calcium   | ppm   | ASTM D5185m   | 1554  | 1010  |   |   |  |  |  |
|   |   |   | 1004  | 1049  | 1491  | 1322  |  |  |  |
| Phosphorus  | ppm   | ASTM D5185m   | 899   | 1049<br>1017  | 1491<br>990   | 1322<br>850   |  |  |  |
|   | ppm<br>ppm  |   |   |   |   |   |  |  |  |
| Zinc  |   | ASTM D5185m   | 899   | 1017  | 990   | 850   |  |  |  |
| Zinc  | ppm   | ASTM D5185m<br>ASTM D5185m  | 899<br>1069   | 1017<br>1215  | 990<br>1241   | 850<br>1075   |  |  |  |
| Zinc<br>Sulfur<br>CONTAMINANTS  | ppm   | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | 899<br>1069<br>2624   | 1017<br>1215<br>3040  | 990<br>1241<br>3625   | 850<br>1075<br>3224   |  |  |  |
| Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon   | ppm<br>ppm  | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>method   | 899<br>1069<br>2624<br>limit/base   | 1017<br>1215<br>3040<br>current   | 990<br>1241<br>3625<br>history1   | 850<br>1075<br>3224<br>history2   |  |  |  |
| CONTAMINANTS<br>Silicon   | ppm<br>ppm  | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br><b>method</b><br>ASTM D5185m   | 899<br>1069<br>2624<br>limit/base   | 1017<br>1215<br>3040<br>current<br>3  | 990<br>1241<br>3625<br>history1<br>5  | 850<br>1075<br>3224<br>history2<br>6  |  |  |  |
| Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium   | ppm<br>ppm<br>ppm<br>ppm  | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>Method<br>ASTM D5185m<br>ASTM D5185m   | 899<br>1069<br>2624<br>limit/base<br>>25  | 1017<br>1215<br>3040<br>current<br>3<br>2   | 990<br>1241<br>3625<br>history1<br>5<br>23  | 850<br>1075<br>3224<br>history2<br>6<br>23  |  |  |  |
| Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED                                     | ppm<br>ppm<br>ppm<br>ppm  | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br><b>method</b><br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m                               | 899<br>1069<br>2624<br><b>limit/base</b><br>>25<br>>20  | 1017<br>1215<br>3040<br>current<br>3<br>2<br>2  | 990<br>1241<br>3625<br>history1<br>5<br>23<br>▲ 96  | 850<br>1075<br>3224<br>history2<br>6<br>23<br>▲ 81                                    |  |  |  |
| Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED<br>Soot %                           | ppm<br>ppm<br>ppm<br>ppm<br>ppm                                   | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>Method<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m                                      | 899<br>1069<br>2624<br>limit/base<br>>25<br>>20<br>limit/base                                       | 1017<br>1215<br>3040<br>current<br>3<br>2<br>2<br>2<br>2<br>current                   | 990<br>1241<br>3625<br>history1<br>5<br>23<br>▲ 96<br>history1                                  | 850<br>1075<br>3224<br>history2<br>6<br>23<br>▲ 81<br>history2                        |  |  |  |
| Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED                                     | ppm                           | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br><b>method</b><br>*ASTM D7844                | 899<br>1069<br>2624<br><i>limit/base</i><br>>25<br>>20<br><i>limit/base</i><br>>3                   | 1017<br>1215<br>3040<br>current<br>3<br>2<br>2<br>2<br>current<br>0.6                 | 990<br>1241<br>3625<br>history1<br>5<br>23<br>▲ 96<br>history1<br>0.2                           | 850<br>1075<br>3224<br>history2<br>6<br>23<br>▲ 81<br>history2<br>0.2                 |  |  |  |
| Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED<br>Soot %<br>Nitration              | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>v<br>v<br>v<br>Abs/.1mm | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br><b>method</b><br>*ASTM D7844<br>*ASTM D7624 | 899<br>1069<br>2624<br><b>imit/base</b><br>>25<br>>20<br><b>imit/base</b><br>>3<br>>20              | 1017<br>1215<br>3040<br>current<br>3<br>2<br>2<br>2<br>current<br>0.6<br>12.5         | 990<br>1241<br>3625<br>history1<br>5<br>23<br>▲ 96<br>history1<br>0.2<br>9.3                    | 850<br>1075<br>3224<br>history2<br>6<br>23<br>▲ 81<br>history2<br>0.2<br>10.1         |  |  |  |
| Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED<br>Soot %<br>Nitration<br>Sulfation | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>v<br>v<br>v<br>Abs/.1mm | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>*ASTM D7844<br>*ASTM D7844<br>*ASTM D7415   | 899<br>1069<br>2624<br><b>imit/base</b><br>>25<br>>20<br><b>imit/base</b><br>>3<br>>20<br>>3<br>>20 | 1017<br>1215<br>3040<br>current<br>3<br>2<br>2<br>2<br>current<br>0.6<br>12.5<br>26.1 | 990<br>1241<br>3625<br>history1<br>5<br>23<br>23<br>96<br><u>history1</u><br>0.2<br>9.3<br>22.0 | 850<br>1075<br>3224<br>history2<br>6<br>23<br>▲ 81<br>history2<br>0.2<br>10.1<br>21.7 |  |  |  |



# **OIL ANALYSIS REPORT**



| VISUAL<br>White Metal<br>Yellow Metal<br>Precipitate<br>Silt<br>Debris<br>Sand/Dirt<br>Appearance<br>Odor<br>Emulsified Water<br>Free Water<br>Free Water<br>Visc @ 100°C<br>GRAPHS | scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar | method *Visual | limit/base<br>NONE<br>NONE<br>NONE<br>NONE<br>NONE<br>NONE<br>NORML  | Current<br>NONE<br>NONE<br>NONE<br>NONE<br>NONE<br>NONE<br>NORE | history1<br>NONE<br>NONE<br>NONE<br>NONE<br>NONE<br>NONE<br>NORML | history2<br>NONE<br>NONE<br>NONE<br>NONE<br>NONE |
|---|--|--|--|---|---|--|
| Yellow Metal<br>Precipitate<br>Silt<br>Debris<br>Sand/Dirt<br>Appearance<br>Odor<br>Emulsified Water<br>Free Water<br>Free Water<br>Visc @ 100°C                                    | scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar | *Visual<br>*Visual<br>*Visual<br>*Visual<br>*Visual<br>*Visual<br>*Visual  | NONE<br>NONE<br>NONE<br>NONE<br>NORML  | NONE<br>NONE<br>NONE<br>NONE                                    | NONE<br>NONE<br>NONE<br>NONE                                      | NONE<br>NONE<br>NONE<br>NONE                     |
| Precipitate<br>Silt<br>Debris<br>Sand/Dirt<br>Appearance<br>Odor<br>Emulsified Water<br>Free Water<br>Free Water<br>FLUID PROPERT<br>Visc @ 100°C                                   | scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar           | *Visual<br>*Visual<br>*Visual<br>*Visual<br>*Visual<br>*Visual   | NONE<br>NONE<br>NONE<br>NORML<br>NORML   | NONE<br>NONE<br>NONE<br>NONE                                    | NONE<br>NONE<br>NONE  | NONE<br>NONE<br>NONE                             |
| Silt<br>Debris<br>Sand/Dirt<br>Appearance<br>Odor<br>Emulsified Water<br>Free Water<br>FLUID PROPERT<br>Visc @ 100°C  | scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar                     | *Visual<br>*Visual<br>*Visual<br>*Visual<br>*Visual  | NONE<br>NONE<br>NORML<br>NORML   | NONE<br>NONE<br>NONE  | NONE<br>NONE<br>NONE  | NONE<br>NONE<br>NONE                             |
| Debris<br>Sand/Dirt<br>Appearance<br>Odor<br>Emulsified Water<br>Free Water<br>FLUID PROPERT<br>Visc @ 100°C  | scalar<br>scalar<br>scalar<br>scalar<br>scalar<br>scalar                               | *Visual<br>*Visual<br>*Visual<br>*Visual<br>*Visual  | NONE<br>NONE<br>NORML<br>NORML   | NONE<br>NONE  | NONE<br>NONE  | NONE<br>NONE                                     |
| Sand/Dirt<br>Appearance<br>Odor<br>Emulsified Water<br>Free Water<br>FLUID PROPERT<br>Visc @ 100°C  | scalar<br>scalar<br>scalar<br>scalar<br>scalar   | *Visual<br>*Visual<br>*Visual<br>*Visual   | NONE<br>NORML<br>NORML   | NONE  | NONE  | NONE   |
| Appearance<br>Odor<br>Emulsified Water<br>Free Water<br>FLUID PROPERT<br>Visc @ 100°C   | scalar<br>scalar<br>scalar<br>scalar   | *Visual<br>*Visual<br>*Visual  | NORML<br>NORML   |   |   |  |
| Odor<br>Emulsified Water<br>Free Water<br>FLUID PROPERT<br>Visc @ 100°C   | scalar<br>scalar<br>scalar   | *Visual<br>*Visual   | NORML  | NORML   | NORML   |  |
| Emulsified Water<br>Free Water<br>FLUID PROPERT<br>Visc @ 100°C   | scalar<br>scalar   | *Visual  |  |   |   | NORML  |
| Free Water<br>FLUID PROPERT<br>Visc @ 100°C   | scalar   |  |  | NORML   | NORML   | NORML  |
| FLUID PROPERT<br>Visc @ 100°C   |  | *Visual  | >0.2   | NEG   | NEG   | NEG  |
| Visc @ 100°C  | IES  | Visual   |  | NEG   | NEG   | NEG  |
|   |  | method   | limit/base   | current   | history1  | history  |
| GRAPHS  | cSt  | ASTM D445  | 13.6   | 13.5  | 13.0  | 13.3   |
|   |  |  |  |   |   |  |
| Ferrous Alloys  |  |  |  |   |   |  |
| 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   | Mar10/21   | Dec6/21  | Aug3/23  |   |   |  |
| Non-ferrous Metals  | 5  |  |  |   |   |  |
| 50 copper   |  |  |  |   |   |  |
| - 00  |  |  |  |   |   |  |
| 50 -  |  |  |  |   |   |  |
| DO <mark>-</mark> - 1   |  |  |  |   |   |  |
| 50  |  |  |  |   |   |  |
| DO  |  |  |  |   |   |  |
| 50  |  |  |  |   |   |  |
|   | 21   | 22   | 23   |   |   |  |
| Jan 1 7/19<br>Jan 1 6/20  | Mar10/21   | Dec6/21<br>Nov8/22   | Aug3/23  |   |   |  |
| Viscosity @ 100°C   | _  |  |  | Base Number   |   |  |
| <sup>18</sup> T :   |  |  | 9.0  | base Number   |   |  |
|   |  |  |  |   |   |  |
| Abnormal  |  |  | 8.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-<br>(p7.0-)))))))))))))))))))))))))))))))))))) |   | $\sim$  | ~  |

4.0 3.0

ase 2.0

1.0

Jan 17/19

Jan 16/20



 Certificate L2367
 Test Package
 : FLEET

 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)

un29/20

Dec6/21.

: WearCheck USA - 501 Madison Ave., Cary, NC 27513

Received

Diagnosed

Mar10/21

Nov8/22 -

Diagnostician : Sean Felton

Aug3/23 -

: 20 Nov 2023

: 21 Nov 2023

cSt (

Unique Number : 10751050

Laboratory

Sample No.

Lab Number

13

12

Jan 17/19

: IL0033226

: 06011906

Jan 16/20

Nov8/22

Vug3/23

Mar10/21.

Dec6/21