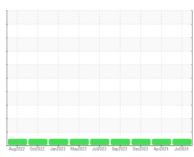


OIL ANALYSIS REPORT

Sample Rating Trend







Machine Id
D-232
Component
Diesel Engine
Fluid
PHILLIPS 66 15W40 (--- GAL)

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor. Please specify the component make and model with your next sample.

Wear

All component wear rates are normal.

Contamination

There is no indication of any contamination in the oil.

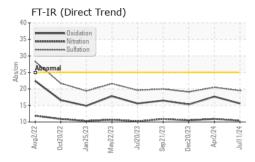
Fluid Condition

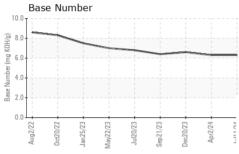
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

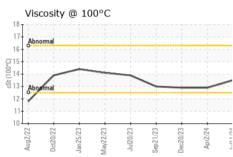
| Cample Date | | | Aug2022 Oct | 2022 Jan 2023 May 2023 | Jul2023 Sep2023 Dec2023 Apr20 | 024 Jul2024 | |
|--|------------------|----------|-------------|------------------------|-------------------------------|-------------|-------------|
| Company Comp | SAMPLE INFORM | MATION | method | limit/base | current | history1 | history2 |
| Machine Age hrs Client Info 0 283 254 | Sample Number | | Client Info | | WC0900283 | WC0703741 | WC0828487 |
| Dil Age | Sample Date | | Client Info | | 11 Jul 2024 | 02 Apr 2024 | 20 Dec 2023 |
| Cilient Info | Machine Age | hrs | Client Info | | 3094 | 2816 | 2533 |
| CONTAMINATION method limit/base current history1 history2 | Oil Age | hrs | Client Info | | 0 | 283 | 254 |
| CONTAMINATION | Oil Changed | | Client Info | | N/A | Changed | Changed |
| Widelign | Sample Status | | | | NORMAL | NORMAL | NORMAL |
| Water WC Method NEG NEG NEG Glycol WC Method NEG NEG NEG WEAR METALS method limit/base current history1 history2 ron ppm ASTM D5185m >100 8 10 4 Chromium ppm ASTM D5185m >20 <1 1 <1 Nickel ppm ASTM D5185m >4 0 <1 0 Isliver ppm ASTM D5185m >4 0 <1 1 <1 Silver ppm ASTM D5185m >20 3 5 4 Silver ppm ASTM D5185m >20 3 5 4 <1 2 <1 0 <1 0 <1 0 <1 0 <1 0 <1 0 <1 0 <1 0 <1 0 <1 0 <1 0 <1 0 <1 <1 <th>CONTAMINATION</th> <th>١</th> <th>method</th> <th>limit/base</th> <th>current</th> <th>history1</th> <th>history2</th> | CONTAMINATION | ١ | method | limit/base | current | history1 | history2 |
| WEAR METALS | Fuel | | WC Method | >5 | <1.0 | <1.0 | <1.0 |
| WEAR METALS method limit/base current history1 history2 ron ppm ASTM D5185m >100 8 10 4 Chromium ppm ASTM D5185m >20 <1 1 <1 Nickel ppm ASTM D5185m >4 0 <1 0 Filtanium ppm ASTM D5185m >3 0 0 0 Aluminum ppm ASTM D5185m >3 0 0 0 Aluminum ppm ASTM D5185m >40 <1 2 <1 Lead ppm ASTM D5185m >40 <1 2 <1 Copper ppm ASTM D5185m >330 <1 2 1 Copper ppm ASTM D5185m 0 <1 0 Vanadium ppm ASTM D5185m 0 <1 0 Cadmium ppm ASTM D5185m 0 <1 <1 | Water | | WC Method | >0.2 | NEG | NEG | NEG |
| Chromium | Glycol | | WC Method | | NEG | NEG | NEG |
| Description | WEAR METALS | | method | limit/base | current | history1 | history2 |
| Nickel | Iron | ppm | ASTM D5185m | >100 | 8 | 10 | 4 |
| Silver | Chromium | ppm | ASTM D5185m | >20 | <1 | 1 | <1 |
| Silver | Nickel | ppm | | >4 | 0 | <1 | 0 |
| ASTM D5185m Part | Titanium | ppm | ASTM D5185m | | <1 | 1 | <1 |
| Deead | Silver | ppm | ASTM D5185m | >3 | 0 | | 0 |
| Copper | Aluminum | ppm | ASTM D5185m | >20 | 3 | 5 | 4 |
| Tin | Lead | ppm | ASTM D5185m | >40 | <1 | | <1 |
| Vanadium ppm ASTM D5185m 0 <1 | Copper | ppm | ASTM D5185m | >330 | <1 | | 1 |
| Cadmium ppm ASTM D5185m 0 <1 | Tin | • • | | >15 | | | |
| ADDITIVES | Vanadium | ppm | | | - | | |
| Asym | Cadmium | ppm | ASTM D5185m | | 0 | <1 | 0 |
| Sarium | ADDITIVES | | | limit/base | current | history1 | history2 |
| Molybdenum ppm ASTM D5185m 95 84 89 Manganese ppm ASTM D5185m 0 <1 | Boron | ppm | | | | 42 | 47 |
| Manganese ppm ASTM D5185m 0 <1 | Barium | ppm | ASTM D5185m | | 0 | <1 | <1 |
| Magnesium ppm ASTM D5185m 33 33 24 Calcium ppm ASTM D5185m 2188 2106 2221 Phosphorus ppm ASTM D5185m 867 994 1030 Zinc ppm ASTM D5185m 1181 1153 1202 Sulfur ppm ASTM D5185m 3241 3784 3470 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 5 6 4 Godium ppm ASTM D5185m >20 1 3 0 Potassium ppm ASTM D5185m >20 1 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 10.4 10.9 10.5 | Molybdenum | ppm | | | | 84 | |
| Calcium ppm ASTM D5185m 2188 2106 2221 Phosphorus ppm ASTM D5185m 867 994 1030 Zinc ppm ASTM D5185m 1181 1153 1202 Sulfur ppm ASTM D5185m 3241 3784 3470 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 5 6 4 Sodium ppm ASTM D5185m >0 2 3 Potassium ppm ASTM D5185m >20 1 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7415 >30 19.5 20.5 19.1 FLUID DEGRADATION method limit/base current history1 history2 | Manganese | ppm | | | _ | | |
| Phosphorus ppm ASTM D5185m 867 994 1030 Zinc ppm ASTM D5185m 1181 1153 1202 Sulfur ppm ASTM D5185m 3241 3784 3470 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 5 6 4 Sodium ppm ASTM D5185m >20 1 3 0 Potassium ppm ASTM D5185m >20 1 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7415 >30 19.5 20.5 19.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.6 | Magnesium | • • | | | | | |
| Tinc ppm ASTM D5185m 1181 1153 1202 | Calcium | ppm | | | | | |
| Sulfur ppm ASTM D5185m 3241 3784 3470 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 5 6 4 Sodium ppm ASTM D5185m 0 2 3 Potassium ppm ASTM D5185m >20 1 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 10.4 10.9 10.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.5 20.5 19.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.6 17.7 15.3 | | • • | | | | | |
| CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 5 6 4 Sodium ppm ASTM D5185m 0 2 3 Potassium ppm ASTM D5185m >20 1 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 10.4 10.9 10.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.5 20.5 19.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.6 17.7 15.3 | - | | | | | | |
| Solition ppm ASTM D5185m >25 5 6 4 | | | | | 3241 | | |
| Sodium ppm ASTM D5185m 0 2 3 Potassium ppm ASTM D5185m >20 1 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 10.4 10.9 10.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.5 20.5 19.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.6 17.7 15.3 | | | | | | | |
| Potassium ppm ASTM D5185m >20 1 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 10.4 10.9 10.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.5 20.5 19.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.6 17.7 15.3 | Silicon | | | >25 | | | |
| INFRA-RED | | | | | | | |
| Soot % % *ASTM D7844 >3 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 10.4 10.9 10.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.5 20.5 19.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.6 17.7 15.3 | | ppm | | | 1 | | |
| Nitration Abs/cm *ASTM D7624 >20 10.4 10.9 10.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.5 20.5 19.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.6 17.7 15.3 | INFRA-RED | | | limit/base | | • | • |
| Sulfation Abs/.1mm *ASTM D7415 >30 19.5 20.5 19.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.6 17.7 15.3 | Soot % | | | | | | |
| FLUID DEGRADATION method limit/base current history1 history2 Dxidation Abs/.1mm *ASTM D7414 >25 15.6 17.7 15.3 | Nitration | | | | | | |
| Oxidation Abs/.1mm *ASTM D7414 >25 15.6 17.7 15.3 | Sulfation | Abs/.1mm | *ASTM D7415 | >30 | 19.5 | 20.5 | 19.1 |
| | FLUID DEGRADA | TION | method | limit/base | current | history1 | history2 |
| | Oxidation | | *ASTM D7414 | >25 | 15.6 | 17.7 | 15.3 |
| Base Number (BN) mg KOH/g ASTM D2896 6.3 6.3 6.6 | Base Number (BN) | mg KOH/g | ASTM D2896 | | 6.3 | 6.3 | 6.6 |



OIL ANALYSIS REPORT

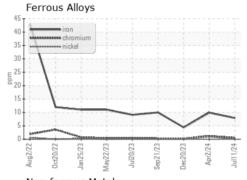


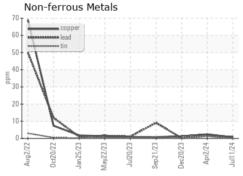


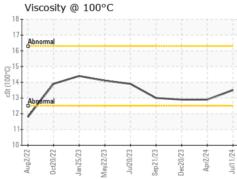


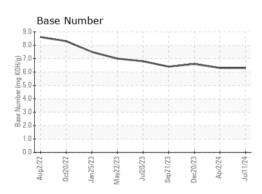
| VISUAL | | method | limit/base | current | history1 | history2 |
|-------------------------|--------|---------|------------|---------|----------|----------|
| White Metal | scalar | *Visual | NONE | NONE | NONE | NONE |
| Yellow Metal | scalar | *Visual | NONE | NONE | NONE | NONE |
| Precipitate | 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 | | | history2 |
|------------------|-----|-----------|------|------|----------|
| Visc @ 100°C | cSt | ASTM D445 | 13.5 | 12.9 | 12.9 |













Certificate 12367

Laboratory Sample No.

: WC0900283 Lab Number : 06237619

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received **Tested** Unique Number : 11126453

: 16 Jul 2024 : 17 Jul 2024 Diagnosed

: 17 Jul 2024 - Wes Davis

4201 FAYETTEVILLE RD RALEIGH, NC US 27603 Contact: BRANDON BYRUM b.byrum@dukelazzara.com

DUKE LAZZARA

Test Package : CONST (Additional Tests: TBN) 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)

Report Id: DUKRAL [WUSCAR] 06237619 (Generated: 07/17/2024 09:08:00) Rev: 1

Contact/Location: BRANDON BYRUM - DUKRAL

T:

F: