

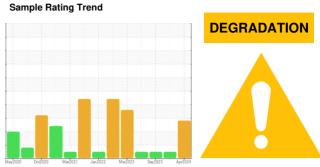
OIL ANALYSIS REPORT



(24588UA) 426026-4675

Diesel Engine

DIESEL ENGINE OIL SAE 15W40 (--- LTR)



DIAGNOSIS

Recommendation

We advise that you check for faulty combustion, plugged air filters, or aftercoolers. Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor. NOTE: High solids (carbon/soot) in the sample have limited the accuracy of Infra-Red data including Total Base Number (TBN) value.

All component wear rates are normal.

Contamination

Light fuel dilution occurring. There is an abnormal amount of solids and carbon present in the oil.

Fluid Condition

The BN level is low. Fuel is present in the oil and is lowering the viscosity.

SAMPLE INFORMATION method limit/base current history1 history2 Sample Number Client Info GFL0077764 GFL0077811 GFL0065058 Sample Date Client Info 04 Apr 2024 11 Oct 2023 27 Sep 2023 Machine Age hrs Client Info 0 0 0 Oil Changed Client Info Changed Changed Not Changd Sample Status MEG NEG NEG NEG Water WC Method >0.2 NEG NEG NEG Wear WC Method >0.2 NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM 05185m >12.0 33 2.7 2.9 Chromium ppm ASTM 05185m >2.0 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1	•						
Sample Date	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 38195 37705 37689 Oil Age hrs Client Info 0 0 0 0 Oil Changed Client Info Changed Changed Not Changed Sample Status Bander ABNORMAL NORMAL CONTAMINATION method limit/base current history1 history2 Water WC Method >0.2 NEG NEG NEG Glycol WC Method limit/base current history1 history2 Iron ppm ASTM D5185m >120 33 27 29 Chromium ppm ASTM D5185m >20 <1	Sample Number		Client Info		GFL0077764	GFL0077811	GFL0065058
Oil Age hrs Client Info 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Not Changed N	Sample Date		Client Info		04 Apr 2024	11 Oct 2023	27 Sep 2023
Contained Client Info Changed ABNORMAL NORMAL NORMAL	Machine Age	hrs	Client Info		38195	37705	37689
ABNORMAL NORMAL NORMAL NORMAL	Oil Age	hrs	Client Info		0	0	0
ABNORMAL NORMAL NORMAL NORMAL	Oil Changed		Client Info		Changed	Changed	Not Changd
Water WC Method >0.2 NEG NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >120 33 27 29 Chromium ppm ASTM D5185m >20 <1 <1 <1 Nickel ppm ASTM D5185m >5 <1 <1 0 Silver ppm ASTM D5185m >2 0 <1 <1 0 Silver ppm ASTM D5185m >2 0 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <td>Sample Status</td> <td></td> <td></td> <td></td> <td>ABNORMAL</td> <td>NORMAL</td> <td>NORMAL</td>	Sample Status				ABNORMAL	NORMAL	NORMAL
WEAR METALS	CONTAMINAT	ION	method	limit/base	current	history1	history2
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >120 33 27 29 Chromium ppm ASTM D5185m >20 <1	Water		WC Method	>0.2	NEG	NEG	NEG
Concording Chromium Chromi	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >20 <1 <1 <1 Nickel ppm ASTM D5185m >5 <1 <1 0 Titianium ppm ASTM D5185m >2 0 <1 0 Siliver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >20 3 2 1 Lead ppm ASTM D5185m >40 <1 <1 <1 Copper ppm ASTM D5185m >40 <1 <1 <1 <1 Comper ppm ASTM D5185m >15 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1<	WEAR METAL	S	method	limit/base	current	history1	history2
Nickel	ron	ppm	ASTM D5185m	>120	33	27	29
Titanium	Chromium	ppm	ASTM D5185m	>20	<1	<1	<1
Silver	Nickel	ppm	ASTM D5185m	>5	<1	<1	0
Aluminum ppm ASTM D5185m >20 3 2 1 Lead ppm ASTM D5185m >40 <1 <1 <1 <1 Copper ppm ASTM D5185m >330 1 2 1 Tin ppm ASTM D5185m >15 <1 <1 <1 <1 Cadmium ppm ASTM D5185m 0 0 <1 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 10 0 12 2 Molybdenum ppm ASTM D5185m 10 0 12 2 Molybdenum ppm ASTM D5185m 10 0 12 2 Molybdenum ppm ASTM D5185m 10 0 56 60 59 Manganese ppm ASTM D5185m 450 898 914 901 Calcium ppm ASTM D5185m 3000 1029 1014 1015 Phosphorus ppm ASTM D5185m 1150 1000 961 978 Zinc ppm ASTM D5185m 1150 1000 961 978 Zinc ppm ASTM D5185m 1350 1191 1173 1160 Sulfur ppm ASTM D5185m 225 3 6 3 Sodium ppm ASTM D5185m >20 4 5 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >158 1 2 1 Potassium ppm ASTM D5185m >20 4 5 <1 Fuel % ASTM D5185m >20 4 5 <1 INFRA-RED method limit/base current history1 history2 Soot % % 'ASTM D7844 >4 4.6 2.7 3 Nitration Abs/.1mm 'ASTM D7415 >30 25.2 21.7 22.1 FLUID DEGRADATION method limit/base current history1 history2 Dxidation Abs/.1mm 'ASTM D7414 >25 14.4 12.9 13.3	Titanium	ppm	ASTM D5185m	>2	0	<1	0
Lead ppm ASTM D5185m >40 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1	Silver	ppm	ASTM D5185m	>2	0	0	0
Copper ppm ASTM D5185m >330 1 2 1 Fin ppm ASTM D5185m >15 <1	Aluminum	ppm	ASTM D5185m	>20	3	2	1
Tin	_ead	ppm	ASTM D5185m	>40	<1	<1	<1
Tin	Copper	ppm	ASTM D5185m	>330	1	2	1
Vanadium ppm ASTM D5185m 0 <1 0 Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 250 8 15 6 Barium ppm ASTM D5185m 10 0 12 2 Molybdenum ppm ASTM D5185m 100 56 60 59 Manganese ppm ASTM D5185m 100 56 60 59 Manganesium ppm ASTM D5185m 450 898 914 901 Calcium ppm ASTM D5185m 3000 1029 1014 1015 Phosphorus ppm ASTM D5185m 1350 1191 1173 1160 Sulfur ppm ASTM D5185m 4250 3404 2904 2928 CONTAMINANTS method limit/base current history1<	Γin				<1	<1	<1
Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 250 8 15 6 Barium ppm ASTM D5185m 10 0 12 2 Molybdenum ppm ASTM D5185m 100 56 60 59 Manganese ppm ASTM D5185m 100 56 60 59 Manganesium ppm ASTM D5185m 450 898 914 901 Calcium ppm ASTM D5185m 3000 1029 1014 1015 Phosphorus ppm ASTM D5185m 1150 1000 961 978 Zinc ppm ASTM D5185m 1350 1191 1173 1160 Sulfur ppm ASTM D5185m >25 3 6 3 CONTAMINANTS method limit/base current	Vanadium		ASTM D5185m		0	<1	0
Boron	Cadmium	ppm	ASTM D5185m		0	0	0
Barium ppm ASTM D5185m 10 0 12 2 Molybdenum ppm ASTM D5185m 100 56 60 59 Manganese ppm ASTM D5185m 100 56 60 59 Manganesium ppm ASTM D5185m 450 898 914 901 Calcium ppm ASTM D5185m 3000 1029 1014 1015 Phosphorus ppm ASTM D5185m 3000 1000 961 978 Zinc ppm ASTM D5185m 1350 1191 1173 1160 Sulfur ppm ASTM D5185m 4250 3404 2904 2928 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 6 3 Sodium ppm ASTM D5185m >158 1 2 1 Potassium ppm ASTM D5	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 100 56 60 59 Manganese ppm ASTM D5185m <1	Boron	ppm	ASTM D5185m	250	8	15	6
Manganese ppm ASTM D5185m <1 <1 <1 Magnesium ppm ASTM D5185m 450 898 914 901 Calcium ppm ASTM D5185m 3000 1029 1014 1015 Phosphorus ppm ASTM D5185m 1150 1000 961 978 Zinc ppm ASTM D5185m 1350 1191 1173 1160 Sulfur ppm ASTM D5185m 4250 3404 2904 2928 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 6 3 Sodium ppm ASTM D5185m >158 1 2 1 Potassium ppm ASTM D5185m >20 4 5 <1	Barium	ppm	ASTM D5185m	10	0	12	2
Magnesium ppm ASTM D5185m 450 898 914 901 Calcium ppm ASTM D5185m 3000 1029 1014 1015 Phosphorus ppm ASTM D5185m 1150 1000 961 978 Zinc ppm ASTM D5185m 1350 1191 1173 1160 Sulfur ppm ASTM D5185m 4250 3404 2904 2928 CONTAMINANTS method limit/base current history1 history2 Solicon ppm ASTM D5185m >25 3 6 3 Solicon ppm ASTM D5185m >158 1 2 1 Potassium ppm ASTM D5185m >20 4 5 <1	Molybdenum	ppm	ASTM D5185m	100	56	60	59
Calcium ppm ASTM D5185m 3000 1029 1014 1015 Phosphorus ppm ASTM D5185m 1150 1000 961 978 Zinc ppm ASTM D5185m 1350 1191 1173 1160 Sulfur ppm ASTM D5185m 4250 3404 2904 2928 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 6 3 Sodium ppm ASTM D5185m >158 1 2 1 Potassium ppm ASTM D5185m >20 4 5 <1	Manganese	ppm	ASTM D5185m		<1	<1	<1
Phosphorus ppm ASTM D5185m 1150 1000 961 978 Zinc ppm ASTM D5185m 1350 1191 1173 1160 Sulfur ppm ASTM D5185m 4250 3404 2904 2928 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 6 3 Sodium ppm ASTM D5185m >158 1 2 1 Potassium ppm ASTM D5185m >20 4 5 <1	Magnesium	ppm	ASTM D5185m	450	898	914	901
Zinc ppm ASTM D5185m 1350 1191 1173 1160 Sulfur ppm ASTM D5185m 4250 3404 2904 2928 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 6 3 Sodium ppm ASTM D5185m >158 1 2 1 Potassium ppm ASTM D5185m >20 4 5 <1	Calcium	ppm	ASTM D5185m	3000	1029	1014	1015
Sulfur ppm ASTM D5185m 4250 3404 2904 2928 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 6 3 Sodium ppm ASTM D5185m >158 1 2 1 Potassium ppm ASTM D5185m >20 4 5 <1	Phosphorus	ppm	ASTM D5185m	1150	1000	961	978
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 6 3 Sodium ppm ASTM D5185m >158 1 2 1 Potassium ppm ASTM D5185m >20 4 5 <1	7:				1000	001	0.0
Silicon ppm ASTM D5185m >25 3 6 3 Sodium ppm ASTM D5185m >158 1 2 1 Potassium ppm ASTM D5185m >20 4 5 <1 Fuel % ASTM D3524 >3.0 3.0 <1.0 <1.0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >4 4.6 2.7 3 Nitration Abs/cm *ASTM D7624 >20 10.3 7.9 8.0 Sulfation Abs/.1mm *ASTM D7415 >30 25.2 21.7 22.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.4 12.9 13.3	ZINC						
Sodium ppm ASTM D5185m >158 1 2 1 Potassium ppm ASTM D5185m >20 4 5 <1		ppm	ASTM D5185m	1350	1191	1173	1160
Potassium ppm ASTM D5185m >20 4 5 <1 Fuel % ASTM D3524 >3.0 ▲ 3.0 <1.0 <1.0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >4 ▲ 4.6 2.7 3 Nitration Abs/cm *ASTM D7624 >20 10.3 7.9 8.0 Sulfation Abs/.1mm *ASTM D7415 >30 25.2 21.7 22.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.4 12.9 13.3	Sulfur	ppm	ASTM D5185m ASTM D5185m	1350 4250	1191 3404	1173 2904	1160 2928
Fuel % ASTM D3524 >3.0 ▲ 3.0 <1.0 <1.0 INFRA-RED method limit/base current history1 history2 Soot % *ASTM D7844 >4 ▲ 4.6 2.7 3 Nitration Abs/cm *ASTM D7624 >20 10.3 7.9 8.0 Sulfation Abs/.1mm *ASTM D7415 >30 25.2 21.7 22.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.4 12.9 13.3	Sulfur CONTAMINAN	ppm ppm	ASTM D5185m ASTM D5185m method	1350 4250 limit/base	1191 3404 current	1173 2904 history1	1160 2928 history2
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >4 ▲ 4.6 2.7 3 Nitration Abs/cm *ASTM D7624 >20 10.3 7.9 8.0 Sulfation Abs/.1mm *ASTM D7415 >30 25.2 21.7 22.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.4 12.9 13.3	Sulfur CONTAMINAN Silicon	ppm ppm ITS ppm	ASTM D5185m ASTM D5185m method ASTM D5185m	1350 4250 limit/base >25	1191 3404 current 3	1173 2904 history1	1160 2928 history2
Soot % % *ASTM D7844 >4 ▲ 4.6 2.7 3 Nitration Abs/cm *ASTM D7624 >20 10.3 7.9 8.0 Sulfation Abs/.1mm *ASTM D7415 >30 25.2 21.7 22.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.4 12.9 13.3	Sulfur CONTAMINAN Silicon Sodium	ppm ppm ITS ppm ppm	ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m	1350 4250 limit/base >25 >158	1191 3404 current 3	1173 2904 history1 6 2	1160 2928 history2 3
Nitration Abs/cm *ASTM D7624 >20 10.3 7.9 8.0 Sulfation Abs/.1mm *ASTM D7415 >30 25.2 21.7 22.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.4 12.9 13.3	Sulfur CONTAMINAN Silicon Sodium Potassium	ppm ppm ITS ppm ppm	ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m	1350 4250 limit/base >25 >158 >20	1191 3404 current 3 1	1173 2904 history1 6 2 5	1160 2928 history2 3 1 <1
Nitration Abs/cm *ASTM D7624 >20 10.3 7.9 8.0 Sulfation Abs/.1mm *ASTM D7415 >30 25.2 21.7 22.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.4 12.9 13.3	Sulfur CONTAMINAN Silicon Sodium Potassium Fuel	ppm ppm ITS ppm ppm	ASTM D5185m Method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D3524	1350 4250 limit/base >25 >158 >20 >3.0	1191 3404 current 3 1 4	1173 2904 history1 6 2 5 <1.0	1160 2928 history2 3 1 <1 <1.0
Sulfation Abs/.1mm *ASTM D7415 >30 25.2 21.7 22.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.4 12.9 13.3	Sulfur CONTAMINAN Silicon Sodium Potassium Fuel INFRA-RED	ppm ppm ITS ppm ppm ppm	ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D3524 method	1350 4250 limit/base >25 >158 >20 >3.0 limit/base	1191 3404 current 3 1 4 3.0 current	1173 2904 history1 6 2 5 <1.0	1160 2928 history2 3 1 <1 <1.0
Oxidation	Sulfur CONTAMINAN Silicon Sodium Potassium Fuel INFRA-RED Soot %	ppm ppm ITS ppm ppm ppm ppm	ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D3524 method *ASTM D7844	1350 4250 limit/base >25 >158 >20 >3.0 limit/base >4	1191 3404	1173 2904 history1 6 2 5 <1.0 history1 2.7	1160 2928 history2 3 1 <1 <1.0 history2 3
	Sulfur CONTAMINAN Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration	ppm ppm ITS ppm ppm ppm ppm %	ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D3524 method *ASTM D7844 *ASTM D7624	1350 4250 limit/base >25 >158 >20 >3.0 limit/base >4 >20	1191 3404	1173 2904 history1 6 2 5 <1.0 history1 2.7 7.9	1160 2928 history2 3 1 <1 <1.0 history2 3 8.0
	Sulfur CONTAMINAN Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation	ppm ppm ITS ppm ppm ppm % Abs/cm	ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D3524 method *ASTM D7844 *ASTM D7624 *ASTM D76185m	1350 4250 limit/base >25 >158 >20 >3.0 limit/base >4 >20 >30	1191 3404	1173 2904 history1 6 2 5 <1.0 history1 2.7 7.9 21.7	1160 2928 history2 3 1 <1 <1.0 history2 3 8.0 22.1
	Sulfur CONTAMINAN Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation FLUID DEGRAI	ppm ppm ppm ppm ppm ppm % Abs/cm Abs/.1mm	ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D3524 method *ASTM D7844 *ASTM D7624 *ASTM D7415 method	1350 4250 limit/base >25 >158 >20 >3.0 limit/base >4 >20 >30 limit/base	1191 3404 current 3 1 4 ▲ 3.0 current ▲ 4.6 10.3 25.2 current	1173 2904 history1 6 2 5 <1.0 history1 2.7 7.9 21.7 history1	1160 2928 history2 3 1 <1 <1.0 history2 3 8.0 22.1 history2



OIL ANALYSIS REPORT







Certificate 12367

Laboratory Sample No.

: GFL0077764 Lab Number : 06145143

Unique Number: 10969951

Received **Tested**

: 16 Apr 2024 - Jonathan Hester Diagnosed

Test Package: FLEET (Additional Tests: FuelDilution, PercentFuel) 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)

: 10 Apr 2024

: 16 Apr 2024

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T:

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