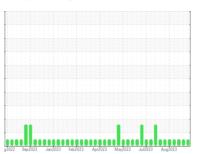


OIL ANALYSIS REPORT

Sample Rating Trend







M C E

CATERPILLAR GM01

Biogas Engine

Q8 G5 MAHLER 40 (--- GAL)

DIAGNOSIS

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.

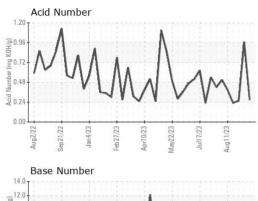
Fluid Condition

The BN result indicates that there is suitable alkalinity remaining in the oil. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

g2022 Sep2022 Jan2023 Feb2023 Apy2023 May2023 Jul2023 Aug2023						
SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0836334	WC0836325	WC0836323
Sample Date		Client Info		21 Aug 2023	18 Aug 2023	16 Aug 2023
Machine Age	hrs	Client Info		22755	22702	22658
Oil Age	hrs	Client Info		395	0	298
Oil Changed		Client Info		N/A	N/A	N/A
Sample Status				NORMAL	NORMAL	NORMAL
CONTAMINATION	V	method	limit/base	current	history1	history2
Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
Glycol		WC Method		NEG	NEG	NEG
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>45	8	7	5
Chromium	ppm	ASTM D5185m	>2	<1	<1	<1
Nickel	ppm	ASTM D5185m	>2	0	<1	0
Titanium	ppm	ASTM D5185m		0	0	0
Silver	ppm	ASTM D5185m	>5	0	0	0
Aluminum	ppm	ASTM D5185m	>10	3	4	4
Lead	ppm	ASTM D5185m	>5	0	<1	0
Copper	ppm	ASTM D5185m	>14	2	<1	<1
Tin	ppm	ASTM D5185m	>13	2	2	1
Vanadium	ppm	ASTM D5185m		0	0	0
Cadmium	ppm	ASTM D5185m		0	0	0
ADDITIVES		method	limit/base	current	history1	history2
ADDITIVES Boron	ppm	method ASTM D5185m	limit/base	current 0	history1 0	history2 0
	ppm		limit/base			
Boron		ASTM D5185m	limit/base	0	0	0
Boron Barium	ppm	ASTM D5185m ASTM D5185m	limit/base	0	0	0
Boron Barium Molybdenum	ppm	ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	0 0 <1	0 0 <1	0 0 0
Boron Barium Molybdenum Manganese	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	0 0 <1 <1	0 0 <1 <1	0 0 0 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	0 0 <1 <1 5	0 0 <1 <1 3	0 0 0 <1 6
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	0 0 <1 <1 5 1435	0 0 <1 <1 3 1426	0 0 0 <1 6 1443
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	0 0 <1 <1 5 1435 387	0 0 <1 <1 3 1426 375	0 0 0 <1 6 1443 388
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	0 0 <1 <1 5 1435 387 439	0 0 <1 <1 3 1426 375 454	0 0 0 <1 6 1443 388 445
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m		0 0 <1 <1 5 1435 387 439 2436	0 0 <1 <1 3 1426 375 454 2224	0 0 0 <1 6 1443 388 445 2437
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	limit/base	0 0 <1 <1 5 1435 387 439 2436	0 0 <1 <1 3 1426 375 454 2224 history1	0 0 0 <1 6 1443 388 445 2437
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	limit/base	0 0 <1 <1 5 1435 387 439 2436 current	0 0 <1 <1 3 1426 375 454 2224 history1	0 0 0 <1 6 1443 388 445 2437 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	limit/base >200	0 0 <1 <1 5 1435 387 439 2436 current 172	0 0 <1 <1 3 1426 375 454 2224 history1 157	0 0 0 <1 6 1443 388 445 2437 history2 129 0
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	limit/base >200 >20	0 0 <1 <1 <1 5 1435 387 439 2436 current 172 3 0 current 0	0 0 <1 <1 3 1426 375 454 2224 history1 157 0 1 history1 0	0 0 0 <1 6 1443 388 445 2437 history2 129 0
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	limit/base >200 >20 limit/base	0 0 <1 <1 5 1435 387 439 2436 current 172 3 0 current	0 0 <1 <1 3 1426 375 454 2224 history1 157 0 1 history1	0 0 0 <1 6 1443 388 445 2437 history2 129 0 0
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m method *ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base >200 >20 limit/base	0 0 <1 <1 <1 5 1435 387 439 2436 current 172 3 0 current 0	0 0 <1 <1 3 1426 375 454 2224 history1 157 0 1 history1 0	0 0 0 <1 6 1443 388 445 2437 history2 129 0 0 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m method ASTM D5185m	limit/base >200 >20 limit/base >20	0 0 <1 <1 <1 5 1435 387 439 2436 current 172 3 0 current 0 5.3	0 0 <1 <1 3 1426 375 454 2224 history1 157 0 1 history1 0 5.2	0 0 0 <1 6 1443 388 445 2437 history2 129 0 0 history2 0 4.9
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m Method ASTM D5185m Method *ASTM D7844 *ASTM D7624 *ASTM D76145	limit/base >200 limit/base >20	0 0 <1 <1 <1 5 1435 387 439 2436 current 172 3 0 current 0 5.3 16.1	0 0 <1 <1 3 1426 375 454 2224 history1 157 0 1 history1 0 5.2 15.9	0 0 0 <1 6 1443 388 445 2437 history2 129 0 0 history2 0 4.9
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method *ASTM D7624 *ASTM D7624 *ASTM D7415 method	limit/base >200 >20 limit/base >20 >30 limit/base	0 0 <1 <1 <1 5 1435 387 439 2436 current 172 3 0 current 0 5.3 16.1 current	0 0 <1 <1 3 1426 375 454 2224 history1 157 0 1 history1 0 5.2 15.9 history1	0 0 0 1 6 1443 388 445 2437 history2 129 0 history2 0 4.9 15.4 history2



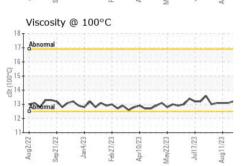
OIL ANALYSIS REPORT

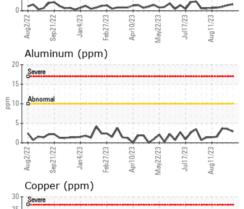


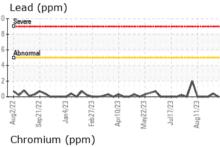
VISUAL		method				history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.1	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG

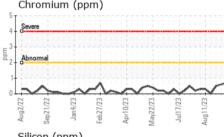
14.0	e Nur	nber						
0.0 Passe Number (mg KOH/g)	~	\sim	~	Λ	✓	N	1	V
Aug2/22	Sep21/22 -	Jan4/23	Feb27/23	Apr10/23 -	May22/23 -	Jul17/23 -	Aug11/23	

Visc @ 100°C	cSt	ASTM D445	13.3	13.1	13.2
GRAPHS					
Iron (ppm)			Lead (ppm)		

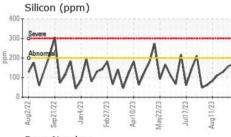


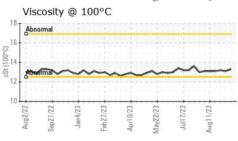


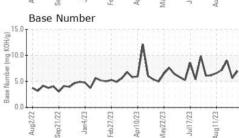














Certificate L2367

Laboratory Sample No. Lab Number **Unique Number** Test Package : MOB 2

: WC0836334 : 05931656 : 10616927

60

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

Received : 22 Aug 2023 : 24 Aug 2023 Diagnosed Diagnostician : Don Baldridge

OAK GROVE KS 1150 E 700TH AVE ARCADIA, KS US 66711

Contact: KALEB WEAVER kaleb.weaver@cubedistrictenergy.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)

Report Id: OAKARC [WUSCAR] 05931656 (Generated: 08/29/2023 14:52:17) Rev: 1

Contact/Location: KALEB WEAVER - OAKARC

T:

F: