

## **OIL ANALYSIS REPORT**

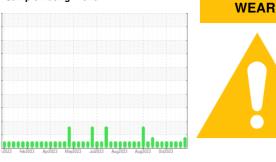
Sample Rating Trend



## CATERPILLAR GM01 Component

**Biogas Engine** 

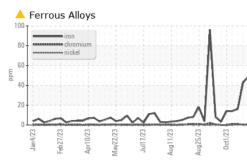
MAHLER Q8 Mahler G8 SAE 40 (--- GAL)

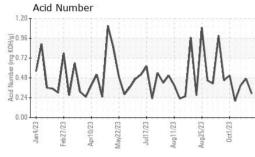


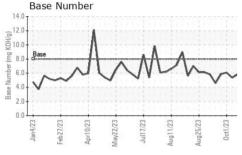
	SAMPLE INFORM		method	limit/base	current	history1	history2
DIAGNOSIS				mmbase			
Recommendation No corrective action is recommended at this time.	Sample Number		Client Info		WC0836375	WC0836380	WC0836387
Resample at the next service interval to monitor.	Sample Date	h un	Client Info		13 Oct 2023	10 Oct 2023	04 Oct 2023
	Machine Age	hrs	Client Info		23593	23525	23425
	Oil Age	hrs	Client Info		720	52	281
he iron level is abnormal. All other component ear rates are normal.	Oil Changed		Client Info		N/A	N/A	N/A
	Sample Status				ABNORMAL	NORMAL	NORMAL
Contamination There is no indication of any contamination in the	CONTAMINATION	V	method	limit/base	current	history1	history2
l.	Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
luid Condition	Glycol		WC Method		NEG	NEG	NEG
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	WEAR METALS		method	limit/base	current	history1	history2
	Iron	ppm	ASTM D5185m	>45	<b>4</b> 9	43	16
itable for further service.	Chromium	ppm	ASTM D5185m	>2	<1	<1	<1
	Nickel	ppm	ASTM D5185m	>2	<1	<1	<1
	Titanium	ppm	ASTM D5185m		0	0	0
	Silver	ppm	ASTM D5185m	>5	0	0	0
	Aluminum	ppm	ASTM D5185m		3	3	7
	Lead	ppm	ASTM D5185m		ء <1	0	1
	Copper		ASTM D5185m		3	1	4
	Tin	ppm	ASTM D5185m		1	1	2
	Vanadium	ppm		>10		0	0
		ppm	ASTM D5185m		0		
	Cadmium	ppm	ASTM D5185m		0	0	0
	ADDITIVES		method	limit/base	current	history1	history2
	Boron	ppm	ASTM D5185m		5	7	7
	Barium	ppm	ASTM D5185m		0	0	0
	Molybdenum	ppm	ASTM D5185m		2	<1	3
	Manganese	ppm	ASTM D5185m		<1	<1	<1
	Magnesium	ppm	ASTM D5185m		13	20	10
	Calcium	ppm	ASTM D5185m		1339	1359	1356
	Phosphorus						
		DDIII	ASTM D5185m		327	381	382
		ppm ppm	ASTM D5185m		327 386	381 452	382 478
	Zinc	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m		327 386 1689	381 452 1914	382 478 2455
	Zinc Sulfur	ppm ppm	ASTM D5185m ASTM D5185m	limit/baco	386 1689	452 1914	478 2455
	Zinc Sulfur CONTAMINANTS	ppm ppm	ASTM D5185m ASTM D5185m method	limit/base	386 1689 current	452 1914 history1	478 2455 history2
	Zinc Sulfur CONTAMINANTS Silicon	ppm ppm	ASTM D5185m ASTM D5185m method ASTM D5185m		386 1689 current 104	452 1914 history1 61	478 2455 history2 189
	Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m Method ASTM D5185m ASTM D5185m	>200	386 1689 <u>current</u> 104 81	452 1914 history1 61 36	478 2455 history2 189 23
	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm	ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m ASTM D5185m	>200 >20	386 1689 current 104	452 1914 61 36 <1	478 2455 history2 189 23 3
	Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m Method ASTM D5185m ASTM D5185m	>200	386 1689 <u>current</u> 104 81	452 1914 history1 61 36	478 2455 history2 189 23
	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method *ASTM D7844	>200 >20 limit/base	386 1689 current 104 81 <1	452 1914 61 36 <1	478 2455 history2 189 23 3
	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m Method ASTM D5185m ASTM D5185m ASTM D5185m Method	>200 >20 limit/base	386 1689 current 104 81 <1 current	452 1914 61 36 <1 history1	478 2455 history2 189 23 3 3 history2
	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method *ASTM D7844	>200 >20 limit/base	386 1689 current 104 81 <1 current 0	452 1914 61 36 <1 history1 0	478 2455 history2 189 23 3 history2 0
	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm % Abs/cm Abs/.1mm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b> *ASTM D7844 *ASTM D7624	>200 >20 limit/base	386 1689 current 104 81 <1 <1 current 0 5.6	452 1914 61 36 <1 history1 0 5.2	478 2455 history2 189 23 3 3 history2 0 5.4
	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA	ppm ppm ppm ppm ppm ppm % Abs/cm Abs/cm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m *ASTM D7844 *ASTM D7624 *ASTM D7415	>200 >20 limit/base >20 >30 limit/base	386 1689 current 104 81 <1 current 0 5.6 15.6 current	452 1914 61 36 <1 history1 0 5.2 15.2 history1	478 2455 history2 189 23 3 history2 0 5.4 15.7 history2
	Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm % Abs/cm Abs/.1mm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m *ASTM D7844 *ASTM D7844 *ASTM D7624	>200 >20 limit/base >20 >30 limit/base	386 1689 current 104 81 <1 <1 current 0 5.6 15.6	452 1914 61 36 <1 history1 0 5.2 15.2	478 2455 history2 189 23 3 history2 0 5.4 15.7

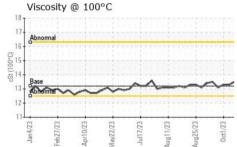


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	VISUAL		method	limit/base	current	history1	history2
	White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
	Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
	Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
(	Silt	scalar	*Visual	NONE	NONE	NONE	NONE
	Debris	scalar	*Visual	NONE	NONE	NONE	NONE
	Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
23 23 23	Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
May22/23 Jul17/23 Aug11/23 Aug25/23 Oct1/23	Odor	scalar	*Visual	NORML	NORML	NORML	NORML
4 4	Emulsified Water	scalar	*Visual	>0.1	NEG	NEG	NEG
	Free Water	scalar	*Visual	20.1	NEG	NEG	NEG
	FLUID PROPERT		method	limit/base			
					current 13.2	history1 13.1	history2
1 Am MUL	Visc @ 100°C GRAPHS	cSt	ASTM D445	13.2	13.2	13.1	13.5
V V VIV	Iron (ppm)				Lead (ppm)		
	100 T					100000000000000000	
Aay22/23 - Jul17/23 - Aug11/23 - Aug25/23 - Oct1/23 -	80 - Severe				8		
May22/23 Jul17/23 Aug11/23 Aug25/23 Oct1/23	60 Abnormal		A	udd	6 - Abnormal		
	40				4		
	20				2	٨	
		~~~					
	Jan4/23 Feb27/23 Apr10/23 May22/23	Jul17/23	Aug11/23 - Aug25/23 -	0011/2	Jan4/23 Feb27/23 Apr1 0/23	May22/23 Jul17/23 Aug11/23	Aug25/23 0ct1/23
ANA A.	2	Ļ	Au Au	-			Au (
1 Mr M	Aluminum (ppm)	10005555			Chromium (pp 51	om)	
	Severe 15				4 - Severe	(panelana)	end and a locate
					3-		
May22/23 Jul17/23 Aug11/23 Aug25/23 Oct1/23	E 10 Abnormal			udd	2 - Abnormal		
Mayi Augi Augi	5		m	Λ	1		10-
°C		MV V				$\sim$	
	Jan4/23 Feb27/23 Apr10/23	Jul17/23	Aug11/23 Aug25/23	7/1101	Jan4/23 Feb27/23 Apr1 0/23	May22/23 Jul17/23 Aug11/23	Aug25/23
	H W	Ju	Aur	tol.	H	Ma Ju Aug	Au
	Copper (ppm)			40	Silicon (ppm)		
	25 Severe				C		
	_ 20			30		٨	
	E 15 - Abnormal			틆20		11.11	1.1
	10			10	-IV WV	VVVI	VIV
May22/23 Jul17/23 Aug11/23 Aug25/23 Oct1/23		m	$\sum$	$\sim$	0		V .
Auç Du, Auç	Jan 4/23 Feb 27/23 Apr1 0/23 May 22/23	Jul17/23	Aug11/23 Aug25/23	c7/172	Jan4/23 Feb27/23 Apr1 0/23	May22/23 Jul17/23 Aug11/23	Aug25/23 0ct1/23
	Real Provide State		3nk Jug	2	H H	May	Aug
	Viscosity @ 100°C			17	Base Number		
	Abnormal			15.1 10.1 KOH(0) 10.1 Base Number (m0 5.1	T		
	10 +			9 10.1	Base		
	Base Bonema			nber (r	Base	M	har
				In S.		~ ~ ~ ~	V.Y
	10						
	Jan4/23 Feb27/23 Apr10/23 May22/23	Jul17/23	Aug11/23 Aug25/23		Jan4/23 Feb27/23 Apr1 0/23	May22/23 Jul17/23 Aug11/23	Aug25/23 0ct1/23
	Ja Feb Apr Mayi	lul	Aug	5	Ja. Feb.	May Jul Aug	Aug
Laboratory	: WearCheck USA - 5	i01 Madi	son Ave Ca	arv. NC 2751	3	04	AK GROVE KS
Sample No.		Receive		Oct 2023	-		E 700TH AVE
Lab Number		Diagnos		Oct 2023			ARCADIA, KS
Unique Number		Diagnos	tician : Jon	athan Heste	r	0	US 66711
Certificate L2367 Test Package To discuss this sample report, of	: MOB 2	no at 1 (	300-237 126	٥	kalah w		LEB WEAVER
* - Denotes test methods that a					kaleb.W	eaver@cubedis	trictenergy.com T:
Statements of conformity to spec					10014 400.0040		F.

Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

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