

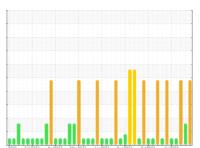
OIL ANALYSIS REPORT



ZOKM01BE (S/N GZJ00541)

Component **Biogas Engine**

SHELL MYSELLA S5 S (160 GAL)



Sample Rating Trend



DIAGNOSIS

Recommendation

We recommend that you drain the oil and perform a filter service on this component if not already done. We recommend an early resample to monitor this condition.

Wear

All component wear rates are normal.

▲ Contamination

Elemental level of silicon (Si) above normal.

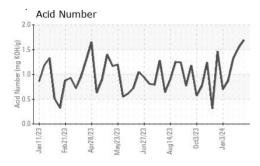
Fluid Condition

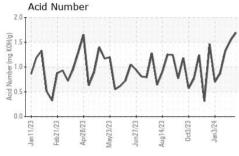
The BN result indicates that there is suitable alkalinity remaining in the oil. The AN level is acceptable for this fluid. The oil is no longer serviceable due to the presence of contaminants.

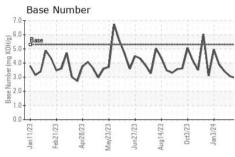
Sample Number Client Info WC0775205 WC0775204 WC067554	(160 GAL)		12023 Feb20	23 Apr2023 May2023	Jun2023 Aug2023 Oct2023	Jan 2024	
Sample Date	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Sample Date Client Info 19 Mar 2024 11 Mar 2024 14 Feb 202 Machine Age hrs Client Info 84092 83836 83348 Oli Age hrs Client Info 415 225 715 Tolor Not Changd N/A SEVERE Contamped N/A ABNORMAL SEVERE CONTAMINATION method limit/base current bistory1 bistory2 bistory3 Client Info NEG N	Sample Number		Client Info		WC0775205	WC0775204	WC0675546
Dil Age	Sample Date		Client Info		19 Mar 2024	11 Mar 2024	14 Feb 2024
Dil Age	Machine Age	hrs	Client Info		84092	83836	83348
Contamination Contaminati	Oil Age	hrs	Client Info		415	225	715
Severage Severage Severage Severage Severage ABNORMAL Severage Severage Severage ABNORMAL Severage Severage	•		Client Info		Not Changd	Changed	
Fuel WC Method >4.0	Sample Status					Ü	SEVERE
Water Glycol WC Method >0.1 NEG Net	CONTAMINATIO	N	method	limit/base	current	history1	history2
WEAR METALS	Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
WEAR METALS	Water		WC Method	>0.1	NEG	NEG	NEG
Concord Conc	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >4 <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 <td>WEAR METALS</td> <td></td> <td>method</td> <td>limit/base</td> <td>current</td> <td>history1</td> <td>history2</td>	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>15	8	5	6
Silver	Chromium	ppm	ASTM D5185m	>4	<1	<1	<1
Silver	Nickel	ppm	ASTM D5185m	>2	<1	0	<1
Aluminum	Titanium	ppm	ASTM D5185m		<1	<1	<1
Lead ppm ASTM D5185m >9 <1 <1 <1 <1 Copper ppm ASTM D5185m >6 5 2 3 Tin ppm ASTM D5185m >4 5 4 5 Vanadium ppm ASTM D5185m <1 <1 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history Boron ppm ASTM D5185m 4 4 4 4 Barium ppm ASTM D5185m 2 1 10 0 Molybdenum ppm ASTM D5185m 2 1 10 0 Magnesium ppm ASTM D5185m 30 28 22 Calcium ppm ASTM D5185m 1643 1575 1482 Phosphorus ppm ASTM D5185m 438 418 399	Silver	ppm	ASTM D5185m	>5	0	0	0
Copper ppm ASTM D5185m >6 5 2 3 Tin ppm ASTM D5185m >4 5 4 5 Vanadium ppm ASTM D5185m <1	Aluminum	ppm	ASTM D5185m	>6	3	3	2
Tin	Lead	ppm	ASTM D5185m	>9	<1	<1	<1
Vanadium ppm ASTM D5185m <1 <1 0 Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history1 Barium ppm ASTM D5185m 4 4 4 Barium ppm ASTM D5185m 2 1 10 Molybdenum ppm ASTM D5185m 2 1 10 Manganese ppm ASTM D5185m 30 28 22 Calcium ppm ASTM D5185m 30 28 22 Calcium ppm ASTM D5185m 300 338 321 381 Zinc ppm ASTM D5185m 403 3794 3691 CONTAMINANTS method limit/base current history1 history1 Silicon ppm ASTM D5185m >181 256 199 266 Godium ppm ASTM D5185m 0	Copper	ppm	ASTM D5185m	>6	5	2	3
Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history3 Boron ppm ASTM D5185m 4 4 4 4 Barium ppm ASTM D5185m 2 1 10 0 Molybdenum ppm ASTM D5185m 8 8 5 Manganese ppm ASTM D5185m 30 28 22 Calcium ppm ASTM D5185m 30 28 22 Calcium ppm ASTM D5185m 1643 1575 1482 Phosphorus ppm ASTM D5185m 300 338 321 381 Zinc ppm ASTM D5185m 4003 3794 3691 CONTAMINANTS method limit/base current history1 history1 Bodium ppm ASTM D5185m >181 256 199 266 Bodium ppm	Γin	ppm	ASTM D5185m	>4	5	4	5
ADDITIVES	Vanadium	ppm	ASTM D5185m		<1	<1	0
Boron	Cadmium	ppm	ASTM D5185m		0	0	0
Barium ppm ASTM D5185m 2 1 10 Molybdenum ppm ASTM D5185m 8 8 5 Manganese ppm ASTM D5185m <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 8 8 5 Manganese ppm ASTM D5185m <1 0 0 Magnesium ppm ASTM D5185m 30 28 22 Calcium ppm ASTM D5185m 1643 1575 1482 Phosphorus ppm ASTM D5185m 300 338 321 381 Zinc ppm ASTM D5185m 438 418 399 Sulfur ppm ASTM D5185m 4003 3794 3691 CONTAMINANTS method limit/base current history1 history Silicon ppm ASTM D5185m >181 256 199 266 Sodium ppm ASTM D5185m 0 0 <1 Potassium ppm ASTM D5185m 20 3 2 1 INFRA-RED method limit/base current history1 history Sout % % *ASTM D	Boron	ppm	ASTM D5185m		4	4	4
Manganese ppm ASTM D5185m <1 0 0 Magnesium ppm ASTM D5185m 30 28 22 Calcium ppm ASTM D5185m 1643 1575 1482 Phosphorus ppm ASTM D5185m 300 338 321 381 Zinc ppm ASTM D5185m 438 418 399 Sulfur ppm ASTM D5185m 4003 3794 3691 CONTAMINANTS method limit/base current history1 history1 Silicon ppm ASTM D5185m >181 256 199 ▲ 266 Godium ppm ASTM D5185m >20 3 2 1 Potassium ppm ASTM D5185m >20 3 2 1 INFRA-RED method limit/base current history1 history1 Soulf ation Abs/:nm *ASTM D7624 >20 4.7 4.5 4.3	Barium	ppm	ASTM D5185m		2	1	10
Magnesium ppm ASTM D5185m 30 28 22 Calcium ppm ASTM D5185m 1643 1575 1482 Phosphorus ppm ASTM D5185m 300 338 321 381 Zinc ppm ASTM D5185m 438 418 399 Sulfur ppm ASTM D5185m 4003 3794 3691 CONTAMINANTS method limit/base current history1 history Silicon ppm ASTM D5185m >181 256 199 266 Sodium ppm ASTM D5185m 0 0 <1	Molybdenum	ppm	ASTM D5185m		8	8	5
Calcium ppm ASTM D5185m 1643 1575 1482 Phosphorus ppm ASTM D5185m 300 338 321 381 Zinc ppm ASTM D5185m 438 418 399 Sulfur ppm ASTM D5185m 4003 3794 3691 CONTAMINANTS method limit/base current history1 history Silicon ppm ASTM D5185m >181 256 199 266 Sodium ppm ASTM D5185m 0 0 <1	Manganese	ppm	ASTM D5185m		<1	0	0
Phosphorus ppm ASTM D5185m 300 338 321 381 Zinc ppm ASTM D5185m 438 418 399 Sulfur ppm ASTM D5185m 4003 3794 3691 CONTAMINANTS method limit/base current history1 history Silicon ppm ASTM D5185m >181 ▲ 256 ▲ 199 ▲ 266 Sodium ppm ASTM D5185m 0 0 <1	Magnesium	ppm	ASTM D5185m		30	28	22
Zinc ppm ASTM D5185m 438 418 399 Sulfur ppm ASTM D5185m 4003 3794 3691 CONTAMINANTS method limit/base current history1 history Silicon ppm ASTM D5185m >181 256 199 266 Sodium ppm ASTM D5185m 0 0 <1	Calcium	ppm	ASTM D5185m		1643	1575	1482
Sulfur ppm ASTM D5185m 4003 3794 3691 CONTAMINANTS method limit/base current history1 history Silicon ppm ASTM D5185m >181 256 199 266 Sodium ppm ASTM D5185m 0 0 <1	Phosphorus	ppm	ASTM D5185m	300	338	321	381
CONTAMINANTS method limit/base current history1 history Silicon ppm ASTM D5185m >181 ▲ 256 ▲ 199 ▲ 266 Sodium ppm ASTM D5185m 0 0 <1	Zinc	ppm	ASTM D5185m		438	418	399
Solition ppm ASTM D5185m >181 ▲ 256 ▲ 199 ▲ 266	Sulfur	ppm	ASTM D5185m		4003	3794	3691
Sodium ppm ASTM D5185m 0 0 <1 Potassium ppm ASTM D5185m >20 3 2 1 INFRA-RED method limit/base current history1 history1 Soot % % *ASTM D7844 0.1 0.1 0 Nitration Abs/cm *ASTM D7624 >20 4.7 4.5 4.3 Sulfation Abs/.1mm *ASTM D7415 >30 22.4 21.1 22.2 FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 14.9 13.6 13.6 Acid Number (AN) mg KOH/g ASTM D8045 1.69 1.54 1.33	CONTAMINANTS	5	method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 3 2 1 INFRA-RED method limit/base current history1 history Soot % % *ASTM D7844 0.1 0.1 0 Nitration Abs/cm *ASTM D7624 >20 4.7 4.5 4.3 Sulfation Abs/.1mm *ASTM D7415 >30 22.4 21.1 22.2 FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 14.9 13.6 13.6 Acid Number (AN) mg KOH/g ASTM D8045 1.69 1.54 1.33	Silicon	ppm	ASTM D5185m	>181	256	<u> </u>	266
INFRA-RED	Sodium	ppm	ASTM D5185m		0	0	<1
Soot % % *ASTM D7844 0.1 0.1 0 Nitration Abs/cm *ASTM D7624 >20 4.7 4.5 4.3 Sulfation Abs/.1mm *ASTM D7415 >30 22.4 21.1 22.2 FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 14.9 13.6 13.6 Acid Number (AN) mg KOH/g ASTM D8045 1.69 1.54 1.33	Potassium	ppm	ASTM D5185m	>20	3	2	1
Nitration Abs/cm *ASTM D7624 >20 4.7 4.5 4.3 Sulfation Abs/.1mm *ASTM D7615 >30 22.4 21.1 22.2 FLUID DEGRADATION method limit/base current history1 history1 history Oxidation Abs/.1mm *ASTM D7414 >25 14.9 13.6 13.6 Acid Number (AN) mg KOH/g ASTM D8045 1.69 1.54 1.33	INFRA-RED		method	limit/base	current	history1	history2
Sulfation Abs/.1mm *ASTM D7415 >30 22.4 21.1 22.2 FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 14.9 13.6 13.6 Acid Number (AN) mg KOH/g ASTM D8045 1.69 1.54 1.33	Soot %	%	*ASTM D7844		0.1	0.1	0
FLUID DEGRADATION method limit/base current history1 history1 Oxidation Abs/.1mm *ASTM D7414 >25 14.9 13.6 13.6 Acid Number (AN) mg KOH/g ASTM D8045 1.69 1.54 1.33	Vitration	Abs/cm	*ASTM D7624	>20	4.7	4.5	4.3
Oxidation Abs/.1mm *ASTM D7414 >25 14.9 13.6 13.6 Acid Number (AN) mg KOH/g ASTM D8045 1.69 1.54 1.33	Sulfation	Abs/.1mm	*ASTM D7415	>30	22.4	21.1	22.2
Acid Number (AN) mg KOH/g ASTM D8045 1.69 1.54 1.33	FLUID DEGRADA	ATION	method	limit/base	current	history1	history2
Acid Number (AN) mg KOH/g ASTM D8045 1.69 1.54 1.33	Oxidation	Abs/.1mm	*ASTM D7414	>25	14.9	13.6	13.6
, , , , ,	Acid Number (AN)	mg KOH/g	ASTM D8045		1.69		1.33
	Base Number (BN)			5.3		3.08	3.42

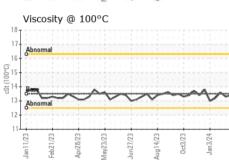


OIL ANALYSIS REPORT





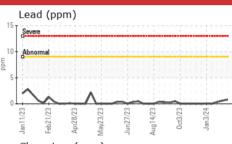


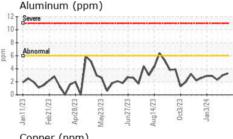


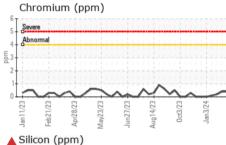
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.1	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG

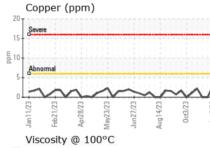
FLUID PROPER	TIES	method	limit/base	current	history1	history2	
Visc @ 100°C	cSt	ASTM D445	13.5	13.4	13.3	13.6	

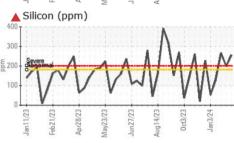
Seve	re						
1.2	ormal	11 11		11 11	11111		
0							
0		4		7	1	(A A	~
5	<u>~</u>	V	~	1	N	W	w
	Feb21/23	Apr.28/23	May23/23	Jun27/23	Aug14/23	Voct3/23	Jan3/24 V

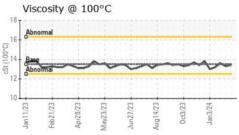


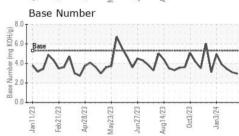
















Laboratory Unique Number: 10939262

Sample No. Lab Number : 06125111

: WC0775205

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

Diagnosed

: 21 Mar 2024

: 25 Mar 2024 : 25 Mar 2024 - Sean Felton

EDL NA Recips-Zook Zook Powerstation, 388 E. Main Street Leola, PA

US 17540-1925 Contact: Kevin Johnson

Test Package : MOB 2 Certificate L2367 To discuss this sample report, contact Customer Service at 1-800-237-1369.

kevin.johnson@edlenergy.com T:

* - 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)

F: