

OIL ANALYSIS REPORT



ZOKM02BE (S/N GZJ00540)

Component **Biogas Engine**

SHELL MYSELLA S5 S (--- GAL)





DIAGNOSIS

Recommendation

We recommend that you drain the oil from the component if this has not already been done. The filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

Wear

All component wear rates are normal.

Contamination

Elemental level of silicon (Si) above normal indicating ingress of seal material.

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.

Machine Age hrs Client Info 79424 79163 78966 Oil Age hrs Client Info 400 139 791 Oil Changed Client Info Not Changd Not Changd Not Changd Sample Status SEVERE NORMAL SEVERE CONTAMINATION method limit/base current history1 history2 Fuel WC Method >4.0 < 1.0 < 1.0 < 1.0 < 1.0 Glycol WC Method NEG NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron 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 <	(GAL)		y2022 Aug20	22 Dec2022 Feb2023	Apr2023 May2023 Jun2023	Aug2023	
Sample Date Client Info 25 Sep 2023 14 Sep 2023 05 Sep 2023 Machine Age hrs Client Info 79424 79163 78866 Oil Age hrs Client Info 400 139 791 Oil Changed Client Info Not Changed Not Changed Not Changed Sample Status SEVERE NORMAL SEVERE CONTAMINATION method Imitibase current history1 history2 Fuel WC Method >4.0 <1.0	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Sample Date	Sample Number		Client Info		WC0770233	WC0770231	WC0770229
Machine Age hrs Client Info 79424 79163 78966 Oil Age hrs Client Info 400 139 791 Oil Changed Client Info Not Changed Not Changed Not Changed Not Changed Sample Status BEVERE NORMAL SEVERE Normal SEVERE CONTAMINATION method Imitibase current history1 history2 Fuel WC Method >4.0 <1.0	Sample Date		Client Info		25 Sep 2023	14 Sep 2023	05 Sep 2023
Coli	Machine Age	hrs	Client Info		-		
Sample Status	Oil Age	hrs	Client Info		400	139	791
Sample Status	Oil Changed		Client Info		Not Changd	Changed	Not Changd
Fuel	Sample Status				SEVERE		SEVERE
WEAR METALS	CONTAMINATION	١	method	limit/base	current	history1	history2
WEAR METALS	Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >4 <1 <1 <1 Nickel ppm ASTM D5185m >2 <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>15	4	3	6
Description	Chromium	ppm	ASTM D5185m	>4	<1	<1	<1
Silver	Nickel	ppm	ASTM D5185m	>2	<1	0	<1
Aluminum ppm ASTM D5185m >6 3 4 4 Lead ppm ASTM D5185m >9 1 <1	Titanium	ppm	ASTM D5185m		0	0	0
Lead ppm ASTM D5185m >9 1 <1 <1 <1 Copper ppm ASTM D5185m >6 1 <1 1 Tin ppm ASTM D5185m >4 4 2 5 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 3 2 3 Barium ppm ASTM D5185m 2 0 2 Molybdenum ppm ASTM D5185m 3 2 5 Manganese ppm ASTM D5185m 0 0 0 0 Calcium ppm ASTM D5185m 14 12 19 Calcium ppm ASTM D5185m 300 327 314 342 Zinc <th< td=""><td>Silver</td><td>ppm</td><td>ASTM D5185m</td><td>>5</td><th>0</th><td>0</td><td>0</td></th<>	Silver	ppm	ASTM D5185m	>5	0	0	0
Copper ppm ASTM D5185m >6 1 <1 1 Tin ppm ASTM D5185m >4 4 2 5 Vanadium ppm ASTM D5185m 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 3 2 3 3 Barium ppm ASTM D5185m 2 0 2 3 Molybdenum ppm ASTM D5185m 3 2 5 0 2 Manganese ppm ASTM D5185m 3 2 5 0	Aluminum	ppm	ASTM D5185m	>6	3	4	4
Tin ppm ASTM D5185m >4 4 2 5 Vanadium ppm ASTM D5185m 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 3 2 3 Barium ppm ASTM D5185m 3 2 5 Molybdenum ppm ASTM D5185m 3 2 5 Manganese ppm ASTM D5185m 0 0 0 0 Magnesium ppm ASTM D5185m 14 12 19 Calcium ppm ASTM D5185m 14 12 19 Calcium ppm ASTM D5185m 1560 1493 1651 Phosphorus ppm ASTM D5185m 300 327 314 342 Zinc ppm ASTM D5185m 300 327 314 342 Zinc ppm ASTM D5185m 3551 3693 3589 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m 0 0 0 0 <1 INFRA-RED method limit/base current history1 history2 Soot % % 'ASTM D7844 0 0 0 0.1 INFRA-RED method limit/base current history1 history2 Soot % % 'ASTM D7844 0 0 0 0.1 INFRA-RED method limit/base current history1 history2 Soot % % 'ASTM D7844 0 0 0 0.1 Nitration Abs/:mm 'ASTM D7415 >30 22.0 18.5 24.8 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/:mm 'ASTM D7415 >30 22.0 18.5 24.8 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/:mm 'ASTM D7415 >30 22.0 18.5 24.8	Lead	ppm	ASTM D5185m	>9	1	<1	<1
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ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 3 2 3 Barium ppm ASTM D5185m 2 0 2 Molybdenum ppm ASTM D5185m 3 2 5 Manganese ppm ASTM D5185m 0 0 0 Magnesium ppm ASTM D5185m 14 12 19 Calcium ppm ASTM D5185m 1560 1493 1651 Phosphorus ppm ASTM D5185m 300 327 314 342 Zinc ppm ASTM D5185m 421 405 438 Sulfur ppm ASTM D5185m 3551 3693 3589 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >181 249 126 318 Sodium ppm ASTM D5185m	Vanadium	ppm	ASTM D5185m		0	0	0
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Barium ppm ASTM D5185m 2 0 2 Molybdenum ppm ASTM D5185m 3 2 5 Manganese ppm ASTM D5185m 0 0 0 Magnesium ppm ASTM D5185m 14 12 19 Calcium ppm ASTM D5185m 1560 1493 1651 Phosphorus ppm ASTM D5185m 300 327 314 342 Zinc ppm ASTM D5185m 421 405 438 Sulfur ppm ASTM D5185m 3551 3693 3589 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >181 249 126 318 Sodium ppm ASTM D5185m >20 <1	ADDITIVES		method	limit/base	current	history1	history2
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Magnesium ppm ASTM D5185m 14 12 19 Calcium ppm ASTM D5185m 1560 1493 1651 Phosphorus ppm ASTM D5185m 300 327 314 342 Zinc ppm ASTM D5185m 421 405 438 Sulfur ppm ASTM D5185m 3551 3693 3589 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >181 249 126 318 Sodium ppm ASTM D5185m 0 0 <1 Potassium ppm ASTM D5185m >20 <1 <1 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0 0 0.1 Nitration Abs/:1mm *ASTM D7624 >20 4.4 4.3 5.1 Sulfation	Molybdenum	ppm	ASTM D5185m		3	2	5
Calcium ppm ASTM D5185m 1560 1493 1651 Phosphorus ppm ASTM D5185m 300 327 314 342 Zinc ppm ASTM D5185m 421 405 438 Sulfur ppm ASTM D5185m 3551 3693 3589 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >181 249 126 318 Sodium ppm ASTM D5185m 0 0 <1	Manganese	ppm	ASTM D5185m		0	0	0
Phosphorus ppm ASTM D5185m 300 327 314 342 Zinc ppm ASTM D5185m 421 405 438 Sulfur ppm ASTM D5185m 3551 3693 3589 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >181 249 126 318 Sodium ppm ASTM D5185m >20 <1	Magnesium	ppm	ASTM D5185m		14	12	19
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Sulfur ppm ASTM D5185m 3551 3693 3589 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >181 249 126 318 Sodium ppm ASTM D5185m 0 0 <1	Phosphorus	ppm	ASTM D5185m	300	327	314	342
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >181 249 126 318 Sodium ppm ASTM D5185m 0 0 <1	Zinc	ppm	ASTM D5185m		421	405	438
Silicon ppm ASTM D5185m >181 249 126 318 Sodium ppm ASTM D5185m 0 0 <1 Potassium ppm ASTM D5185m >20 <1 <1 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0 0 0.1 Nitration Abs/cm *ASTM D7624 >20 4.4 4.3 5.1 Sulfation Abs/.1mm *ASTM D7415 >30 22.0 18.5 24.8 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.8 11.0 16.3 Acid Number (AN) mg KOH/g ASTM D8045 1.34 0.80 1.55	Sulfur	ppm	ASTM D5185m		3551	3693	3589
Sodium ppm ASTM D5185m 0 0 <1	CONTAMINANTS		method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 <1 <1 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0 0 0.1 Nitration Abs/cm *ASTM D7624 >20 4.4 4.3 5.1 Sulfation Abs/.1mm *ASTM D7415 >30 22.0 18.5 24.8 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.8 11.0 16.3 Acid Number (AN) mg KOH/g ASTM D8045 1.34 0.80 1.55	Silicon	ppm	ASTM D5185m	>181	249	126	318
INFRA-RED	Sodium	ppm	ASTM D5185m		0	0	<1
Soot % % *ASTM D7844 0 0 0.1 Nitration Abs/cm *ASTM D7624 >20 4.4 4.3 5.1 Sulfation Abs/.1mm *ASTM D7415 >30 22.0 18.5 24.8 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.8 11.0 16.3 Acid Number (AN) mg KOH/g ASTM D8045 1.34 0.80 1.55	Potassium	ppm	ASTM D5185m	>20	<1	<1	1
Nitration Abs/cm *ASTM D7624 >20 4.4 4.3 5.1 Sulfation Abs/.1mm *ASTM D7415 >30 22.0 18.5 24.8 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.8 11.0 16.3 Acid Number (AN) mg KOH/g ASTM D8045 1.34 0.80 1.55	INFRA-RED		method	limit/base	current	history1	history2
Sulfation Abs/.1mm *ASTM D7415 >30 22.0 18.5 24.8 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.8 11.0 16.3 Acid Number (AN) mg KOH/g ASTM D8045 1.34 0.80 1.55	Soot %	%	*ASTM D7844		0	0	0.1
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.8 11.0 16.3 Acid Number (AN) mg KOH/g ASTM D8045 1.34 0.80 1.55	Nitration	Abs/cm	*ASTM D7624	>20	4.4	4.3	5.1
Oxidation Abs/.1mm *ASTM D7414 >25 13.8 11.0 16.3 Acid Number (AN) mg KOH/g ASTM D8045 1.34 0.80 1.55	Sulfation	Abs/.1mm	*ASTM D7415	>30	22.0	18.5	24.8
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	FLUID DEGRADA	TION	method	iiiiii/base	current	TilStory I	Historyz
Base Number (BN) mg KOH/g ASTM D2896 5.3 3.22 3.73 2.82							
		Abs/.1mm	*ASTM D7414		13.8	11.0	16.3



OIL ANALYSIS REPORT







Certificate L2367

Laboratory Sample No. Lab Number **Unique Number** Test Package

: WC0770233 : 05963681 : 10670232

To discuss this sample report, contact Customer Service at 1-800-237-1369.

: MOB 2

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : 28 Sep 2023 Received Diagnosed : Sean Felton Diagnostician

: 29 Sep 2023

Aug14/23

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

US 17540-1925 Contact: Kevin Johnson

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)

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