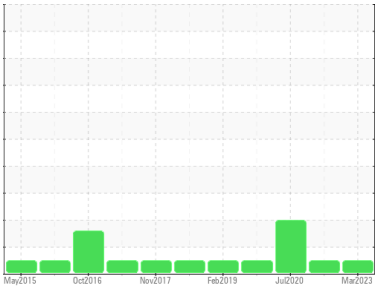
OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL

Area
13
Machine Id
WTG-1305 (S/N EH806A-003-LM0044)
Component
Wind Turbine Gearbox
Fluid
SHELL OMALA 320 (340 LTR)

DIAGNOSIS

Recommendation
Resample at the next service interval to monitor. Analytical Ferrography: Results are normal with typical amounts of ferrous rubbing wear and contamination, and two rolling wear particles with notable age discoloration present suggesting they are not from any active issue.

Wear
All component wear rates are normal.

Contaminants
The amount and size of particulates present in the system are acceptable. There is no indication of any contamination in the oil.

Oil Condition
The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number		Client Info		**WC0804446**	WC05504518	WCI039512
Sample Date		Client Info		**04 Mar 2023**	07 Feb 2022	25 Jul 2020
Machine Age	mths	Client Info		**101**	0	0
Oil Age	mths	Client Info		**101**	0	0
Oil Changed		Client Info		**Not Changd**	N/A	N/A
Sample Status				**NORMAL**	NORMAL	ATTENTION

WEAR METALS		method	limit/base	current	history1	history2
PQ		ASTM D8184	>50	**18**	15	---
Iron	ppm	ASTM D5185m	>65	**39**	35	25
Chromium	ppm	ASTM D5185m	>3	**<1**	<1	<1
Nickel	ppm	ASTM D5185m	>3	**0**	0	0
Titanium	ppm	ASTM D5185m	>10	**0**	0	0
Silver	ppm	ASTM D5185m		**0**	<1	0
Aluminum	ppm	ASTM D5185m	>10	**1**	<1	0
Lead	ppm	ASTM D5185m	>5	**0**	<1	1
Copper	ppm	ASTM D5185m	>10	**0**	<1	<1
Tin	ppm	ASTM D5185m	>10	**<1**	0	0
Antimony	ppm	ASTM D5185m	>5	**---**	---	0
Vanadium	ppm	ASTM D5185m		**0**	0	0
Cadmium	ppm	ASTM D5185m		**0**	0	0

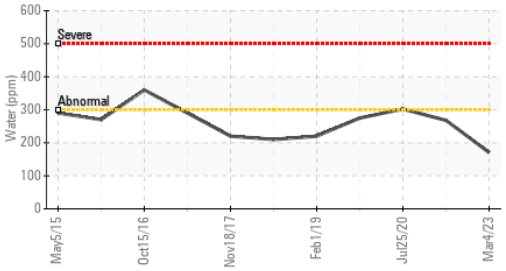
ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m	5.5	**4**	0	6
Barium	ppm	ASTM D5185m	0.4	**0**	0	0
Molybdenum	ppm	ASTM D5185m	0.5	**0**	0	0
Manganese	ppm	ASTM D5185m		**<1**	<1	<1
Magnesium	ppm	ASTM D5185m	23	**<1**	0	0
Calcium	ppm	ASTM D5185m	13	**2**	1	1
Phosphorus	ppm	ASTM D5185m	450	**340**	375	324
Zinc	ppm	ASTM D5185m	9.9	**27**	28	16
Sulfur	ppm	ASTM D5185m	8181	**6115**	4752	4429

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m	>15	**0**	<1	2
Sodium	ppm	ASTM D5185m		**3**	<1	3
Potassium	ppm	ASTM D5185m	>20	**2**	0	<1
Water	%	ASTM D6304	>0.03	**0.017**	0.026	▲ 0.030
ppm Water	ppm	ASTM D6304	>300	**170.6**	268.0	▲ 302.1

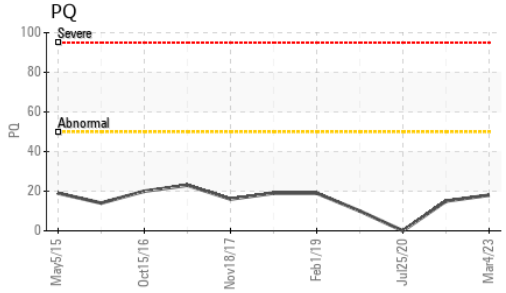
FLUID CLEANLINESS		method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647		**3180**	7966	149052
Particles >6µm		ASTM D7647	>5000	**123**	1411	▲ 9075
Particles >14µm		ASTM D7647	>640	**6**	72	6
Particles >21µm		ASTM D7647	>160	**2**	11	1
Particles >38µm		ASTM D7647	>40	**0**	1	0
Particles >71µm		ASTM D7647	>10	**0**	0	0
Oil Cleanliness		ISO 4406 (c)	>--/19/16	**19/14/10**	20/18/13	▲ 24/20/10

OIL ANALYSIS REPORT

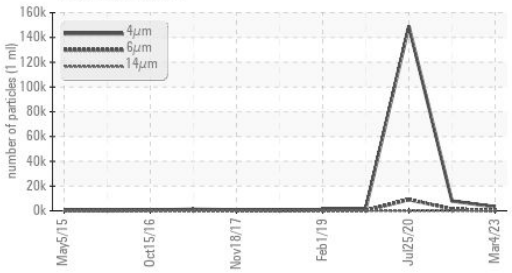
Water (KF)



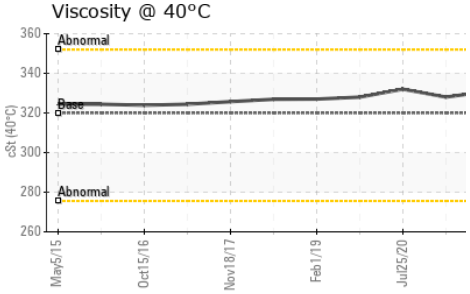
PQ



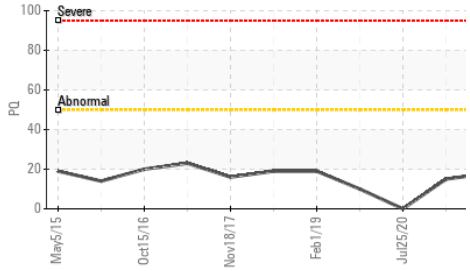
Particle Trend



Viscosity @ 40°C



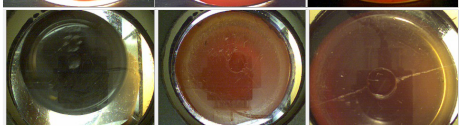
PQ



FLUID DEGRADATION		method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D8045		**1.25**	1.23	1.169

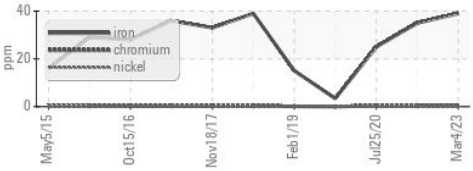
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	**NONE**	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	**NONE**	NONE	NONE
Precipitate	scalar	*Visual	NONE	**NONE**	NONE	NONE
Silt	scalar	*Visual	NONE	**NONE**	NONE	LIGHT
Debris	scalar	*Visual	NONE	**NONE**	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	**NONE**	NONE	NONE
Appearance	scalar	*Visual	NORML	**NORML**	NORML	NORML
Odor	scalar	*Visual	NORML	**NORML**	NORML	NORML
Emulsified Water	scalar	*Visual	>0.03	**NEG**	NEG	NEG
Free Water	scalar	*Visual		**NEG**	NEG	NEG

FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D445	320	**331**	328	332

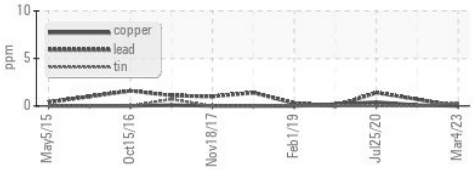
SAMPLE IMAGES	method	limit/base	current	history1	history2
Color					
Bottom					

GRAPHS

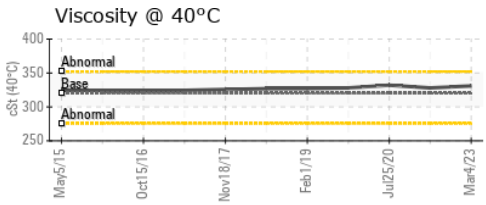
Ferrous Alloys



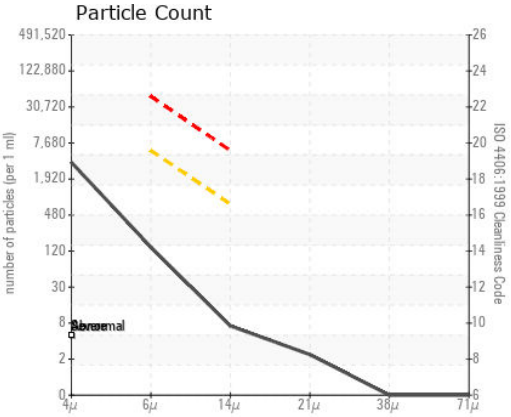
Non-ferrous Metals



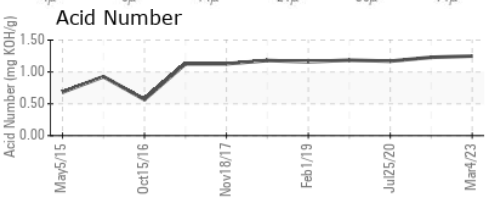
Viscosity @ 40°C



Particle Count



Acid Number



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : WC0804446 **Received** : 26 May 2023
Lab Number : 05857856 **Diagnosed** : 08 Jun 2023
Unique Number : 10492321 **Diagnostician** : Aaron Black
Test Package : IND 3 (Additional Tests: KF, PrtCount)

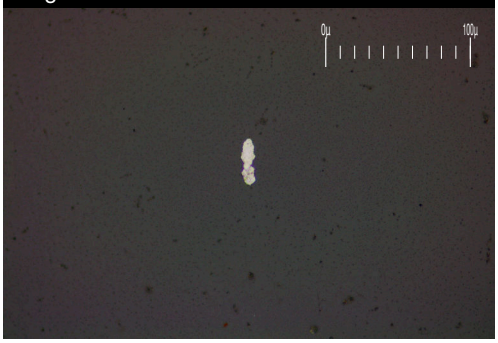
To discuss this sample report, contact Customer Service at 1-800-237-1369.
** - Denotes test methods that are outside of the ISO 17025 scope of accreditation.*
Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

ENERGIA EOLICA
STA ANA KM25 CARRETERA AL SUR, A 1KM DEL CRUCE
FRANCISCO MORAZAN, ZZ
HN
Contact: SANTOS DEL CID
sdelcid@dencmi.com
T: x:
F: x:

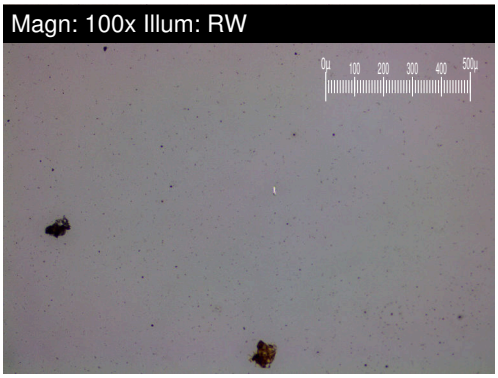
FERROGRAPHY REPORT

Area
13
Machine Id
WTG-1305 (S/N EH806A-003-LM0044)
Component
Wind Turbine Gearbox
Fluid
SHELL OMALA 320 (340 LTR)

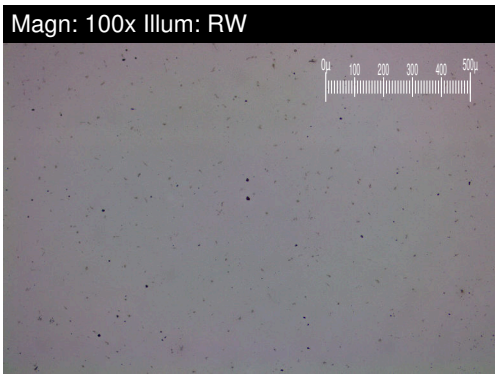
Magn: 500x Illum: RW



Magn: 100x Illum: RW



Magn: 100x Illum: RW

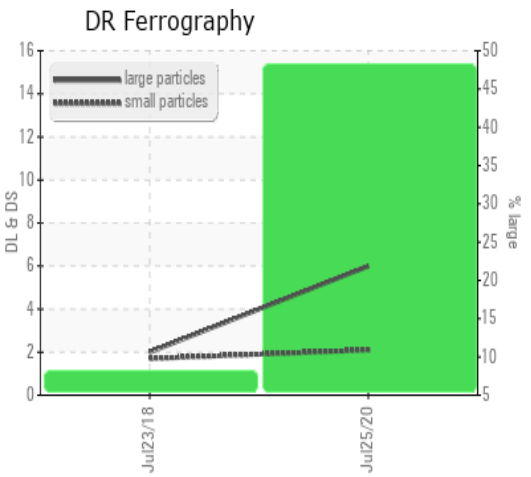


DR-FERROGRAPHY		method	limit/base	current	history1	history2
Large Particles		*DR-Ferr	>30	---	---	6.0
Small Particles		*DR-Ferr	>30	---	---	2.1
Total Particles		*DR-Ferr	>45.0	---	---	8.1
Large Particles Percentage	%	*DR-Ferr		---	---	48.1
Severity Index		*DR-Ferr		---	---	23.4

FERROGRAPHY		method	limit/base	current	history1	history2
Ferrous Rubbing	Scale 0-10	*ASTM D7684		**1**		1
Ferrous Sliding	Scale 0-10	*ASTM D7684				
Ferrous Cutting	Scale 0-10	*ASTM D7684				
Ferrous Rolling	Scale 0-10	*ASTM D7684		**1**		1
Ferrous Break-in	Scale 0-10	*ASTM D7684				
Ferrous Spheres	Scale 0-10	*ASTM D7684				
Ferrous Black Oxides	Scale 0-10	*ASTM D7684				
Ferrous Red Oxides	Scale 0-10	*ASTM D7684				
Ferrous Corrosive	Scale 0-10	*ASTM D7684				
Ferrous Other	Scale 0-10	*ASTM D7684				
Nonferrous Rubbing	Scale 0-10	*ASTM D7684				
Nonferrous Sliding	Scale 0-10	*ASTM D7684				
Nonferrous Cutting	Scale 0-10	*ASTM D7684				
Nonferrous Rolling	Scale 0-10	*ASTM D7684				
Nonferrous Other	Scale 0-10	*ASTM D7684				
Carbonaceous Material	Scale 0-10	*ASTM D7684				
Lubricant Degradation	Scale 0-10	*ASTM D7684				
Sand/Dirt	Scale 0-10	ASTM D7684				1
Fibres	Scale 0-10	*ASTM D7684				
Spheres	Scale 0-10	*ASTM D7684				
Other	Scale 0-10	*ASTM D7684		**1**		1

WEAR

All component wear rates are normal.



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