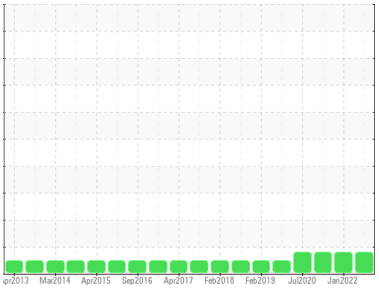
PROBLEM SUMMARY

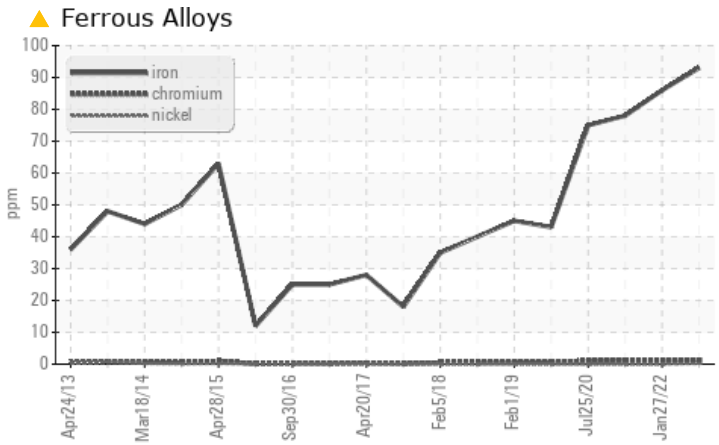
Sample Rating Trend



WEAR

Area
3
Machine Id
WINERGY GEARBOX WTG-302 (S/N 4836487-0020-6)
Component
Wind Turbine Gearbox
Fluid
FUCHS RENOLIN UNISYN CKC ISO 320 (340 LTR)

COMPONENT CONDITION SUMMARY



RECOMMENDATION

We recommend an early resample to monitor this condition. Analytical Ferrography: Results suggest a problem may be forming with this system. A slow but consistent increase in Fe metal content along with the presence of a handful of ferrous rolling and cutting wear in the size and quantity present are potential indicators of a forming low to mid speed gear set issue. Much of the wear present has an aged appearance so being a current issue is difficult to confirm. Consider doing a filter analysis of this system, looking for possible gear wear; the wear present is too large to be from a typical bearing and if it is from an active problem it is most likely a gear issue. If you have online vibration monitoring on this system, consider looking at it for a possible mid-to-low speed gear set fault. Based on the amount of debris, this would be a relatively small issue currently and may bot be breaking baseline on vibration yet.

PROBLEMATIC TEST RESULTS

Sample Status				**ABNORMAL**	ABNORMAL	ABNORMAL
Iron	ppm	ASTM D5185m	>65	▲ **93**	▲ 86	▲ 78

Customer Id: ENEFRA
Sample No.: WC0804451
Lab Number: 05857852
Test Package: IND 3

To manage this report scan the QR code

To discuss the diagnosis or test data:
Aaron Black +1
aaron.black@wearcheck.com

To change component or sample information:
Customer Service +1 1-800-237-1369
customerservice@wearcheck.com

RECOMMENDED ACTIONS

Action	Status	Date	Done By	Description
Resample	---	---	?	We recommend an early resample to monitor this condition.

HISTORICAL DIAGNOSIS

27 Jan 2022 Diag: Aaron Black

WEAR

Resample at the next service interval to monitor.Iron ppm levels are abnormal. The low ferrous density (PQ) index indicates the wear metal levels are due to corrosion. Analytical ferrography: wear is normal with typical amounts of ferrous rubbing wear and a single moderate sized rolling wear particle. The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The water content is negligible. The system and fluid cleanliness is acceptable. Analytical ferrography: contamination is normal with typical amounts of external debris present. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

view report

06 Mar 2021 Diag: Don Baldridge

WEAR

No corrective action is recommended at this time. Resample at the next service interval to monitor.The iron level is abnormal. All other component wear rates are normal. The water content is negligible. There is no indication of any contamination in the oil. The amount and size of particulates present in the system are acceptable. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

view report

25 Jul 2020 Diag: Doug Bogart

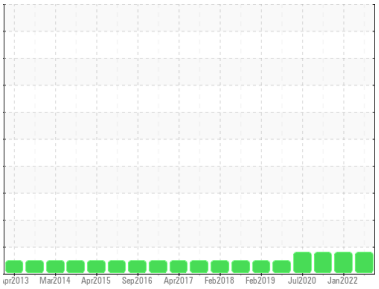
WEAR

No corrective action is recommended at this time. Resample at the next service interval to monitor.The iron level is abnormal. The water content is negligible. There is no indication of any contamination in the oil. The amount and size of particulates present in the system are acceptable. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

view report

OIL ANALYSIS REPORT

Sample Rating Trend



WEAR

Area
3
Machine Id
WINERGY GEARBOX WTG-302 (S/N 4836487-0020-6)
Component
Wind Turbine Gearbox
Fluid
FUCHS RENOLIN UNISYN CKC ISO 320 (340 LTR)

DIAGNOSIS

Recommendation

We recommend an early resample to monitor this condition. Analytical Ferrography: Results suggest a problem may be forming with this system. A slow but consistent increase in Fe metal content along with the presence of a handful of ferrous rolling and cutting wear in the size and quantity present are potential indicators of a forming low to mid speed gear set issue. Much of the wear present has an aged appearance so being a current issue is difficult to confirm. Consider doing a filter analysis of this system, looking for possible gear wear; the wear present is too large to be from a typical bearing and if it is from an active problem it is most likely a gear issue. If you have online vibration monitoring on this system, consider looking at it for a possible mid-to-low speed gear set fault. Based on the amount of debris, this would be a relatively small issue currently and may bot be breaking baseline on vibration yet.

Wear

The low ferrous density (PQ) index indicates the wear metal levels are due to corrosion.

Contaminants

The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The water content is negligible. The system and fluid cleanliness is acceptable.

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		**WC0804451**	WC05504539	WC0547160
Sample Date		Client Info		**02 Mar 2023**	27 Jan 2022	06 Mar 2021
Machine Age	mths	Client Info		**95**	71	120
Oil Age	mths	Client Info		**95**	0	65
Oil Changed		Client Info		**Not Changd**	N/A	Not Changd
Sample Status				**ABNORMAL**	ABNORMAL	ABNORMAL

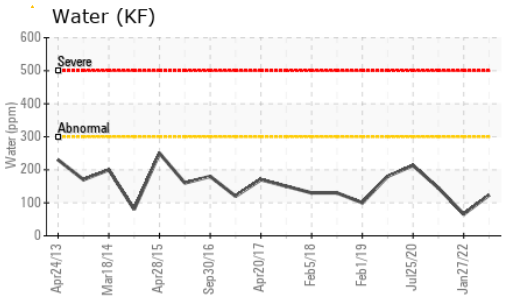
WEAR METALS		method	limit/base	current	history1	history2
PQ		ASTM D8184	>50	**15**	16	21
Iron	ppm	ASTM D5185m	>65	▲ **93**	▲ 86	▲ 78
Chromium	ppm	ASTM D5185m	>3	**1**	1	1
Nickel	ppm	ASTM D5185m	>3	**<1**	0	0
Titanium	ppm	ASTM D5185m	>10	**0**	0	0
Silver	ppm	ASTM D5185m		**0**	<1	0
Aluminum	ppm	ASTM D5185m	>10	**<1**	0	0
Lead	ppm	ASTM D5185m	>5	**0**	0	<1
Copper	ppm	ASTM D5185m	>10	**0**	<1	<1
Tin	ppm	ASTM D5185m	>10	**<1**	0	<1
Antimony	ppm	ASTM D5185m	>5	**---**	---	0
Vanadium	ppm	ASTM D5185m		**0**	0	0
Cadmium	ppm	ASTM D5185m		**0**	0	0

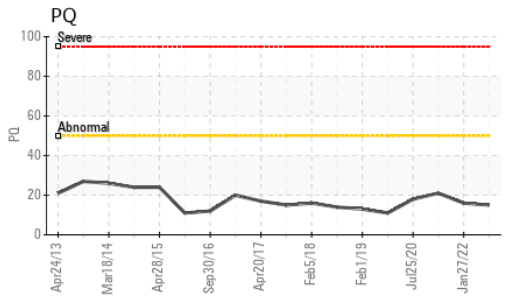
ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m	25	**<1**	0	2
Barium	ppm	ASTM D5185m		**0**	0	0
Molybdenum	ppm	ASTM D5185m		**0**	0	<1
Manganese	ppm	ASTM D5185m		**1**	<1	<1
Magnesium	ppm	ASTM D5185m		**0**	0	0
Calcium	ppm	ASTM D5185m	17	**4**	5	6
Phosphorus	ppm	ASTM D5185m	200	**193**	198	175
Zinc	ppm	ASTM D5185m		**19**	18	0
Sulfur	ppm	ASTM D5185m	5000	**4932**	3737	3896

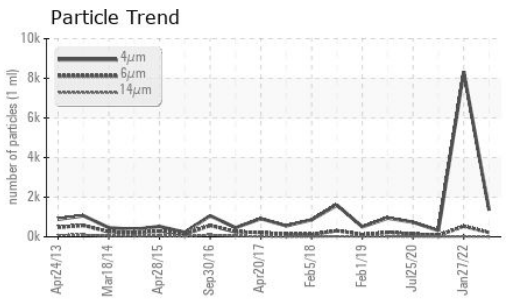
CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m	>15	**<1**	0	0
Sodium	ppm	ASTM D5185m		**5**	3	4
Potassium	ppm	ASTM D5185m	>20	**2**	0	<1
Water	%	ASTM D6304	>0.03	**0.012**	0.006	0.014
ppm Water	ppm	ASTM D6304	>300	**123.4**	65.5	145.0

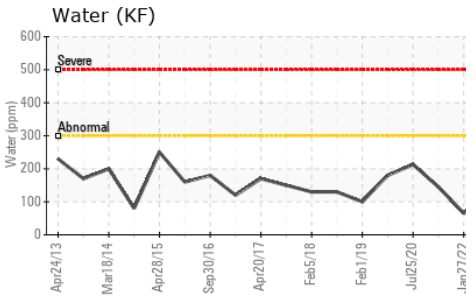
FLUID CLEANLINESS		method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647		**1348**	8338	314
Particles >6µm		ASTM D7647	>5000	**212**	532	65
Particles >14µm		ASTM D7647	>640	**10**	19	12
Particles >21µm		ASTM D7647	>160	**2**	4	4
Particles >38µm		ASTM D7647	>40	**0**	0	0
Particles >71µm		ASTM D7647	>10	**0**	0	0
Oil Cleanliness		ISO 4406 (c)	>--/19/16	**18/15/10**	20/16/11	15/13/11

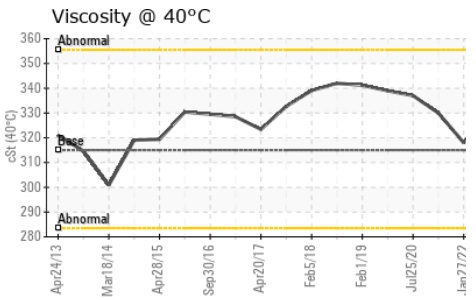
OIL ANALYSIS REPORT









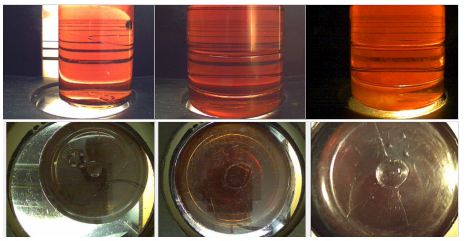


FLUID DEGRADATION		method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D8045	0.9	**0.87**	0.86	0.902

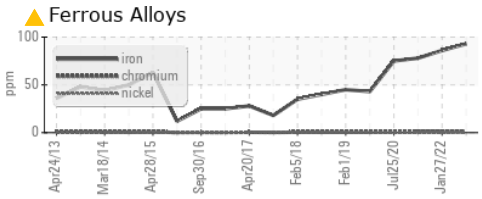
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	**NONE**	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	**NONE**	NONE	NONE
Precipitate	scalar	*Visual	NONE	**NONE**	NONE	NONE
Silt	scalar	*Visual	NONE	**NONE**	NONE	NONE
Debris	scalar	*Visual	NONE	**NONE**	NONE	NONE
Sand/Dirt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

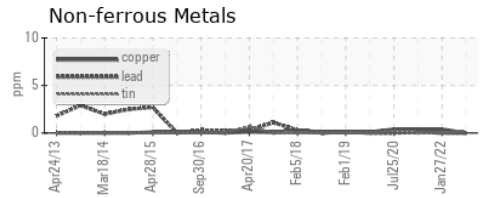
FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D445	315	**329**	318	330

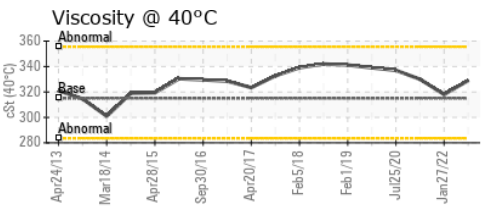
SAMPLE IMAGES	method	limit/base	current	history1	history2
Color					
Bottom					

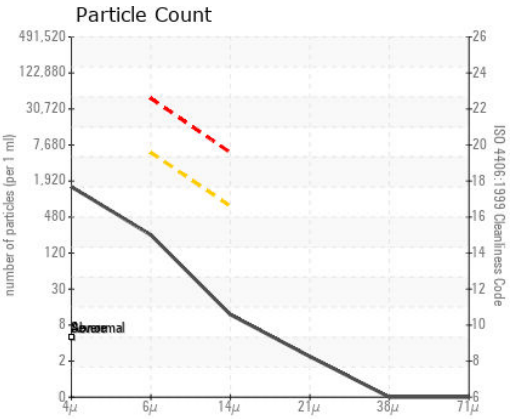


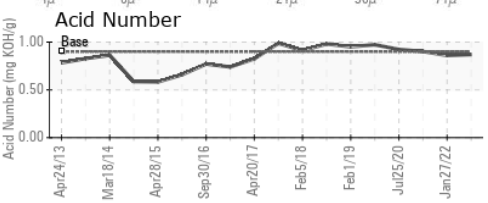
GRAPHS











Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : WC0804451 **Received** : 26 May 2023
Lab Number : 05857852 **Diagnosed** : 08 Jun 2023
Unique Number : 10492317 **Diagnostician** : Aaron Black
Test Package : IND 3 (Additional Tests: KF, PrtCount)

Certificate L2367

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)

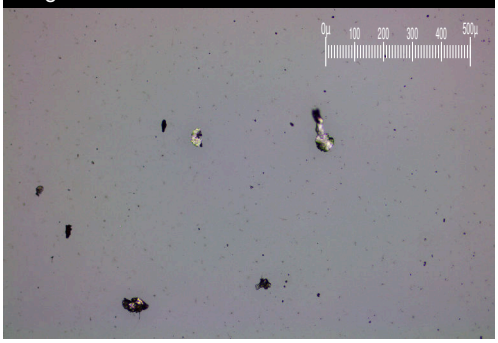
ENERGIA EOLICA
STA ANA KM25 CARRETERA AL SUR, A 1KM DEL CRUCE
FRANCISCO MORAZAN, ZZ
HN
Contact: SANTOS DEL CID
sdelcid@dencmi.com
T: x:
F: x:

FERROGRAPHY REPORT

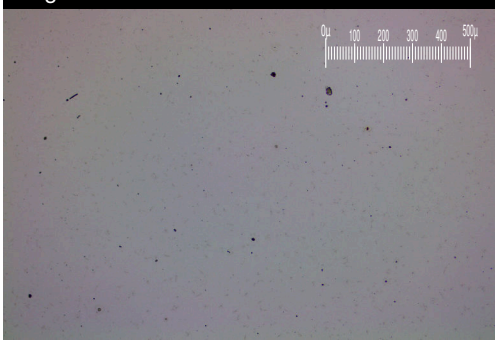
Area
3
Machine Id
WINERGY GEARBOX WTG-302 (S/N 4836487-0020-6)
Component
Wind Turbine Gearbox
Fluid
FUCHS RENOLIN UNISYN CKC ISO 320 (340 LTR)

Magn: 500x Illum: RW

Magn: 100x Illum: RW



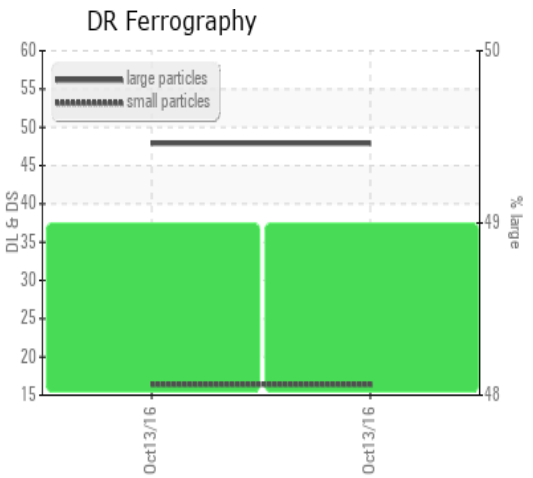
Magn: 100x Illum: RW



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		2		
Ferrous Rolling	Scale 0-10	*ASTM D7684		2	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				
Fibres	Scale 0-10	*ASTM D7684				
Spheres	Scale 0-10	*ASTM D7684				
Other	Scale 0-10	*ASTM D7684		1	1	

WEAR

The low ferrous density (PQ) index indicates the wear metal levels are due to corrosion.



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