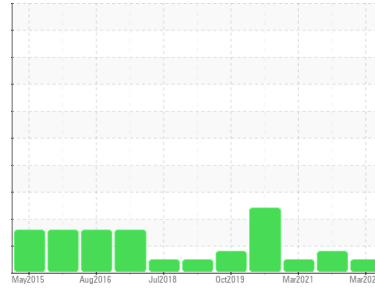




OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL



Area
14
Machine Id
HANSEN WTG-1401 (S/N EH806A-003-LM0045)
Component
Wind Turbine Gearbox
Fluid
SHELL OMALA S4 GX 320 (340 LTR)

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor. Analytical Ferrography: Results indicate normal operation, with typical amounts of ferrous rubbing wear and contamination present.

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		WC0804440	WC05504501	WC0547210
Sample Date	Client Info		06 Mar 2023	07 Feb 2022	12 Mar 2021
Machine Age	mths	Client Info	101	0	120
Oil Age	mths	Client Info	101	0	65
Oil Changed	Client Info		Not Chngd	N/A	Not Chngd
Sample Status			NORMAL	ABNORMAL	NORMAL

WEAR METALS

	method	limit/base	current	history1	history2	
PQ	ASTM D8184	>50	22	24	20	
Iron	ppm	ASTM D5185m	>65	28	25	18
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	<1	2	0
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		3	0	6
Barium	ppm	ASTM D5185m		0	0	0
Molybdenum	ppm	ASTM D5185m		0	0	0
Manganese	ppm	ASTM D5185m		<1	<1	<1
Magnesium	ppm	ASTM D5185m		0	0	0
Calcium	ppm	ASTM D5185m		5	4	2
Phosphorus	ppm	ASTM D5185m		349	397	267
Zinc	ppm	ASTM D5185m		44	46	35
Sulfur	ppm	ASTM D5185m		6036	4640	3442

CONTAMINANTS

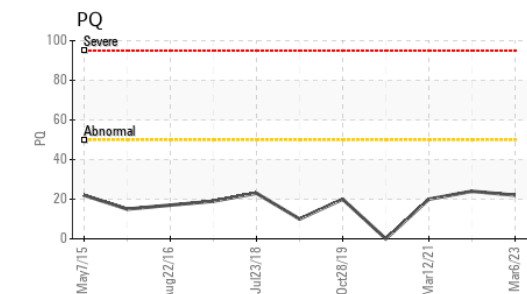
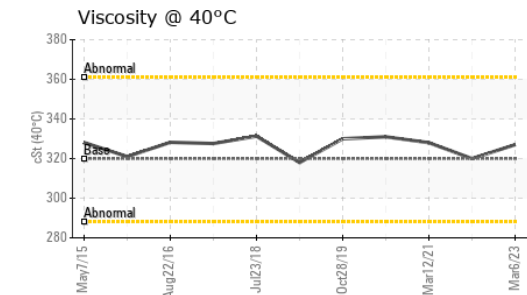
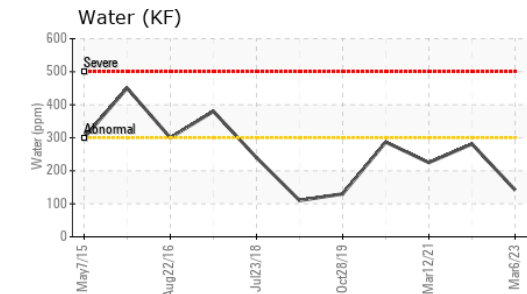
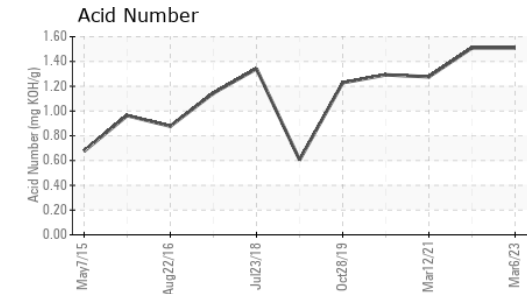
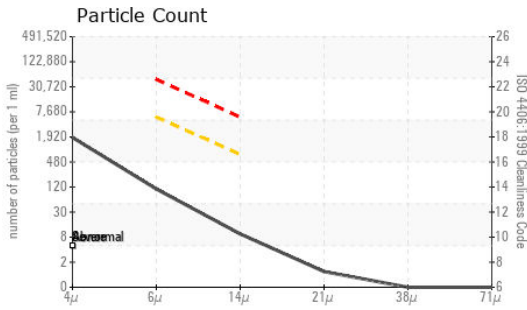
	method	limit/base	current	history1	history2	
Silicon	ppm	ASTM D5185m	>15	0	<1	0
Sodium	ppm	ASTM D5185m		4	2	2
Potassium	ppm	ASTM D5185m	>20	1	0	<1
Water	%	ASTM D6304	>0.03	0.014	0.028	0.022
ppm Water	ppm	ASTM D6304	>300	142.0	281.1	224.7

FLUID CLEANLINESS

	method	limit/base	current	history1	history2
Particles >4µm	ASTM D7647		1632	137314	821
Particles >6µm	ASTM D7647	>5000	95	▲ 41991	70
Particles >14µm	ASTM D7647	>640	8	▲ 1905	9
Particles >21µm	ASTM D7647	>160	1	25	5
Particles >38µm	ASTM D7647	>40	0	0	1
Particles >71µm	ASTM D7647	>10	0	0	0
Oil Cleanliness	ISO 4406 (c)	>--/19/16	18/14/10	▲ 24/23/18	17/13/10



OIL ANALYSIS REPORT



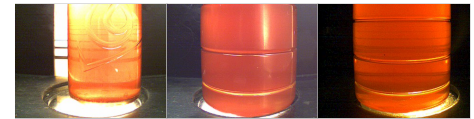
FLUID DEGRADATION	method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D8045	1.51	1.51	1.276

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

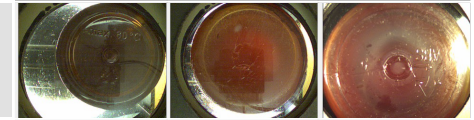
FLUID PROPERTIES	method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D445	320	327	320

SAMPLE IMAGES	method	limit/base	current	history1	history2
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Color



Bottom



PrtFilter



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : WC0804440 **Received** : 26 May 2023
Lab Number : 05857862 **Diagnosed** : 16 Jun 2023
Unique Number : 10492327 **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

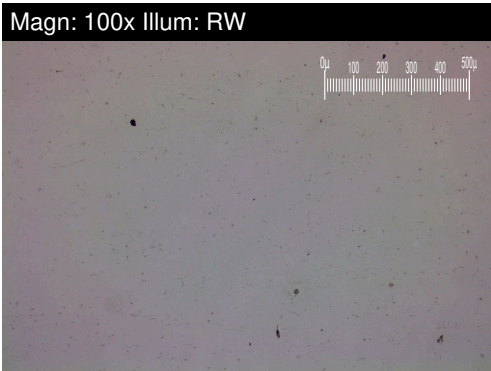
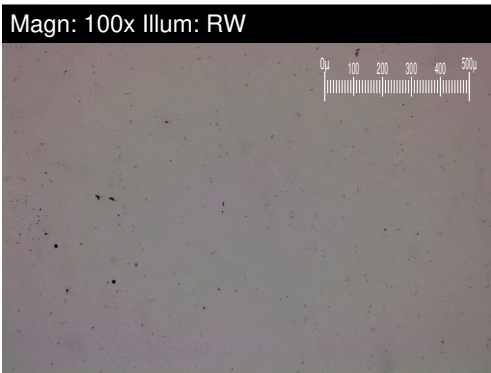
T: x:

F: x:



FERROGRAPHY REPORT

Area
14
 Machine Id
HANSEN WTG-1401 (S/N EH806A-003-LM0045)
 Component
Wind Turbine Gearbox
 Fluid
SHELL OMALA S4 GX 320 (340 LTR)

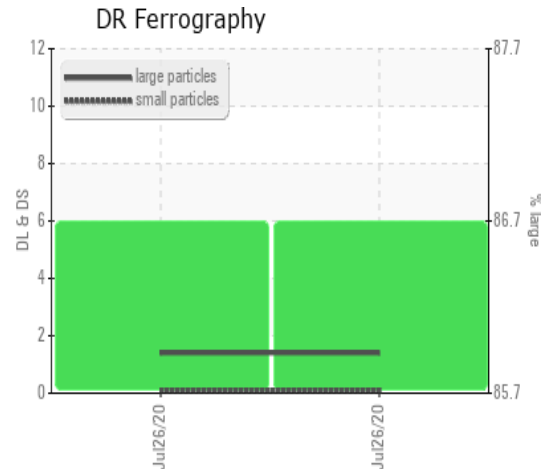


DR-FERROGRAPHY		method	limit/base	current	history1	history2
Large Particles		*DR-Ferr	>30	---	---	---
Small Particles		*DR-Ferr	>30	---	---	---
Total Particles		*DR-Ferr	>45.0	---	---	---
Large Particles Percentage	%	*DR-Ferr		---	---	---
Severity Index		*DR-Ferr		---	---	---

FERROGRAPHY		method	limit/base	current	history1	history2
Ferrous Rubbing	Scale 0-10	*ASTM D7684		1		
Ferrous Sliding	Scale 0-10	*ASTM D7684				
Ferrous Cutting	Scale 0-10	*ASTM D7684				
Ferrous Rolling	Scale 0-10	*ASTM D7684		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		

WEAR

All component wear rates are normal.



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