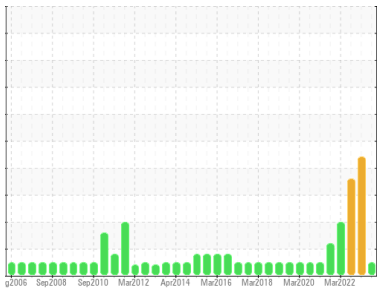
OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL

Area
Kingsbridge SP-13584
Machine Id
T21 (S/N 21750)
Component
Wind Turbine Gearbox
Fluid
CHEVRON PINNACLE WM 320 (--- LTR)

DIAGNOSIS

Recommendation
Resample at the next service interval to monitor. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.

Wear
All component wear rates are normal.

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

Fluid 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		**WC0863452**	WC0783094	WC0305836
Sample Date		Client Info		**21 Dec 2023**	02 Aug 2023	12 Sep 2022
Machine Age	yrs	Client Info		**0**	0	0
Oil Age	yrs	Client Info		**0**	0	0
Oil Changed		Client Info		**N/A**	N/A	N/A
Sample Status				**NORMAL**	SEVERE	SEVERE

WEAR METALS		method	limit/base	current	history1	history2
PQ		ASTM D8184*	>50	**0**	0	0
Iron	ppm	ASTM D5185(m)	>75	**0**	▲ 78	74
Chromium	ppm	ASTM D5185(m)	>5	**0**	<1	<1
Nickel	ppm	ASTM D5185(m)	>10	**0**	0	<1
Titanium	ppm	ASTM D5185(m)	>10	**0**	0	0
Silver	ppm	ASTM D5185(m)		**0**	0	0
Aluminum	ppm	ASTM D5185(m)	>10	**<1**	<1	<1
Lead	ppm	ASTM D5185(m)	>15	**0**	<1	<1
Copper	ppm	ASTM D5185(m)	>10	**0**	2	1
Tin	ppm	ASTM D5185(m)	>10	**0**	0	<1
Antimony	ppm	ASTM D5185(m)	>5	**0**	0	0
Vanadium	ppm	ASTM D5185(m)		**0**	0	0
Beryllium	ppm	ASTM D5185(m)		**0**	0	0
Cadmium	ppm	ASTM D5185(m)		**0**	0	0

ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185(m)	0	**<1**	1	1
Barium	ppm	ASTM D5185(m)	0	**0**	0	0
Molybdenum	ppm	ASTM D5185(m)	0	**0**	0	0
Manganese	ppm	ASTM D5185(m)		**0**	<1	<1
Magnesium	ppm	ASTM D5185(m)	0	**<1**	<1	0
Calcium	ppm	ASTM D5185(m)	0	**2**	1	<1
Phosphorus	ppm	ASTM D5185(m)	300	**270**	232	240
Zinc	ppm	ASTM D5185(m)	0	**<1**	▲ 25	▲ 21
Sulfur	ppm	ASTM D5185(m)	8000	**7363**	7063	7182
Lithium	ppm	ASTM D5185(m)		**<1**	<1	<1

CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185(m)	>10	**0**	<1	<1
Sodium	ppm	ASTM D5185(m)	>10	**0**	6	6
Potassium	ppm	ASTM D5185(m)	>20	**<1**	<1	1
Water	%	ASTM D6304*	>0.02	**0.004**	0.013	0.011
ppm Water	ppm	ASTM D6304*	>200	**41**	131.9	115.7

INFRA-RED		method	limit/base	current	history1	history2
Soot %	%	ASTM D7844*		**0**	0	0
Nitration	Abs/cm	ASTM D7624*		**1.9**	2.2	2.1
Sulfation	Abs/.1mm	ASTM D7415*		**27.7**	28.3	27.6

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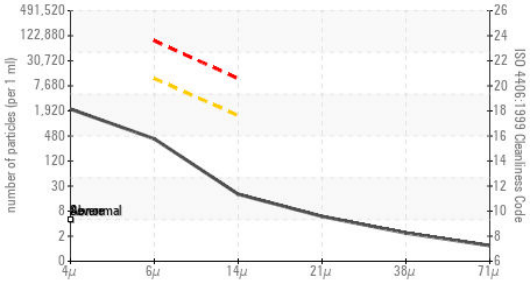
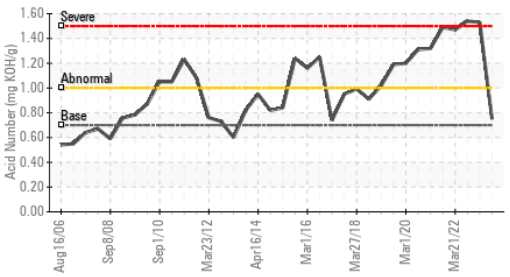
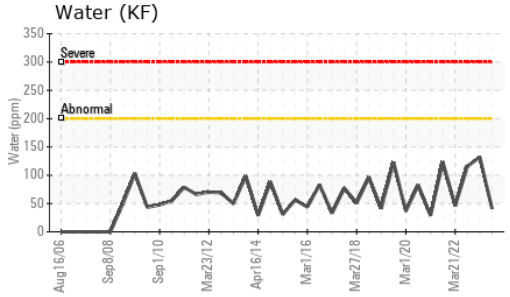
Particle Count



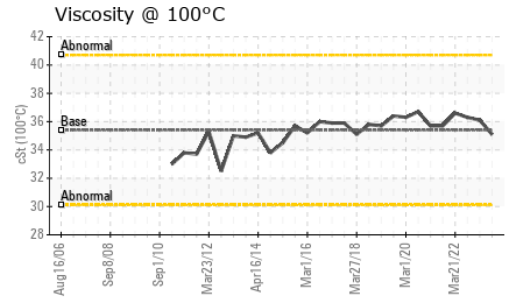
Acid Number



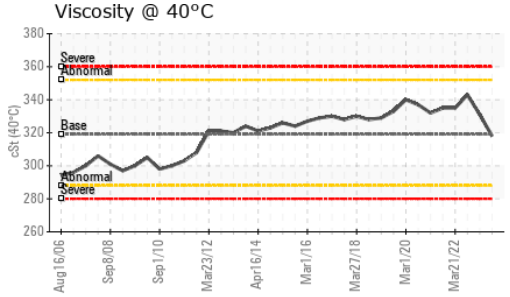
Water (KF)



Viscosity @ 100°C



Viscosity @ 40°C



FLUID CLEANLINESS		method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647		**1863**	1182	191
Particles >6µm		ASTM D7647	>10000	**360**	281	50
Particles >14µm		ASTM D7647	>1300	**17**	23	9
Particles >21µm		ASTM D7647	>320	**5**	8	2
Particles >38µm		ASTM D7647	>80	**2**	1	0
Particles >71µm		ASTM D7647	>20	**1**	0	0
Oil Cleanliness		ISO 4406 (c)	>--/20/17	**18/16/11**	17/15/12	15/13/10

FLUID DEGRADATION		method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	ASTM D7414*		**27.5**	29.1	29.6
Acid Number (AN)	mg KOH/g	ASTM D974*	0.7	**0.75**	1.53	1.54

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*	>0.02	**NEG**	NEG	NEG
Free Water	scalar	Visual*		**NEG**	NEG	NEG

FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D7279(m)	319	**318**	331	343
Visc @ 100°C	cSt	ASTM D7279(m)	35.4	**35.1**	36.1	36.3
Viscosity Index (VI)	Scale	ASTM D2270*	156	**155**	155	152

SAMPLE IMAGES	method	limit/base	current	history1	history2
Color					
Bottom					

ISO 17025:2017 Accredited Laboratory

Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9 **Vestas American Wind Technology Inc.**
Sample No. : WC0863452 **Recieved** : 12 Jan 2024 1417 NW Everett Street
Lab Number : 02608645 **Diagnosed** : 16 Jan 2024 Portland, OR
Unique Number : 5709731 **Diagnostician** : Kevin Marson US 97209
Test Package : IND 2 (Additional Tests: FT-IR, KF, KV100, PQ, PrtCount, TAN Man, VI) Contact: Nicole Philippi

To discuss this sample report, contact Customer Service at 1-800-268-2131. NiPhi@vestas.com
Test denoted (*) outside scope of accreditation, (m) method modified, (e) tested at external lab. T: (503)327-7683
Validity of results and interpretation are based on the sample and information as supplied. F: (503)327-0247