

PROBLEM SUMMARY

Sample Rating Trend

m7009 0ct2010 Apr2012 0ct2013 0ct2013 0ct2013 0ct2013

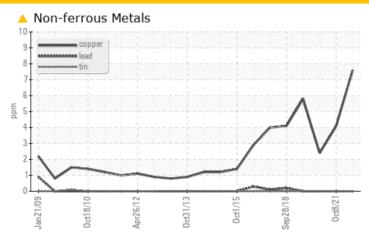
WEAR

Saugeen Shores SP-17701 04K05

Component Wind Turbine Gearbox

MOBIL MOBILGEAR SHC XMP 320 (260 LTR)

COMPONENT CONDITION SUMMARY



RECOMMENDATION

We recommend an early resample to monitor this condition.

PROBLEMATIC TEST RESULTS								
Sample Status ABN					NORMAL	NORMAL		
Copper	ppm	ASTM D5185(m)	>5	<u> 8</u>	4	2		

Customer Id: VESTAS Sample No.: WC0835244 Lab Number: 02590756 Test Package: IND 2



To manage this report scan the QR code

To discuss the diagnosis or test data: Bill Quesnel CLS,OMA II,MLA-III,LLA-I +1 (289)291-4641 x4641

Bill.Quesnel@wearcheck.com

To change component or sample information: Gloria Gonzalez +1 (289)291-4643 x4643 gloria.gonzalez@wearcheck.com

RECOMMENDED ACTIONS

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

HISTORICAL DIAGNOSIS

08 Oct 2021 Diag: Kevin Marson

NORMAL



Resample at the next service interval to monitor. All component wear rates are normal. The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The water content is negligible. The system and fluid cleanliness is acceptable. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.



16 Oct 2020 Diag: Kevin Marson

NORMAL



Resample at the next service interval to monitor. All component wear rates are normal. The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The water content is negligible. The system and fluid cleanliness is acceptable. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

view report

24 Sep 2019 Diag: Kevin Marson

NORMAL



Resample at the next service interval to monitor. All component wear rates are normal. The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The water content is negligible. The system and fluid cleanliness is acceptable. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.





OIL ANALYSIS REPORT

Sample Rating Trend

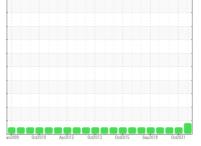
WEAR

Saugeen Shores SP-17701 04K05

Component

Wind Turbine Gearbox

MOBIL MOBILGEAR SHC XMP 320 (260 LTR)



DIAGNOSIS

Recommendation

We recommend an early resample to monitor this condition.

Wear

Copper ppm levels are abnormal. Bearing and/or bushing wear is indicated.

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.

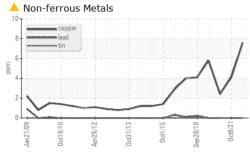
Fluid Condition

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

Oil Changed Sample Status Client Info Not Changd ABNORMAL Not Changd NORMAL Not Changd NoRMAL	,		an 2009 Oc	Api2012 01			
Sample Date Client Info 04 Oct 2023 08 Oct 2021 16 Oct 2020	SAMPLE INFORM	IATION	method	limit/base	current	history1	history2
Machine Age yrs Client Info 15 13 12 Oil Age yrs Client Info 15 13 12 Oil Changed Client Info Not Changd Not Changd Not Changd Not Changd No Changd N	Sample Number		Client Info		WC0835244	WC0546326	WC0419200
Oil Age yrs Client Info Not Changd	Sample Date		Client Info		04 Oct 2023	08 Oct 2021	16 Oct 2020
Oil Changed Sample Status	Machine Age	yrs	Client Info		15	13	12
WEAR METALS method limit/base current history1 history2 PQ ASTM D8184* >50 0 0 0 Iron ppm ASTM D8185(m) >75 17 13 13 Chromium ppm ASTM D8185(m) >5 0 0 <1	Oil Age	yrs	Client Info		15	13	12
WEAR METALS method limit/base current history1 history2 PQ ASTM D81841 >50 0 0 0 Iron ppm ASTM D8185(m) >75 17 13 13 Chromium ppm ASTM D8185(m) >5 0 0 <1	Oil Changed		Client Info		Not Changd	Not Changd	Not Changd
PQ ASTM D8184* >50 0 0 0 Iron ppm ASTM D5185(m) >75 17 13 13 Chromium ppm ASTM D5185(m) >5 0 0 <1 Nickel ppm ASTM D5185(m) >10 <1 <1 0 Silver ppm ASTM D5185(m) >10 0 <1 <1 0 Silver ppm ASTM D5185(m) >10 0 <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 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1	Sample Status				ABNORMAL	NORMAL	NORMAL
Iron	WEAR METALS		method	limit/base	current	history1	history2
Chromium ppm ASTM D5185(m) >5 0 0 <1 Nickel ppm ASTM D5185(m) >10 <1 <1 0 Titanium ppm ASTM D5185(m) >10 0 0 0 Silver ppm ASTM D5185(m) >10 0 <1 <1 Aluminum ppm ASTM D5185(m) >10 0 <1 <1 Lead ppm ASTM D5185(m) >10 0 <1 <1 Lead ppm ASTM D5185(m) >5 4 8 4 2 Copper ppm ASTM D5185(m) >5 4 8 4 2 Tin ppm ASTM D5185(m) >5 0 <1 0 Vandium ppm ASTM D5185(m) 0 0 0 0 Beryllium ppm ASTM D5185(m) 0 0 0 0 Cadmium ppm ASTM D5185(m) <th< td=""><td>PQ</td><td></td><td>ASTM D8184*</td><td>>50</td><th>0</th><td>0</td><td>0</td></th<>	PQ		ASTM D8184*	>50	0	0	0
Nickel	Iron	ppm	ASTM D5185(m)	>75	17	13	13
Nickel	Chromium	ppm	ASTM D5185(m)	>5	0	0	<1
Titanium ppm ASTM D5185(m) >10 0 0 0 Silver ppm ASTM D5185(m) < -1 0 <1 Aluminum ppm ASTM D5185(m) >10 0 <1 <1 Lead ppm ASTM D5185(m) >15 0 0 0 Copper ppm ASTM D5185(m) >5 0 4 2 Tin ppm ASTM D5185(m) >10 0 0 0 Antimony ppm ASTM D5185(m) 0 -1 0 0 Vanadium ppm ASTM D5185(m) 0 0 0 0 Vanadium ppm ASTM D5185(m) 0 0 0 0 Beryllium ppm ASTM D5185(m) 0 0 0 0 ADDTTVES method limit/base current history1 history2 Boron ppm ASTM D5185(m) 0 1 1 1	Nickel	ppm	ASTM D5185(m)	>10	<1	<1	0
Silver ppm ASTM D5185(m) <1 0 <1 Aluminum ppm ASTM D5185(m) >10 0 <1	Titanium		ASTM D5185(m)	>10	0	0	0
Aluminum ppm ASTM D5185(m) >10 0 <1 <1 Lead ppm ASTM D5185(m) >15 0 0 0 Copper ppm ASTM D5185(m) >5 ▲ 8 4 2 Tin ppm ASTM D5185(m) >10 0 0 0 Antimony ppm ASTM D5185(m) >5 0 <1 0 Vanadium ppm ASTM D5185(m) 0 0 0 0 Beryllium ppm ASTM D5185(m) 0 0 0 0 Cadmium ppm ASTM D5185(m) 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185(m) 0 1 1 1 Boron ppm ASTM D5185(m) 0 0 0 0 Barium ppm ASTM D5185(m) 0 0 0	Silver		ASTM D5185(m)		<1	0	<1
Lead ppm ASTM D5185(m) >15 0 0 0 Copper ppm ASTM D5185(m) >5 ▲ 8 4 2 Tin ppm ASTM D5185(m) >10 0 0 0 Antimony ppm ASTM D5185(m) >5 0 <1	Aluminum		. ,	>10	0	<1	<1
Copper ppm ASTM D5185(m) >5 ▲ 8 4 2 Tin ppm ASTM D5185(m) >10 0 0 0 Antimony ppm ASTM D5185(m) >5 0 <1	Lead		. ,	>15	0	0	
Tin	Copper		()	>5	<u>^</u> 8	4	2
Antimony	• •		. ,	>10	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 0 0 0 Magnesium ppm ASTM D5185(m) 0 0 0 1 Calcium ppm ASTM D5185(m) 0 0 -1 -1 Phosphorus ppm ASTM D5185(m) 485 303 360 373 3958 Lithium ppm ASTM D5185(m) 0 17 9 7	Antimony		. ,		0	<1	
Beryllium	•		. ,				
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 Molybdenum ppm ASTM D5185(m) 0 0 0 Manganese ppm ASTM D5185(m) 0 0 0 Magnesium ppm ASTM D5185(m) 0 0 -1 Calcium ppm ASTM D5185(m) 0 0 -1 Phosphorus ppm ASTM D5185(m) 0 0 -1 -1 Phosphorus ppm ASTM D5185(m) 0 17 9 7 Sulfur ppm ASTM D5185(m) 3506 3733 3958 Lithium ppm ASTM D5185(m) >40 16 11 9 Sodium ppm ASTM D5185(m) <td></td> <td></td> <td>()</td> <td></td> <th></th> <td></td> <td></td>			()				
ADDITIVES	•		. ,			0	0
Barium ppm ASTM D5185(m) 0 0 0 Molybdenum ppm ASTM D5185(m) 0 0 0 Manganese ppm ASTM D5185(m) 0 0 0 Magnesium ppm ASTM D5185(m) 0 0 <1	ADDITIVES		method	limit/base	current	history1	history2
Barium ppm ASTM D5185(m) 0 0 0 Molybdenum ppm ASTM D5185(m) 0 0 0 Manganese ppm ASTM D5185(m) 0 0 0 Magnesium ppm ASTM D5185(m) 0 0 <1 Calcium ppm ASTM D5185(m) 0 0 <1 <1 Phosphorus ppm ASTM D5185(m) 485 303 360 335 Zinc ppm ASTM D5185(m) 0 17 9 7 Sulfur ppm ASTM D5185(m) 3506 3733 3958 Lithium ppm ASTM D5185(m) <1 <1 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >40 16 11 9 Sodium ppm ASTM D5185(m) >20 <1 <1 1 Water %	Boron	ppm	ASTM D5185(m)	0	1	1	1
Molybdenum ppm ASTM D5185(m) 0 0 0 0 Manganese ppm ASTM D5185(m) 0 0 0 0 Magnesium ppm ASTM D5185(m) 0 0 <1 <1 Calcium ppm ASTM D5185(m) 0 0 <1 <1 Phosphorus ppm ASTM D5185(m) 485 303 360 335 Zinc ppm ASTM D5185(m) 0 17 9 7 Sulfur ppm ASTM D5185(m) 3506 3733 3958 Lithium ppm ASTM D5185(m) <1 <1 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >40 16 11 9 Sodium ppm ASTM D5185(m) >10 <1 <1 1 Potassium ppm ASTM D5185(m) >20 <1 <1 <td>Barium</td> <td></td> <td>ASTM D5185(m)</td> <td></td> <th>0</th> <td>0</td> <td>0</td>	Barium		ASTM D5185(m)		0	0	0
Manganese ppm ASTM D5185(m) 0 0 0 Magnesium ppm ASTM D5185(m) 0 0 <1 Calcium ppm ASTM D5185(m) 0 0 <1 <1 Phosphorus ppm ASTM D5185(m) 485 303 360 335 Zinc ppm ASTM D5185(m) 0 17 9 7 Sulfur ppm ASTM D5185(m) 3506 3733 3958 Lithium ppm ASTM D5185(m) <1 <1 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >40 16 11 9 Sodium ppm ASTM D5185(m) >10 <1	Molybdenum	ppm	ASTM D5185(m)	0	0	0	0
Magnesium ppm ASTM D5185(m) 0 0 <1 Calcium ppm ASTM D5185(m) 0 0 <1 <1 Phosphorus ppm ASTM D5185(m) 485 303 360 335 Zinc ppm ASTM D5185(m) 0 17 9 7 Sulfur ppm ASTM D5185(m) 3506 3733 3958 Lithium ppm ASTM D5185(m) <1 <1 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >40 16 11 9 Sodium ppm ASTM D5185(m) >10 <1 0 <1 Potassium ppm ASTM D5185(m) >20 <1 <1 1 Water % ASTM D6304* >0.02 0.005 0.009 0.006 ppm Water ppm ASTM D6304* >200 52.0 91.7			ASTM D5185(m)		0	0	0
Calcium ppm ASTM D5185(m) 0 0 <1 <1 Phosphorus ppm ASTM D5185(m) 485 303 360 335 Zinc ppm ASTM D5185(m) 0 17 9 7 Sulfur ppm ASTM D5185(m) 3506 3733 3958 Lithium ppm ASTM D5185(m) <1	-		. ,		0	0	<1
Phosphorus ppm ASTM D5185(m) 485 303 360 335 Zinc ppm ASTM D5185(m) 0 17 9 7 Sulfur ppm ASTM D5185(m) 3506 3733 3958 Lithium ppm ASTM D5185(m) <1	Calcium			0	0	<1	<1
Zinc ppm ASTM D5185(m) 0 17 9 7 Sulfur ppm ASTM D5185(m) 3506 3733 3958 Lithium ppm ASTM D5185(m) <1 <1 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >40 16 11 9 Sodium ppm ASTM D5185(m) >10 <1	Phosphorus		ASTM D5185(m)	485	303	360	335
Sulfur ppm ASTM D5185(m) 3506 3733 3958 Lithium ppm ASTM D5185(m) <1 <1 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >40 16 11 9 Sodium ppm ASTM D5185(m) >10 <1	Zinc		ASTM D5185(m)	0	17	9	7
Lithium ppm ASTM D5185(m) <1 <1 <1 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185(m) >40 16 11 9 Sodium ppm ASTM D5185(m) >10 <1	Sulfur		. ,				2050
Silicon ppm ASTM D5185(m) >40 16 11 9 Sodium ppm ASTM D5185(m) >10 <1 0 <1 Potassium ppm ASTM D5185(m) >20 <1 <1 1 Water % ASTM D6304* >0.02 0.005 0.009 0.006 ppm Water ppm ASTM D6304* >200 52.0 91.7 65.0 INFRA-RED method limit/base current history1 history2 Soot % % ASTM D7844* 0 0 Nitration Abs/cm ASTM D7624* 2.2 2.2			AO HVI DO FOOTIIII		3506	3/33	3930
Sodium ppm ASTM D5185(m) >10 <1	Lithium		. ,				
Sodium ppm ASTM D5185(m) >10 <1 0 <1 Potassium ppm ASTM D5185(m) >20 <1			ASTM D5185(m)	limit/base	<1	<1	<1
Potassium ppm ASTM D5185(m) >20 <1 <1 1 Water % ASTM D6304* >0.02 0.005 0.009 0.006 ppm Water ppm ASTM D6304* >200 52.0 91.7 65.0 INFRA-RED method limit/base current history1 history2 Soot % % ASTM D7844* 0 0 Nitration Abs/cm ASTM D7624* 2.2 2.2	CONTAMINANTS	ppm	ASTM D5185(m) method		<1 current	<1 history1	<1 history2
Water % ASTM D6304* >0.02 0.005 0.009 0.006 ppm Water ppm ASTM D6304* >200 52.0 91.7 65.0 INFRA-RED method limit/base current history1 history2 Soot % % ASTM D7844* 0 0 Nitration Abs/cm ASTM D7624* 2.2 2.2	CONTAMINANTS Silicon	ppm	ASTM D5185(m) method ASTM D5185(m)	>40	<1 current	<1 history1	<1 history2
ppm Water ppm ASTM D6304* >200 52.0 91.7 65.0 INFRA-RED method limit/base current history1 history2 Soot % % ASTM D7844* 0 0 Nitration Abs/cm ASTM D7624* 2.2 2.2	CONTAMINANTS Silicon Sodium	ppm ppm ppm	ASTM D5185(m) method ASTM D5185(m) ASTM D5185(m)	>40 >10	<1 current 16 <1	<1 history1 11 0	<1 history2 9 <1
Soot % % ASTM D7844* 0 0 Nitration Abs/cm ASTM D7624* 2.2 2.2	CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm	ASTM D5185(m) method ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	>40 >10 >20	<1 current 16 <1 <1	<1 history1 11 0 <1	<1 history2 9 <1 1
Nitration Abs/cm ASTM D7624* 2.2 2.2	CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm %	ASTM D5185(m) method ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D6304*	>40 >10 >20 >0.02	<1 current 16 <1 <1 0.005	<1 history1 11 0 <1 0.009	<1 history2 9 <1 1 0.006
	CONTAMINANTS Silicon Sodium Potassium Water ppm Water	ppm ppm ppm ppm %	ASTM D5185(m) method ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D6304* ASTM D6304*	>40 >10 >20 >0.02 >200	<1 current 16 <1 <1 0.005 52.0	<1 history1 11 0 <1 0.009 91.7	<1 history2 9 <1 1 0.006 65.0
	CONTAMINANTS Silicon Sodium Potassium Water ppm Water INFRA-RED	ppm ppm ppm ppm ppm	ASTM D5185(m) method ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D6304* ASTM D6304* method	>40 >10 >20 >0.02 >200	<1 current 16 <1 <1 <0.005 52.0 current	<1 history1 11 0 <1 0.009 91.7 history1	<1 history2 9 <1 1 0.006 65.0 history2
	CONTAMINANTS Silicon Sodium Potassium Water ppm Water INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm % ppm	ASTM D5185(m) method ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D6304* ASTM D6304* method ASTM D7844*	>40 >10 >20 >0.02 >200	<1 current 16 <1 <1 0.005 52.0 current 0	<1 history1 11 0 <1 0.009 91.7 history1 0	<1 history2 9 <1 1 0.006 65.0 history2

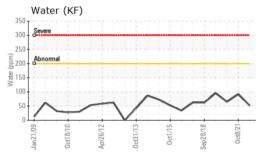


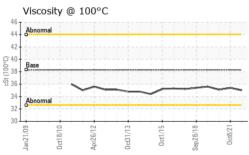
OIL ANALYSIS REPORT



122,880					-2
30,720					2
7,680					-2
1,920	/				-11
480 -	1				-11
120-		/			-14
30+			1		+1:
8 Serese mal					-10
2-				_	-8
0 4µ 6µ	1	14μ	21μ	38µ	71µ

Acid	Numbe	r				
(15/H0X 2.00 Abnor 1.50 Base	mal					
1.50						
1.00 Base						
0.50						
Jan21,09	Oct18/10	Apr26/12	0ct31/13	Oct1/15	Sep28/18 -	0ct8/21
Jan	Oct	Apr	Oct	ŏ	Sep	0





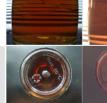
FLUID CLEANLIN	ESS	method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647		15525	3448	3099
Particles >6µm		ASTM D7647	>10000	2964	858	572
Particles >14µm		ASTM D7647	>1300	96	70	46
Particles >21µm		ASTM D7647	>320	20	19	14
Particles >38µm		ASTM D7647	>80	2	0	2
Particles >71µm		ASTM D7647	>20	1	0	0
Oil Cleanliness		ISO 4406 (c)	>/20/17	21/19/14	19/17/13	19/16/13
FLUID DEGRADA	TION	method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	ASTM D7414*		54.6	53.3	
Acid Number (AN)	mg KOH/g	ASTM D974*	0.85	0.84	0.82	0.81
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	VLITE	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 PROPERT	IES	method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D7279(m)	335	308	310	309
Visc @ 100°C	cSt	ASTM D7279(m)	38.3	35.0	35.4	35.1
Viscosity Index (VI)	Scale	ASTM D2270*	164	159	160	159
0444545						

limit/base

Color

SAMPLE IMAGES

Bottom



current



history1



history2



CALA ISO 17025:2017

Accredited

Laboratory Sample No. Lab Number Unique Number : 5659822

: WC0835244

: 02590756

Validity of results and interpretation are based on the sample and information as supplied.

: WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9 Vestas American Wind Technology Inc. Received : 20 Oct 2023 Diagnosed

method

: 23 Oct 2023 Diagnostician : Bill Quesnel

Test Package : IND 2 (Additional Tests: FT-IR, KF, KV100, PQ, TAN Man, VI)

Portland, OR US 97209 Contact: Nicole Philippi NiPhi@vestas.com T: (503)327-7683

F: (503)327-0247

1417 NW Everett Street

To discuss this sample report, contact Customer Service at 1-800-268-2131. Test denoted (*) outside scope of accreditation, (m) method modified, (e) tested at external lab.

Report Id: VESTAS [WCAMIS] 02590756 (Generated: 10/23/2023 18:15:36) Rev: 1

Contact/Location: Nicole Philippi - VESTAS