

PROBLEM SUMMARY

Sample Rating Trend

0c2008 Mar2010 Oct2011 Anr2013 Oct20114 Sanz011E Sanz011E Sanz011E Sanz011E

WEAR

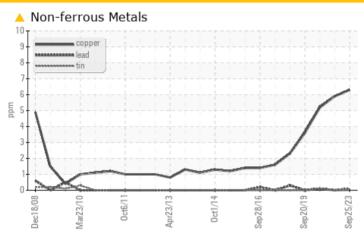
WEAR

Saugeen Shores SP-17701 Machine IV ECW #1

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				ABNORMAL	ABNORMAL	ABNORMAL		
Copper	ppm	ASTM D5185(m)	>5	<u>^</u> 6	<u></u> 6	<u>\$</u> 5		

Customer Id: VESTAS Sample No.: WC0835228 Lab Number: 02590760 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

27 Sep 2022 Diag: Kevin Marson

WEAR



We recommend an early resample to monitor this condition. Copper ppm levels are abnormal. Bearing and/or bushing wear is indicated. 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.



01 Oct 2020 Diag: Bill Quesnel

WEAR



We recommend an early resample to monitor this condition. Copper ppm levels are abnormal. Bearing and/or bushing wear is indicated. 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.



20 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.



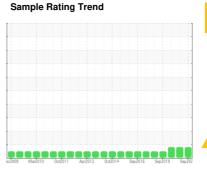


OIL ANALYSIS REPORT

Saugeen Shores SP-17701 **ECW #1**

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.

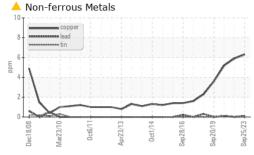
Fluid Condition

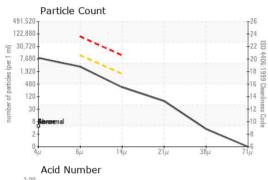
The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

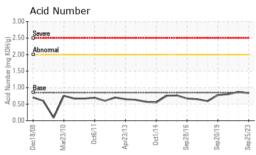
SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0835228	WC0577978	WC0419173
Sample Date		Client Info		25 Sep 2023	27 Sep 2022	01 Oct 2020
Machine Age	yrs	Client Info		15	14	12
Oil Age	yrs	Client Info		15	14	12
Oil Changed	, -	Client Info		Not Changd	Not Changd	Not Changd
Sample Status				ABNORMAL	ABNORMAL	ABNORMAL
WEAR METALS		method	limit/base	current	history1	history2
PQ		ASTM D8184*	>50	0	0	0
Iron	ppm	ASTM D5185(m)	>75	15	14	15
Chromium	ppm	ASTM D5185(m)	>5	0	0	<1
Nickel	ppm	ASTM D5185(m)	>10	<1	<1	<1
Titanium	ppm	ASTM D5185(m)	>10	0	<1	0
Silver	ppm	ASTM D5185(m)		<1	0	<1
Aluminum	ppm	ASTM D5185(m)	>10	0	0	0
Lead	ppm	ASTM D5185(m)	>15	<1	0	<1
Copper	ppm	ASTM D5185(m)	>5	<u>^</u> 6	<u>^</u> 6	<u> 5</u>
Tin	ppm	ASTM D5185(m)	>10	0	0	<1
Antimony	ppm	ASTM D5185(m)	>5	0	<1	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
	1-1-	()		-		
ADDITIVES	1-1-	method	limit/base	current	history1	history2
	ppm	. ,	limit/base	-	history1	history2 <1
ADDITIVES		method		current		
ADDITIVES Boron	ppm	method ASTM D5185(m)		current	1	<1
ADDITIVES Boron Barium	ppm ppm	method ASTM D5185(m) ASTM D5185(m)	0	current <1 <1	1	<1
ADDITIVES Boron Barium Molybdenum	ppm ppm ppm	method ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	0	<pre>current <1 <1 0</pre>	1 0 0	<1 0 0
ADDITIVES Boron Barium Molybdenum Manganese	ppm ppm ppm	method ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	0	<pre>current <1 <1 0 0</pre>	1 0 0	<1 0 0 0
ADDITIVES Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	method ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	0	current <1 <1 0 0 <1	1 0 0 0	<1 0 0 0 0 <1
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	method ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	0 0 0 485	current <1 <1 0 0 <1 0 <1 0	1 0 0 0 0 0	<1 0 0 0 0 <1 <1
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm ppm	method ASTM D5185(m)	0 0 0 485	current <1 <1 0 0 <1 0 <1 0 333	1 0 0 0 0 0 0 0 372	<1 0 0 0 0 <1 <1 <1 344
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185(m)	0 0 0 485	current <1 <1 0 0 <1 0 <1 0 333 14	1 0 0 0 0 0 0 0 372	<1 0 0 0 0 <1 <1 <1 344
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185(m)	0 0 0 485	current <1 <1 0 0 <1 0 <1 0 333 14 3554	1 0 0 0 0 0 0 372 12 3814	<1 0 0 0 0 <1 <1 <1 344 12 4031
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185(m)	0 0 0 485 0	current <1 <1 0 0 0 <1 0 333 14 3554 <1	1 0 0 0 0 0 0 372 12 3814 <1	<1 0 0 0 0 <1 <1 <1 344 12 4031 <1
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185(m)	0 0 0 485 0	current <1 <1 0 0 <1 0 <1 0 333 14 3554 <1 current	1 0 0 0 0 0 0 372 12 3814 <1 history1	<1 0 0 0 0 <1 <1 <1 344 12 4031 <1 history2
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185(m)	0 0 485 0 limit/base	current <1 <1 0 0 <1 0 <1 0 333 14 3554 <1 current 11	1 0 0 0 0 0 0 372 12 3814 <1 history1	<1 0 0 0 <1 <1 344 12 4031 <1 history2
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185(m)	0 0 485 0 limit/base >40 >10	current <1 <1 0 0 0 <1 0 333 14 3554 <1 current 11 <1	1 0 0 0 0 0 0 0 0 372 12 3814 <1 history1 10 <1	<1 0 0 0 <1 <1 <1 344 12 4031 <1 history2
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185(m)	0 0 485 0 limit/base >40 >10 >20	current <1 <1 0 0 0 <1 0 333 14 3554 <1 current 11 <1 <1	1 0 0 0 0 0 0 372 12 3814 <1 history1	<1 0 0 0 <1 <1 <1 344 12 4031 <1 history2 15 <1
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS Silicon Sodium Potassium Water	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185(m)	0 0 485 0 limit/base >40 >10 >20 >0.02	current <1 <1 0 0 0 <1 0 333 14 3554 <1 current 11 <1 <1 0.008	1 0 0 0 0 0 0 372 12 3814 <1 history1 10 <1 0	<1 0 0 0 <1 <1 344 12 4031 <1 history2 15 <1 <1 <1
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS Silicon Sodium Potassium Water ppm Water	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185(m) ASTM D5185(m)	0 0 485 0 limit/base >40 >10 >20 >0.02 >200	current <1 <1 0 0 0 <1 0 333 14 3554 <1 current 11 <1 <1 0.008 83.7	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<1 0 0 0 0 <1 <1 <1 344 12 4031 <1 history2 15 <1 <1 0.006 63.1
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINANTS Silicon Sodium Potassium Water ppm Water INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185(m) ASTM D6304* ASTM D6304*	0 0 485 0 limit/base >40 >10 >20 >0.02 >200	current <1 <1 0 0 <1 0 333 14 3554 <1 current 11 <1 0.008 83.7 current	1 0 0 0 0 0 0 372 12 3814 <1 history1 10 <1 0 0.009 93.3 history1	<1 0 0 0 0 <1 <1 344 12 4031 <1 history2 15 <1 <1 0.006 63.1 history2

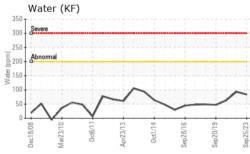


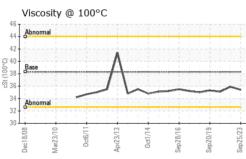
OIL ANALYSIS REPORT











FLUID CLEANLINE	ESS	method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647		7580	7620	8351
Particles >6µm		ASTM D7647	>10000	2863	2553	530
Particles >14μm		ASTM D7647	>1300	298	308	23
Particles >21µm		ASTM D7647	>320	65	95	9
Particles >38μm		ASTM D7647	>80	3	8	2
Particles >71μm		ASTM D7647	>20	0	3	0
Oil Cleanliness		ISO 4406 (c)	>/20/17	20/19/15	20/19/15	20/16/12
FLUID DEGRADA	TION	method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	ASTM D7414*		53.8	56.1	
Acid Number (AN)	mg KOH/g	ASTM D974*	0.85	0.83	0.87	0.80
MICHAI		mothod	limit/haaa	ourront	hiotonyt	hintory

Α	cid Number (AN)	mg KOH/g	ASTM D974*	0.85	0.83	0.87	0.80
	VISUAL		method	limit/base	current	history1	history2
٧	/hite Metal	scalar	Visual*	NONE	NONE	NONE	NONE
Υ	ellow Metal	scalar	Visual*	NONE	NONE	NONE	NONE
Р	recipitate	scalar	Visual*	NONE	NONE	NONE	NONE
S	ilt	scalar	Visual*	NONE	NONE	NONE	NONE
D	ebris	scalar	Visual*	NONE	VLITE	NONE	NONE
S	and/Dirt	scalar	Visual*	NONE	NONE	NONE	NONE
Α	ppearance	scalar	Visual*	NORML	NORML	NORML	NORML
C)dor	scalar	Visual*	NORML	NORML	NORML	NORML
Е	mulsified Water	scalar	Visual*	>0.02	NEG	NEG	NEG
F	ree Water	scalar	Visual*		NEG	NEG	NEG
	FLUID PROPERT	IES	method	limit/base	current	history1	history2

FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D7279(m)	335	312	315	308
Visc @ 100°C	cSt	ASTM D7279(m)	38.3	35.4	35.9	35.1
Viscosity Index (VI)	Scale	ASTM D2270*	164	159	161	159
	Visc @ 40°C Visc @ 100°C	Visc @ 100°C cSt	Visc @ 40°C cSt ASTM D7279(m) Visc @ 100°C cSt ASTM D7279(m)	Visc @ 40°C cSt ASTM D7279(m) 335 Visc @ 100°C cSt ASTM D7279(m) 38.3	Visc @ 40°C cSt ASTM D7279(m) 335 312 Visc @ 100°C cSt ASTM D7279(m) 38.3 35.4	Visc @ 40°C cSt ASTM D7279(m) 335 312 315 Visc @ 100°C cSt ASTM D7279(m) 38.3 35.4 35.9

VISC @ 100 C		ASTIVI DIZIS(III)		33.4	00.0	00.1
Viscosity Index (VI)	Scale	ASTM D2270*	164	159	161	159
SAMPLE IMAGES	3	method	limit/base	current	history1	histo





CALA ISO 17025:2017

Accredited

Laboratory

Laboratory Sample No. Lab Number Unique Number

: WC0835228 : 02590760 : 5659826

Color

Bottom

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

Diagnosed : 23 Oct 2023 Diagnostician : Bill Quesnel

: 20 Oct 2023 1417 NW Everett Street Test Package : IND 2 (Additional Tests: FT-IR, KF, KV100, PQ, TAN Man, VI)

US 97209 Contact: Nicole Philippi NiPhi@vestas.com T: (503)327-7683 F: (503)327-0247

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.

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

Report Id: VESTAS [WCAMIS] 02590760 (Generated: 10/23/2023 18:16:13) Rev: 1

Contact/Location: Nicole Philippi - VESTAS

Portland, OR