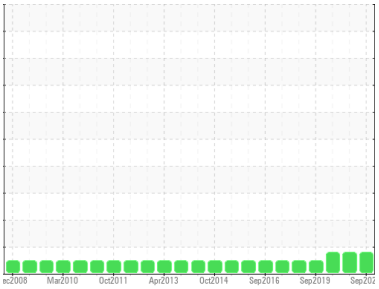
# PROBLEM SUMMARY

Sample Rating Trend

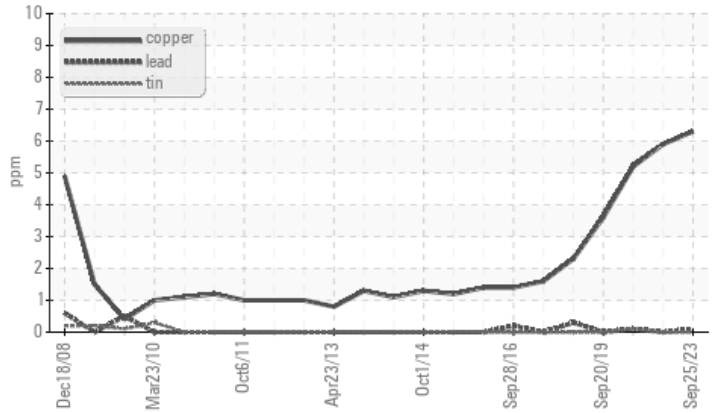


**WEAR**

Area
## Saugeen Shores SP-17701
Machine ID
## ECW #1
Component
**Wind Turbine Gearbox**
Fluid
**MOBIL MOBILGEAR SHC XMP 320 (260 LTR)**

## COMPONENT CONDITION SUMMARY

▲ Non-ferrous Metals




## RECOMMENDATION

We recommend an early resample to monitor this condition.

## PROBLEMATIC TEST RESULTS

| Sample Status | | | | **ABNORMAL** | ABNORMAL | ABNORMAL |
|---|---|---|---|---|---|---|
| Copper | ppm | ASTM D5185(m) | >5 | ▲ **6** | ▲ 6 | ▲ 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:*
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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.

view report

**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.

view report

**20 Sep 2019 Diag: Kevin Marson**

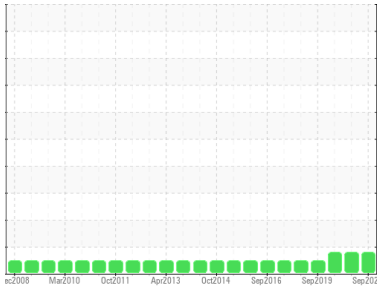
NORMAL

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.

view report

# OIL ANALYSIS REPORT

Sample Rating Trend



**WEAR**

Area
## Saugeen Shores SP-17701
Machine ID
## ECW #1
Component
**Wind Turbine Gearbox**
Fluid
**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 INFORMATION | | 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 | ▲ **6** | ▲ 6 | ▲ 5 |
| 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 |

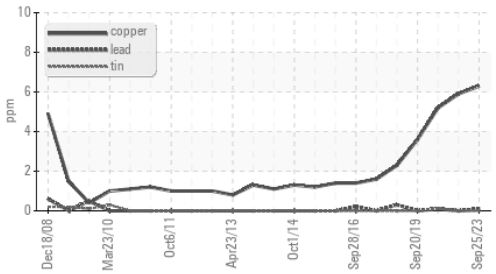
| ADDITIVES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Boron | ppm | ASTM D5185(m) | 0 | **<1** | 1 | <1 |
| Barium | ppm | ASTM D5185(m) | | **<1** | 0 | 0 |
| Molybdenum | ppm | ASTM D5185(m) | 0 | **0** | 0 | 0 |
| Manganese | ppm | ASTM D5185(m) | | **0** | 0 | 0 |
| Magnesium | ppm | ASTM D5185(m) | | **<1** | 0 | <1 |
| Calcium | ppm | ASTM D5185(m) | 0 | **0** | 0 | <1 |
| Phosphorus | ppm | ASTM D5185(m) | 485 | **333** | 372 | 344 |
| Zinc | ppm | ASTM D5185(m) | 0 | **14** | 12 | 12 |
| Sulfur | ppm | ASTM D5185(m) | | **3554** | 3814 | 4031 |
| Lithium | ppm | ASTM D5185(m) | | **<1** | <1 | <1 |

| CONTAMINANTS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Silicon | ppm | ASTM D5185(m) | >40 | **11** | 10 | 15 |
| Sodium | ppm | ASTM D5185(m) | >10 | **<1** | <1 | <1 |
| Potassium | ppm | ASTM D5185(m) | >20 | **<1** | 0 | <1 |
| Water | % | ASTM D6304* | >0.02 | **0.008** | 0.009 | 0.006 |
| ppm Water | ppm | ASTM D6304* | >200 | **83.7** | 93.3 | 63.1 |

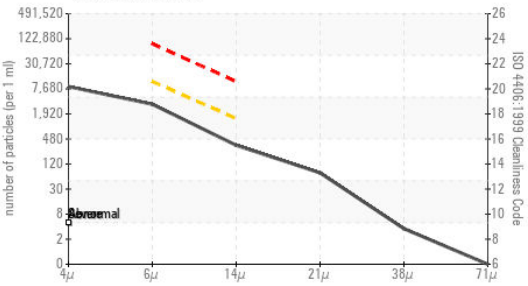
| INFRA-RED | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Soot % | % | ASTM D7844* | | **0** | 0 | --- |
| Nitration | Abs/cm | ASTM D7624* | | **2.1** | 2.2 | --- |
| Sulfation | Abs/.1mm | ASTM D7415* | | **47.2** | 48.7 | --- |

# OIL ANALYSIS REPORT

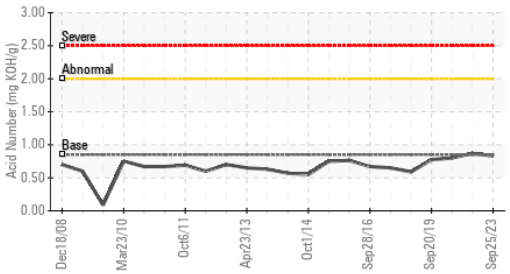
Non-ferrous Metals



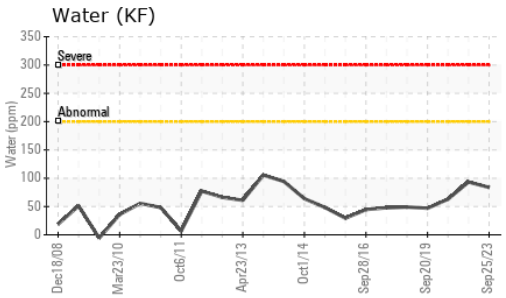

Particle Count



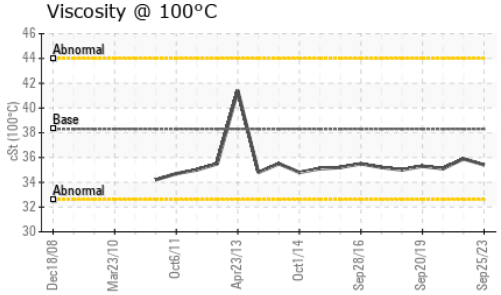

Acid Number




Water (KF)




Viscosity @ 100°C

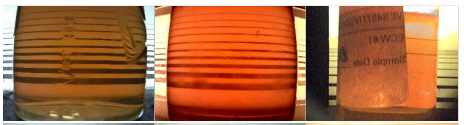



| FLUID CLEANLINESS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Particles >4µm | | ASTM D7647 | | **7580** | 7620 | 8351 |
| Particles >6µm | | ASTM D7647 | >10000 | **2863** | 2553 | 530 |
| Particles >14µm | | ASTM D7647 | >1300 | **298** | 308 | 23 |
| 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 DEGRADATION | | 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 |

| 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 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 |

| 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.** : WC0835228 **Received** : 20 Oct 2023 1417 NW Everett Street
**Lab Number** : 02590760 **Diagnosed** : 23 Oct 2023 Portland, OR
**Unique Number** : 5659826 **Diagnostician** : Bill Quesnel US 97209
**Test Package** : IND 2 ( Additional Tests: FT-IR, KF, KV100, PQ, 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